

Whisky Creek

Service Assessment

02/05/2022

This document was prepared by Palmerston North City Council, Three Waters Activities Division.

| | Name | Signature | Date |
|-------------------------------|---|--|------------|
| Prepared by: | Jaques Mik – Activities Manager Three Waters |  | 02/05/2022 |
| Reviewed by: | Eng Lim – Asset Information Analyst – Three Waters |  | 02/05/2022 |
| Approved for Issue by: | Mike Monaghan – Group Manager Three Waters |  | 04/05/2022 |

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Scope

This water and wastewater service assessment provides engineering information that underpins the Proposed Whiskey Creek Private Plan Change. This Plan change aims to transition the current rural zoning to residential and to unlock housing supply for the long-term growth of Palmerston North city.

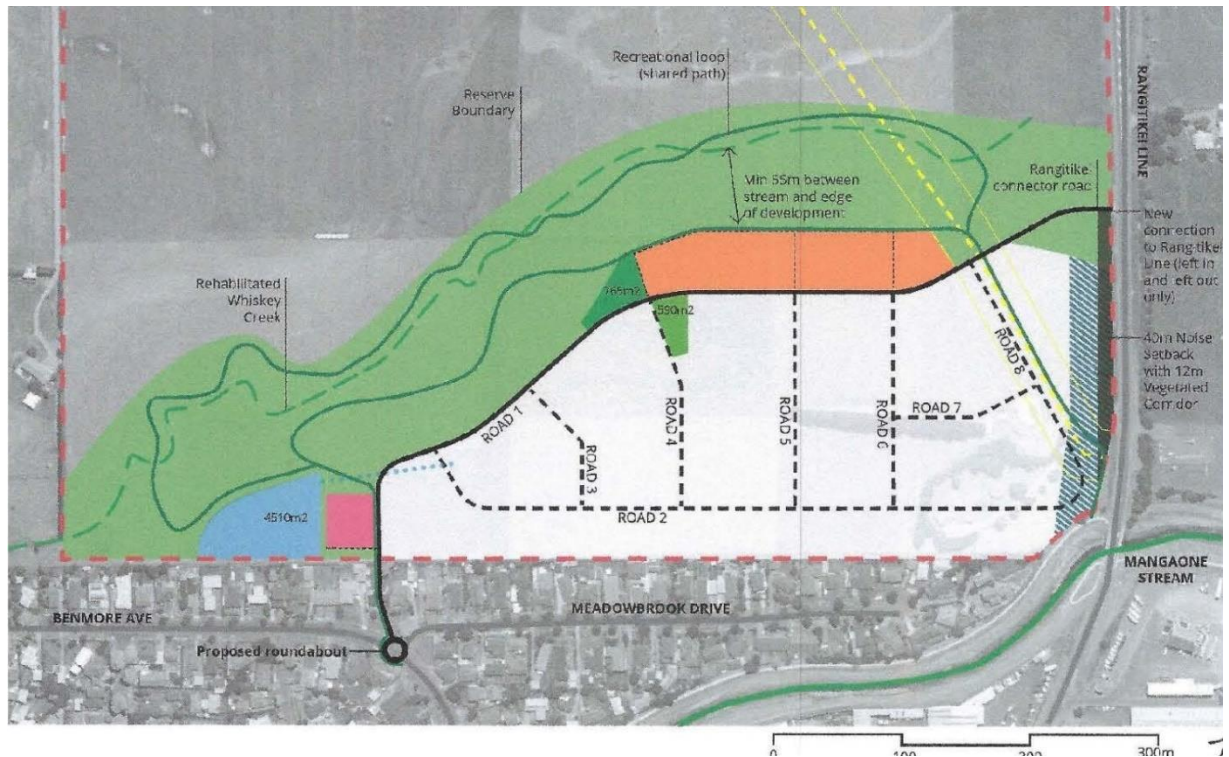


Figure 1. Study area

Yield studies on the proposed area (i.e. Whiskey Creek) have been done and estimated that there could be 136 conventional lots, 21 multi-unit housing lots and 1 mixed use lot, which equates to 158 lots for development. Layout of the proposed plan change can be seen in Figure 2 below.



Figure 2. Yield study

1 Wastewater

1.1 Existing network

The existing wastewater network in the area has a 150mm main located within Benmore Avenue to the south (bottom end) of proposed plan change indicated with the red line. This sewer main flows to the south west and joins the 525mm trunk main that discharges to the Maxwells Line pump station, and eventually discharges at the Wastewater Treatment Plant in Totara Road, some 5km away. The depth of the wastewater system adjacent the proposed roundabout, is in the order of 2 metres deep.



Figure 3. Existing Network

1.2 Current Wastewater services

As indicated by figure 3, the proposed plan change area would connect at the proposed roundabout in Benmore avenue. The 150mm sewer main from Benmore avenue (red line) connects to the 525mm trunk main. Although there are no immediate hydraulic concerns in Benmore Avenue area, with connecting the proposed plan change area to the network, the trunk main capacity becomes a more critical component downstream where wet weather surcharges can happen in extreme events.

1.3 Proposed Network

Two options have been investigated to service this proposed area, i.e. gravity network and a pressure sewer network. Due to the proposed ground levels of the land in question, it was calculated that there would not be elevation for a gravity system to drain the site without the need for a pump station. It was also considered that any gravity system could increase the peak flow effects on the downstream network, due to the users discharging sewage at peak times.

The pressure sewer system would be able to service the entire development without the need for a new pump station. The individual on property pump systems can be time coordinated so that the discharge from the properties can be timed to occur outside peak flow hours, which would not cause any downstream capacity issues. It can also be used for storage in storm events, which helps with the flow control in potential high flow events. Pressure sewer systems are also less susceptible to the effects of stormwater infiltration, liquefaction and ground movement.

A pressure sewer network has lesser impact on the existing network downstream. A gravity network requirement is calculated below for the average dry weather flow (ADWF).

Number of lots = 158

Average daily discharge = 250l/day/person

Average number of occupants per household = 2.9

Daily demand on the network = 114,550l/day (1.33l/s)

The big difference comes in when the Wet weather allowances are made to determine the average wet weather flows (AWWF). For gravity networks the Engineering Standards for Land Development requires a factor of 4, which means the network should be designed to cater for $1.33\text{l/s} \times 4 = 5.32\text{ l/s}$. A pressure sewer network requires a wet weather peaking factor of 1.2, which results in an impact of $1.33\text{l/s} \times 1.2 = 1.6\text{l/s}$

In a network that already has wet weather limitations, it is preferred that a pressure sewer system is utilised. The proposed Whisky Creek development must be designated as a Pressure sewer area in the District Plan, as highlighted in yellow in the map in figure 4.

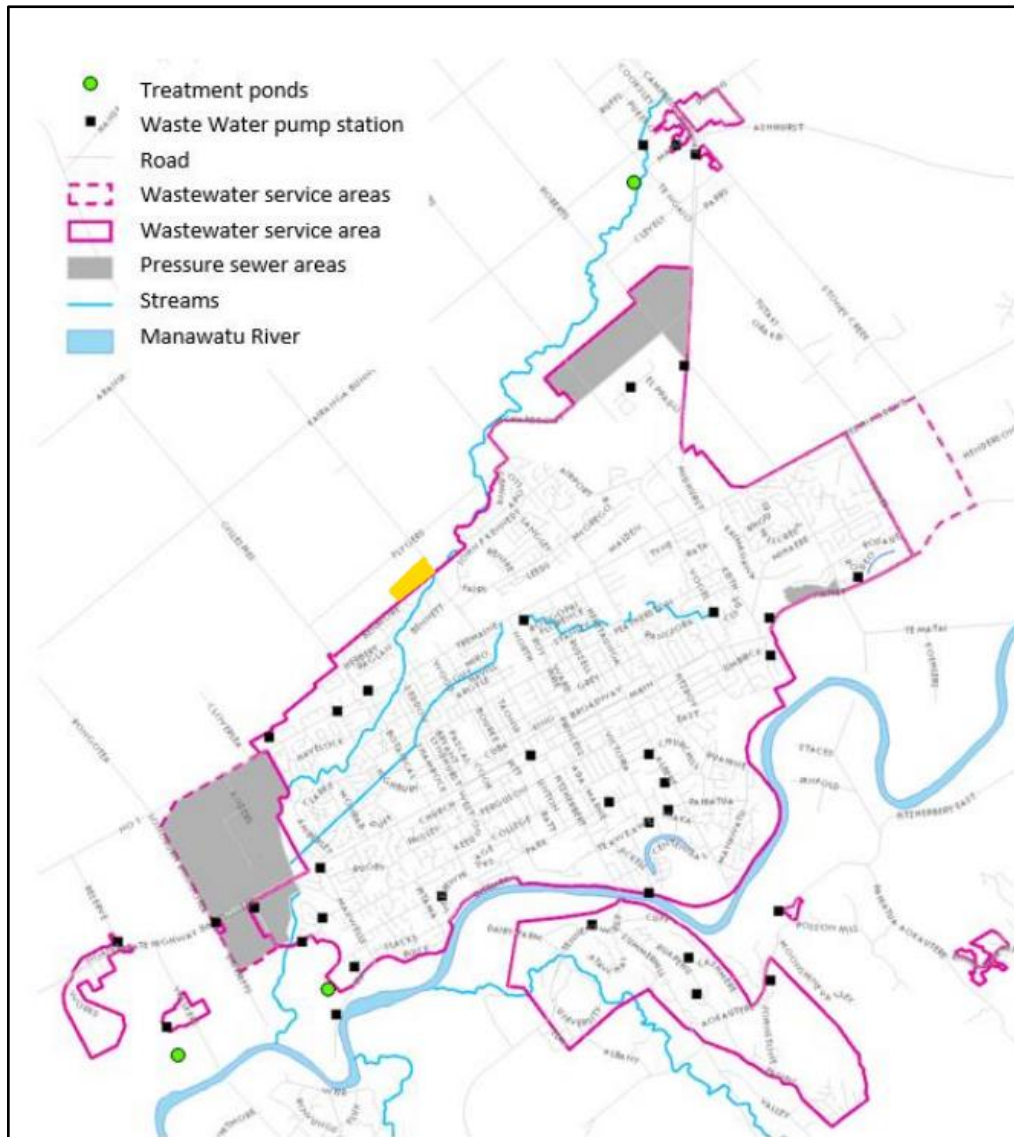


Figure 4. Pressure sewer system areas in current District Plan

1.4 Funding

No budget provisions have been made for this Growth area in the 2021/31 long term plan. There are no immediate requirements to include a request for additional funding in the Long-Term Plan. The pressure sewer network will be developer funded and the on-property pressure sewer systems would be privately owned.

2 Water Supply

2.1 Existing Network

The study area is adjacent to the Palmerston North Water Supply area. The primary source for the supply in Palmerston North is the Turitea Water Treatment Plant, which treats raw water from the Turitea Dams. This surface water supply is located on the southern side of the Manawatū River and supplies the city via trunk mains crossing the Fitzherbert Bridge. It is supplemented by bores on the northern side of the Manawatū River which activate during periods of high demand to maintain pressure.

Benmore Avenue is currently supplied mainly from a single 225 mm diameter concrete-lined steel (CLS) water main which crosses the railway line on Rangitikei Line. This main distributes water to Bennett street via a 225mm CLS water main, where the main then feeds two 150mm Asbestos cement (AC) mains on both sides of Benmore avenue. Two other pipelines that supply across the railway line are further away at Gillespie's Line (300mm CLS) and at Milson Line (225mm CLS). On Rangitikei Line, the council water supply stops just before the Mangaone stream. The last section of the main is a 150mm AC main. The Palmerston North water supply area does not extend north of the Mangaone stream, east of Rangitikei Line.

2.2 Demand

2.2.1 Current

Currently, the area supplied North of the railway line (via the 225mm CLS main) contains several commercial industries as well as residential properties. The overall character of the study area is such that the sizing of water mains will be to achieve the desired levels of service for firefighting water supply.

With the current water supply, there is an existing deficiency in the network. Levels of service for pressure drops to about 32m¹ for the summer peak day, evening peak demand in the current investigation area (Meadowbrook drive). The whole area North of the railway line relies heavily on the single 225mm CLS watermain and it is already under capacity. Levels of service for firefighting are also not achieved with the current infrastructure during the summer peak evening demand period. Since the summer evening peak pressure can drop below 35m, the FW3 fire flow requirement of 50L/s is not achieved for industrial and commercial areas during those periods. The summer peak day evening demand scenario is mainly due to watering of gardens which is very dependent on weather conditions. Typically, these peak demand days occurs less than 10 days in a year. Outside these high evening demand periods, levels of service for pressure (35m)² and fire flows (FW2 - 25 L/s for residential and FW3 - 50 L/s for Commercial/Industrial) for the surrounding areas, are typically met, including summer morning peak demand periods.

¹ Pressure – 10m = 100kPa

² Palmerston North City Council Level of service – 35m = 350Kpa

2.2.2 Future

Future demand was calculated based on the development scenario outlined in the scope above. Assumptions used in this exercise, from the PNCC Engineering Standards for Land Development, were:

- Average day demand = 290 L/person
- Household occupancy = 2.8 people/dwelling
- for 158 lots, demand = 128,296 L/day
- Peak Day Demand (over a 12-month period) = Average Day Demand x Peaking factor
- PF = 2 for populations below 2,000 people
- Peak Day Demand = 256,592 L/day (2.97 L/s)

2.3 Servicing assessment

2.3.1 Background

Water network modelling was carried out internally by PNCC. Scenarios were run based on knowledge of the current network, with additional reticulation and water demand added for the growth study areas as per the scope above. Modelling was done, assuming that there would be a ring main feed, where one main connects in Benmore Avenue, and the second to an extension of the Rangitikei line main as can be seen in figure 5.

2.3.2 Capacity

There is adequate supply from the Palmerston North Water supply under normal day demand to enable this development. As indicated in section 2.2.1, there are existing deficiencies in the network that may result in pressure drops (32m) and flows (Fire flows) dropping below the requirements for levels of service during the summer evening peak demand periods.

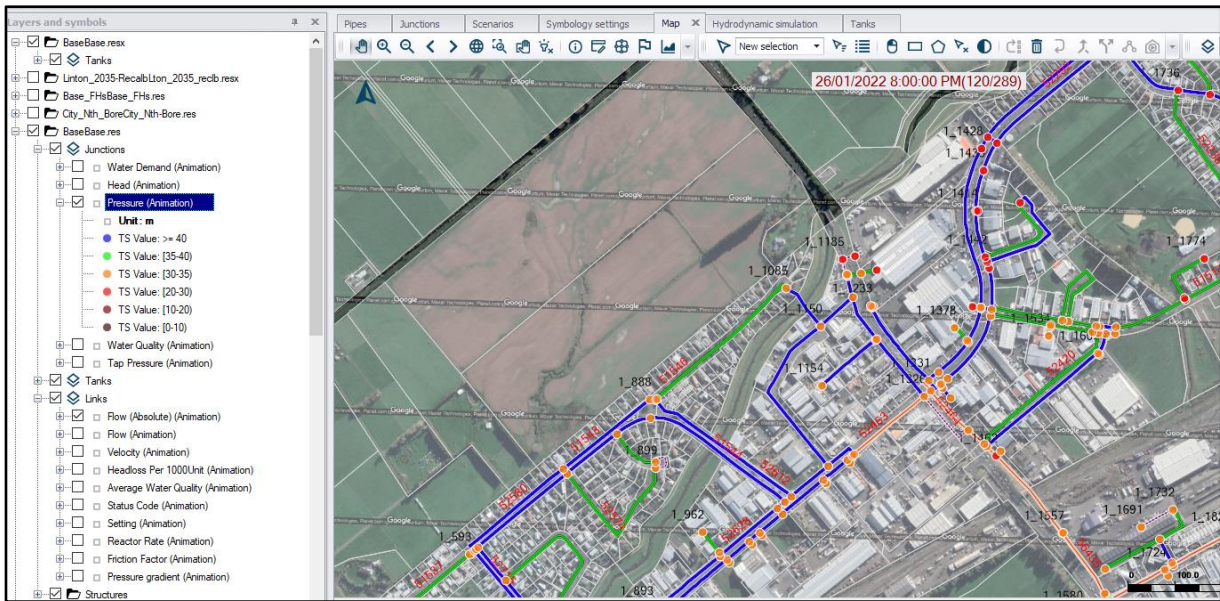


Figure 5. Existing Pressure level of service

2.3.3 Modelling Results

Modelling showed that:

1. The PNCC level of service for pressure of 35m at lot boundaries would be achieved for each of the 158 proposed lots during normal day demand. As indicated, on certain summer peak evenings, the demand peak pressure of 35m would not be achieved. The proposed development does put some additional strain on the network. Currently, the summer peak demand evening pressure can drop to 32m. With the proposed Whisky Creek development modelled into the network, the pressure can drop to 28m.
2. The PNCC level of service for firefighting for residential properties, which is FW2, would not be met during some evenings of the summer peak demand, as well as FW3 for industrial and commercial properties during the same periods.
3. It is paramount to emphasize that PNCC cannot achieve certain pressure levels of service during certain times of the peak periods, but would still be able to maintain around 28m of head, but not 35m as required by current levels of service, as can be seen in figure 5 below. The required levels of service as stipulated in the PNCC Engineering Standards for Land Development requires the minimum design pressure (at peak flow rate) at the point of supply to be 35m. The minimum water demand for firefighting is also stipulated in the Engineering Standards and needs to comply to SNZ PAS 4509 for residential and commercial properties, which it does not comply to on certain days of the year in peak summer evening demand.

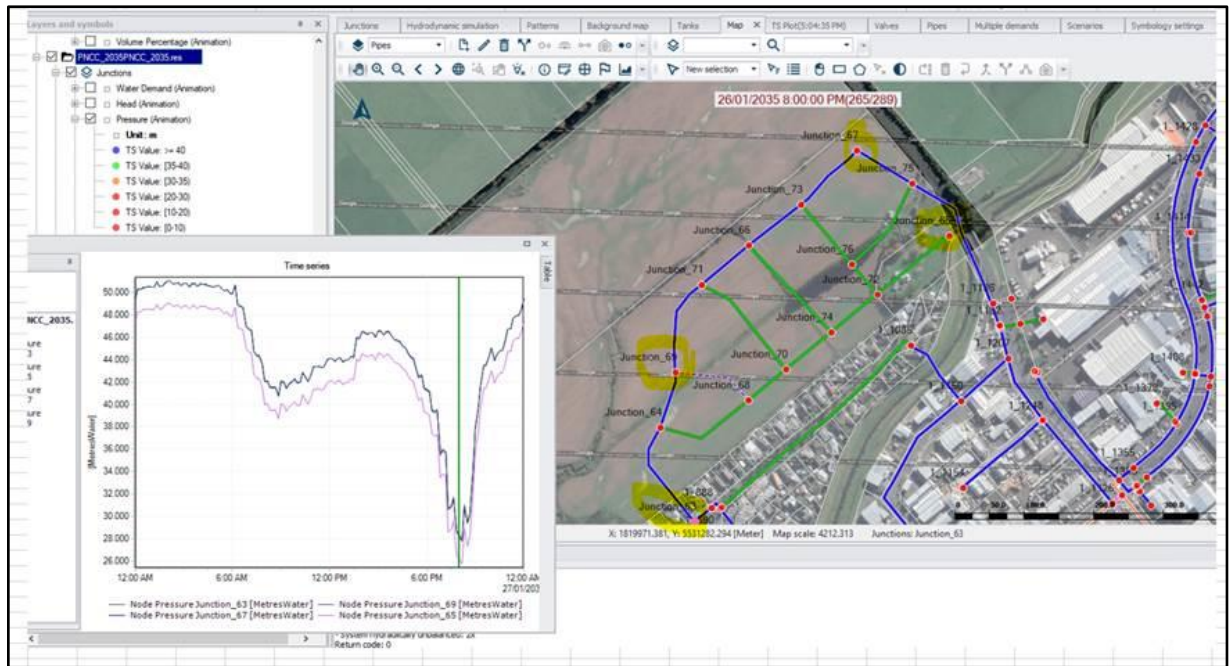


Figure 6. Predicted Levels of service for pressure

4. Further modelling was done to determine whether improvements can be done in the network to improve the levels of service north of the railway line. Duplication of the 225mm diameter watermain on Rangitikei Line from Tremaine Avenue to Bennett St would enable FW2 fire requirements (25 L/s) to be met at Whiskey Creek development during summer peak evening demand periods. However, this network upgrade alone is insufficient to address the 35m level of service pressure deficiency for Whiskey Creek development and the surrounding areas during Summer peak days evening demand. It is also inadequate to resolve the existing deficiency in FW3 (50 L/s) fire flows in the nearby industrial areas during summer evening peak demand.

5. A pressure booster pump could also be installed to ensure the pressure levels of service can be met in the proposed development area, but as highlighted in point 4 that by installing a pressure pump and duplicating the main on Rangitikei line, FW3 fire flows would still not be achieved.

6. There are existing Long-Term Plan programmes to supplement capacity in the northeast of Palmerston North (currently programmed from 2025-2028). Depending on the location and urgency of development needs at the time, this could be repurposed slightly and brought forward to assist in this area.

7. Level of service deficiencies must be addressed prior to development to ensure that summer peak demand needs can be safely met. This would mean deficiencies be addressed first to ensure compliance to our current standards during the summer peak demand periods. This would mean that the planning, investigation, consenting and construction of a new water supply source North of the railway line would have to be done first before construction of the development commences. It is anticipated that, providing budget is available, an updated Water Supply Development Plan will be produced in the 2022 calendar year. The need for growth and reinforcement in this area will be part of that plan, which will inform our next Asset Management Plan and Long-Term Plan. A realistic timeframe to identify a suitable location for

a new bore, drill an exploratory bore, test, then drill a production bore and construct the ancillary equipment to bring it into service would be 3-5 years.

2.4 Funding

As mentioned above, there are existing Long-Term Plan programmes to supplement capacity in the northeast of Palmerston North (currently programmed from 2025-2028). Depending on the location and urgency of development needs at the time, this could be repurposed slightly and brought forward to assist in this area. This investigation has identified some previously unknown existing Levels of Service issues for the broader catchment which will need to be addressed sooner than development is likely to proceed. Should the Whisky Creek plan change be approved, allowance will be made to also address growth needs for Whisky Creek. Given the short-term needs of the city for housing, a programme will be included in the early stages of the next long-term plan.

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