PAJANTI LTD

11 August 2023

259 ALFORD FOREST ROAD, ASHBURTON

Infrastructure Servicing Feasibility Report

environmental
CONSULTING CIVIL ENGINEERS

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1 Introduction

This report details the infrastructure servicing feasibility for a proposed Plan Change to rezone the site from Residential D to Residential C under the Ashburton District Plan. If the Plan Change is approved, this will result in a residential subdivision located at 259 Alford Forest Road, Ashburton. The proposed subdivision consists of nine lots zoned residential C, as shown in the Concept Scheme Plan in Figure 1.

The proposed subdivision area comprises eight existing lots with the legal descriptions Lots 14, 16, 17, 31, 34, 35, and 36 DP 864, and Lot 1 DP 41503.

Figure 1: Preliminary Layout Plan

The site is bounded by Alford Forest Road to the north east, with Residential D properties to the north, west, and south. There are existing houses to the north and south. The site is currently zoned Residential D and contains one existing house accessed from Alford Forest Road. This house is to remain as proposed Lot 3 with new access from the right of way (RoW) as shown in Figure 1.

The site has a reasonable grade, dropping approximately 1.5 m from the back of site towards Alford Forest Road. The Ashburton River North Branch is located approximately 300 m west of the site.

Nearby bore logs from Canterbury Maps show the site is underlain by ‘claybound gravel’ over most of the site up to 6 m deep, although based on knowledge of reported bore logs, this layer is likely to be silty gravel.

1.1 Surface Water

There are no existing surface water bodies within the site boundary. Surface water bodies within the surrounding area comprise of a drain and the Ashburton River North Branch. The drain that feeds into the Ashburton River North Branch is approximately 140 m north of site.

1.2 Site Contamination

There is no information available on Environment Canterbury’s (ECan) Listed Land Use Register (LLUR) and as far as we are aware no HAIL reports such as preliminary or detailed site investigations (PSI and DSI) have been prepared.

2 Stormwater and Flooding

There are three ways stormwater discharges can be authorised for a development in Ashburton:

1. *If it complies with a rule in the Canterbury Land and Water Regional Plan to make it a permitted activity.* It does not comply because the stormwater discharge will serve more than five lots.
2. *If it falls within the zone which covers Ashburton District Council's (ADC) global stormwater consent, meeting all applicable rules.*
3. *With a site-specific stormwater discharge consent from Environment Canterbury.*

This section focusses on on-site stormwater discharge feasibility in accordance with ADC's global consent shown as Option 2 above, including first flush treatment.

2.1 Design Restraints

The two main design constraints for stormwater treatment and discharge are underlying soils and depth to groundwater. If the underlying soil is gravel and there is sufficient depth to groundwater, stormwater runoff can be discharge to ground via a soakhole.

There many nearby wells from which bore logs and water levels can be assessed; a map of these wells is shown below in Figure 2. As previously mentioned, a nearby bore log (15 m north of site – K37/2330) demonstrates that the site has silty gravel up to 6 m deep, with varying gravel types beyond this depth (Figure 3). Well K37/0392 (130 m north-west of site – closer to both nearby surface water bodies) has eight years of water level readings from 1974 to 1982 and it is the only nearby (former) ECan monitoring well (Figure 4). The high groundwater level in this time was 108.994 m (converted to NZVD2016). The levels on site range from approximately 111.7 m to 113.2 m. There are two more nearby wells with time-varying water levels. One well from the 70s (K37/1411) suggests higher water levels, whilst another well from the 2000s (K37/0433) suggest much lower water levels. Therefore, we conservatively estimate that the seasonal high groundwater level is 109.0 m.

Figure 2 A map of nearby wells

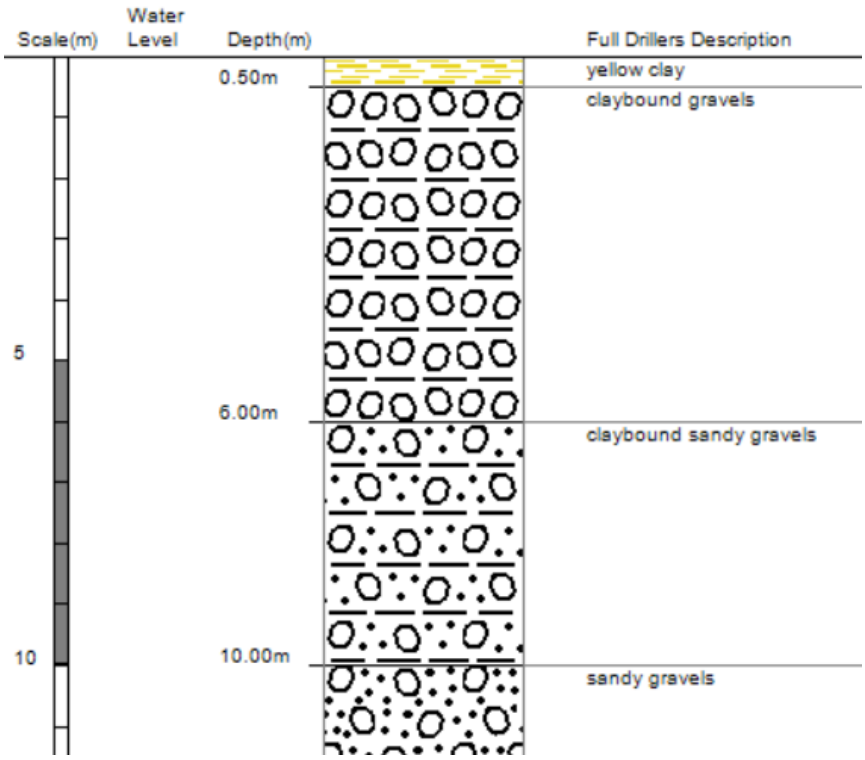

Figure 3 Bore log from a nearby well (K37/2330)

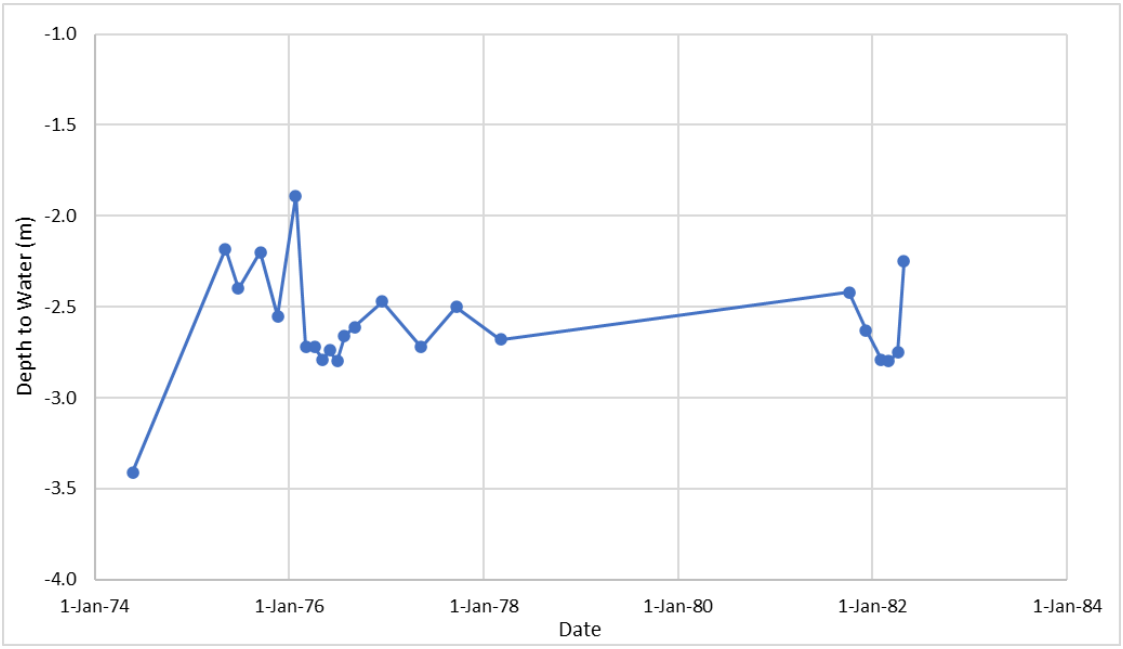

Figure 4 Depth to water graph from former ECan monitoring well (K37/0392)

Assuming the RoW discharge for treatment occurs at the lowest site elevation, there is 2.7 m of separation to the seasonal high water table. Leaving 0.5 m separation between the seasonal high water table and lowest discharge point of a soakhole provides 2.2 m to construct a soakhole which discharges stormwater to ground. We consider this to be feasible.

A breakdown of the proposed areas for first flush runoff[1] is shown below in Table 1. We have assumed that Lots 1, 8, and 9 will discharge to the new kerb upgrade in Alford Forest Road, and each of the remaining six lots will have a roof area of approximately 250 m^2 and a hardstand area of 30 m^2. We have also assumed the full 902 m^2 right of way area will be entirely hardstand.

Table 1 Runoff areas and coefficients

	Area (m^2)	**C**	**C*A**
Right of way	902	0.85	767
Hardstand	180	0.85	153
Greenfield	4,876	0.3	1,463
Total (average)	**5,958**	**(0.40)**	**2,383**

With a runoff area of 5,958 m^2 and an average runoff coefficient of 0.40, the first flush rainfall depth of 18 mm results in a first flush volume of 42.9 m^3. A long, thin infiltration basin in the shape of a swale along the southern boundary of the proposed right of way (88 m long) would require a cross-sectional area of 0.49 m^2 to store the 42.9 m^3 first flush volume. A cross-section with a base width of 0.8 m, and 1:3 side slopes up to a depth of 0.3 m results in an overall width of 2.6 m and a cross-sectional area of 0.51 m^2. Therefore, a cross-sectional area of 0.49 m^2 is feasible.

Any volume exceeding this value will flow to a soakhole designed to treat a 2% AEP + climate change event. Any flow beyond the 2% AEP event will overflow down the RoW towards Alford Forest Road and continue down the kerb and channel. First flush volumes contained within the infiltration basin will discharge to ground at a design rate between 20 to 100 mm/hr, ensuring underlying soils below the design infiltration media exceed this soakage rate. Although this will not necessarily be the final first flush and stormwater discharge design for the proposed subdivision, its proves that on-site discharge with full first flush treatment is feasible.

[1] The 'first flush' is the initial surface runoff of a single rainfall event. Runoff from the first 18 mm of rainfall in Ashburton contains higher contaminant concentrations and requires treatment, whereas the runoff after the first flush event is considered cleaner and therefore does not require treatment.

3 Roading

There is an approximate 4.8 m offset between the property boundary and the edge of the existing grass berm. There is approximately 6.4 m from the property boundary to the existing roading corridor, shown below in Figure 5. This means there is enough space for a frontage to be upgraded to match the cross-section at the southern boundary.

The road falls approximately 450 mm over the 80 m boundary along Alford Forest Road. The entrance to the right of way will be designed so that water along the kerb and channel will continue to flow in the existing southward direction.

Figure 5 Street view of roading existing frontage layout on-site and south of site

4 Wastewater

The current wastewater reticulation network terminates at the intersection of Alford Forest Road and Farm Road with a manhole, with a depth to invert of 1.85 m. The 150 mm main will need to be extended to enable servicing for all lots via gravity.

The only design constraint for feasibility of wastewater reticulation is cover depth for gravity pipes on all lots. There should be a minimum cover of 500 mm, ideally 800 mm. A conservative minimum requirement for 150 mm pipe grading is 1:160, and the minimum requirement for 100 mm pipe grading is 1:80. Figure *6* below shows the proposed wastewater reticulation to be added within Alford Forest Road. Using the LiDAR difference of 900 mm between the existing manhole and the western edge of Lot 5, with 108 m of 1:160 grade, and 90 m of 1:80 grade, there is 800 mm of cover at the western corner of Lot 5.

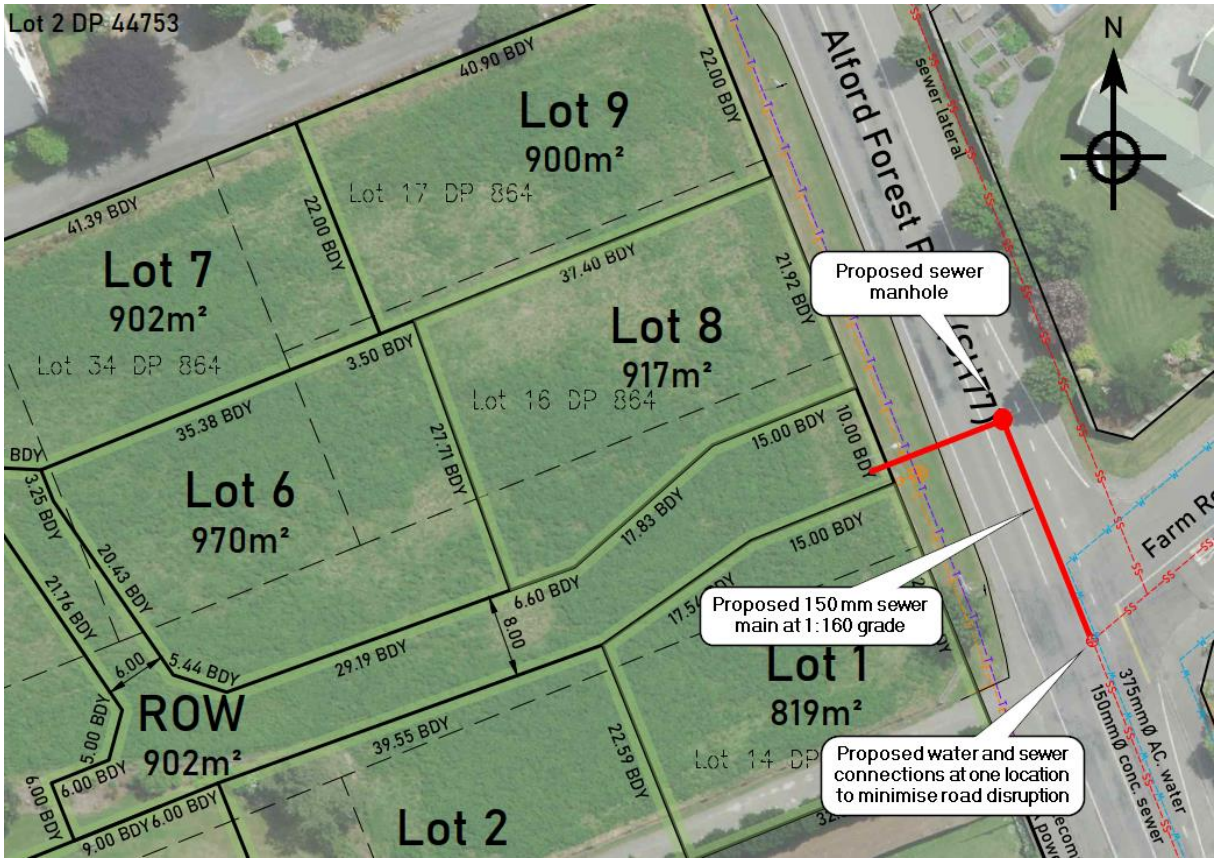

Figure 6 *Proposed sewer and water mains layout (Fox and Associates drawing with e2 markup)*

5 Water Supply

The existing water main runs from Farm Road, through the intersection, and down towards the south of Alford Forest Road. After discussion with ADC (Z. van der Westhuizen, personal communication, 27/07/2023), it was agreed the best location to connect a 100 mm ridermain would also be at the intersection of Alford Forest Rd and Farm Rd because this location will already require traffic control to connect to the existing sewer. Figure *7* and Figure *8* below show sketches of the proposed connection location. The connection will be perpendicular to the road and extend beyond the existing services, so the frontage connection will not require the ridermain to cross the existing services multiple times. The 100 mm ridermain will extend to Lot 9 so that all individual frontage connections are possible, whilst enabling future connections to the north. The ridermain will also extend into the back end of the right of way to enable connection to all proposed lots.

A fire hydrant will need to be added at the end of the 100 mm ridermain. There must be a maximum distance of 135 m to reach the entrance of the furthest lot (Lot 5). There is 125 m from the RoW entrance to the middle of Lot 5. Therefore, it is possible that the hydrant be located at the RoW entrance, with only a 50 mm ridermain extending into the RoW with 20 mm laterals to connect water supply to each lot.

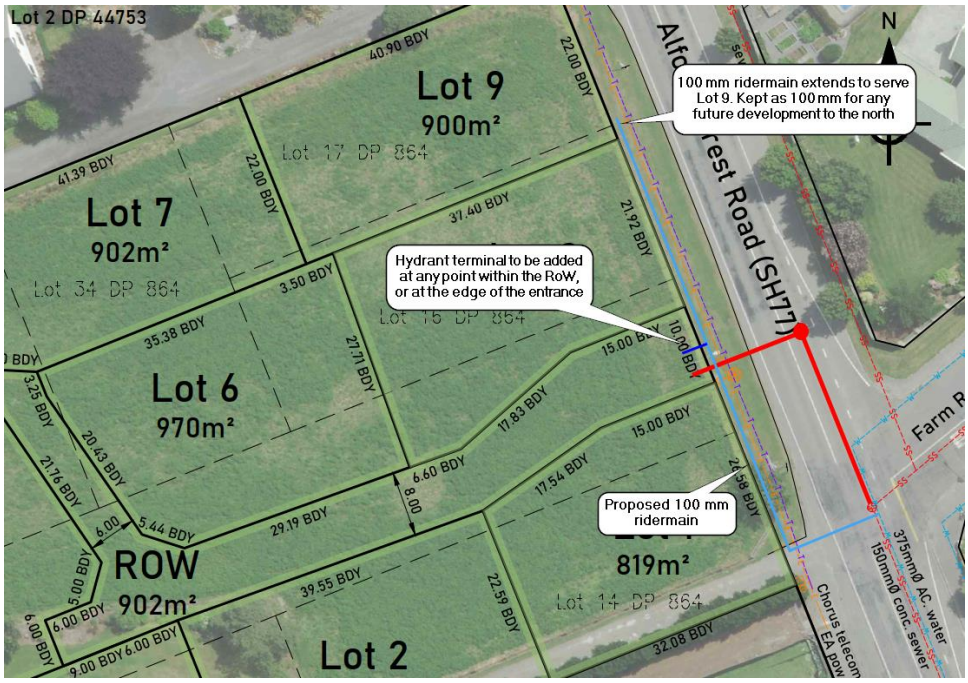

Figure 7 Water servicing (blue line) along road frontage of 259 Alford Forest Road

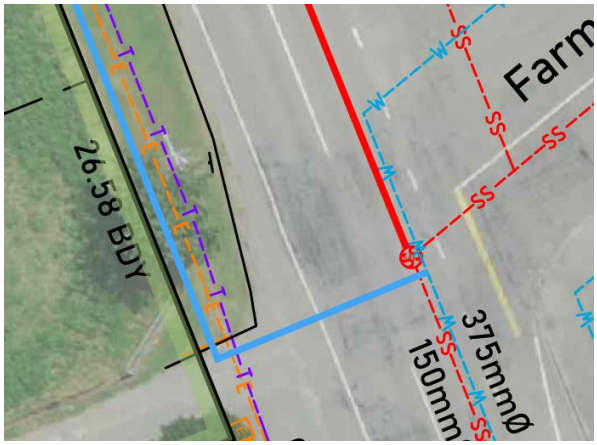

Figure 8 Enlargement of connection to the existing water main (blue line)