



Preliminary Water & Sewer Servicing Report for proposed development of Kooyong Park, Moama

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PRELIMINARY WATER & SEWER SERVICING REPORT FOR PROPOSED DEVELOPMENT OF KOOYONG PARK, MOAMA

dkph12002

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1 Introduction

The subject land is located on the eastern edge of Moama and covers approximately 46 ha bounded by Moama St to the west, Holmes St to the south and Old Deniliquin Rd to the east. Perpetual Green Developments Pty Ltd proposes the development of a 198 lot subdivision (Stage 2) with lots varying in size from approx 500m² to 2300m². Stage 1 of the development consisted of 15 lots in the south west corner of the site.

Although town water and sewerage infrastructure is available on properties adjacent to the site, this report investigates the infrastructure requirements and upgrades that are necessary to provide both potable water and sewerage services to the development.

2 Potable Water Supply

2.1 General

It is proposed that a reticulated potable water supply be provided to each property within the development connected to the existing town supply. A potable water supply will also be provided to the proposed restaurant and function centre off Holmes Street.

2.2 Potable Water Demand

Potable water demand has been calculated for the full proposed development of Kooyong Park based in part on demands assumed in the "Moama Filtered Water Supply Strategy" prepared for Murray Shire by EarthTech in 2006.

In the 2006 report the average daily demand per property was assessed as 520 L/d and this is adopted as the base demand per property for this report.

The filtered water strategy also noted that at the time of writing the peak day demand on the Moama filtered water system was approximately 2.5 times the average day demand.

This peak is however exaggerated by the higher occupancy rates for dwellings and other accommodation such as caravan parks which occurs during the summer peaks and is not reflective of the increase in potable water demand for permanently occupied dwellings.

For the purpose of this report a peak day factor of 1.5 is adopted. This figure is still a conservative estimate and could in practice be as low as 1.1.

Peak day demand for the whole development is therefore estimated to be 169,140 L/d (say 170kL/d or 2L/s) with approximately 160kL of this being for Stage 2.

Peak demand for a potable only water supply network usually occurs in the morning between 7:00am and 9:00am with a later generally smaller peak occurring between 6:00pm and 8:00pm.

For the purpose of this report the peak demand rate is assumed to be 2.0 times peak day demand.

Peak instantaneous demand rate is therefore assumed to be 3.82 L/s for Stage 2 or 4.0 L/s for the full development.

Table 1 provides a summary of the demands adopted for the purpose of this report.

Description	Stage 1 (15 lots)	Stage 2 (198 lots)	Total (213 lots)
Average Daily Demand / lot	520 L	520 L	-
Average Daily Demand/Stage	7,800 L	104,960 L (1.21 L/s)*	112,760 L (1.33 L/s)*
Peak Day Demand/Stage	11,700 L (0.14 L/s)	157,440 (1.82 L/s)	169,140 L (1.96 L/s)
Peak Demand	(0.27 L/s)	3.64 L/s	3.92 L/s

* includes 2,000 L/d for proposed restaurant

Table 1 – Potable Water Demand

2.3 Town Reticulation Supply Capacity & Augmentation

Council have previously confirmed that sufficient supply is available from the existing potable water supply network to provide for the initial 15 lot development proposed in the south west corner of the property. It is proposed that this initial development be connected to the existing town supply via approximately 600m of 100mm diameter water main to be constructed from the corner of Holmes Street and Murray Street (refer Figure 1).

Murray Shire advises however that the existing potable water supply network has limited capacity and is currently unable to meet the instantaneous demands of the ultimate proposed subdivision.

It will therefore be necessary to provide a balancing storage on site to enable water to be stored and fed back into the local Kooyong Park reticulation during times of high demand.

Council have undertaken modelling of the filtered water reticulation network to determine its capacity or otherwise to supply water to the Stage 2 balancing storage.

This modelling has demonstrated that even at the peak hour of the peak demand day the effect on pressures to the south east of the network is minimal.

The Shire have modelled a number of augmentation scenarios ranging from the base case of merely extending the 100mm main installed to service Stage 1 by approximately 650m (refer Figure 2) to the location of the proposed storage, through to that extension plus the upgrading of approximately 1480 metres of 50mm diameter water main to 100mm diameter in Shaw St and within the area bounded by Porter, Meninya, Francis and Blair Streets.

It is noted that the modelling undertaken by Council appears to be based on a demand of 2.67L/s compared to the continuous demand requirement of the Stage 2 development of approximately 2.0 L/s

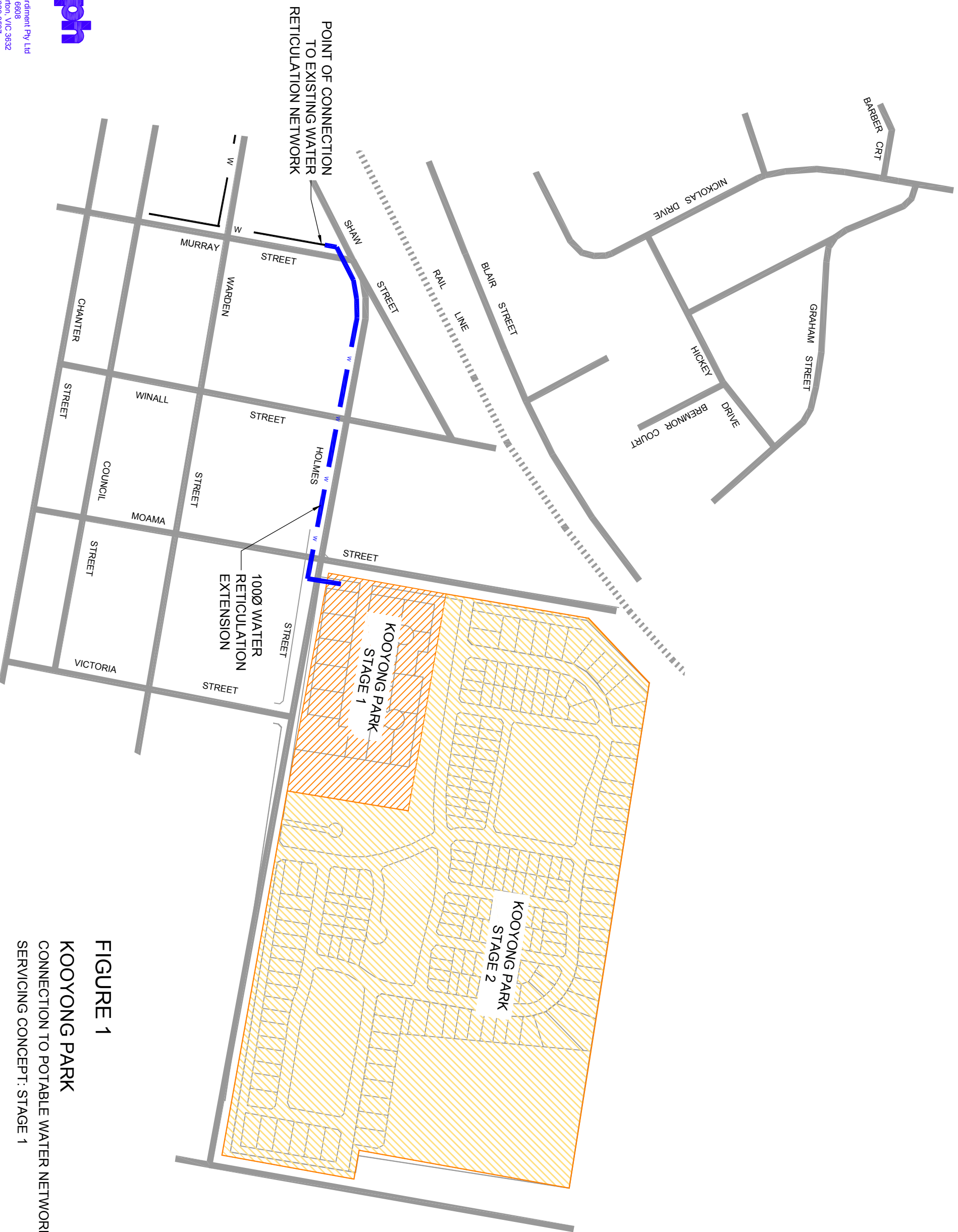
Modelling results provided by Council can be summarised as follows:

- With no augmentation of the system other than that already proposed for Stage 1 the effect of Stage 2 demand on surrounding pressures at peak demand is to reduce them from approx 15.4m to approx 14.1m
- The modelled replacement of approximately 1480 metres of 50mm pipe with 100mm pipe would mean that pressures in the surrounding area would reduce from approx 15.4m to approx 14.7m at peak demand time.

The Shire has expressed a desire to maintain a minimum supply pressure to customers of 15 metres at all times.

Given that even at the peak hour of the peak demand day pressures in the reticulation are only 0.9m below the minimum desirable it is considered that it is feasible to configure the supply system to provide for the peak day demand of Stage 2 while maintaining pressures in the surrounding area above the desired level.

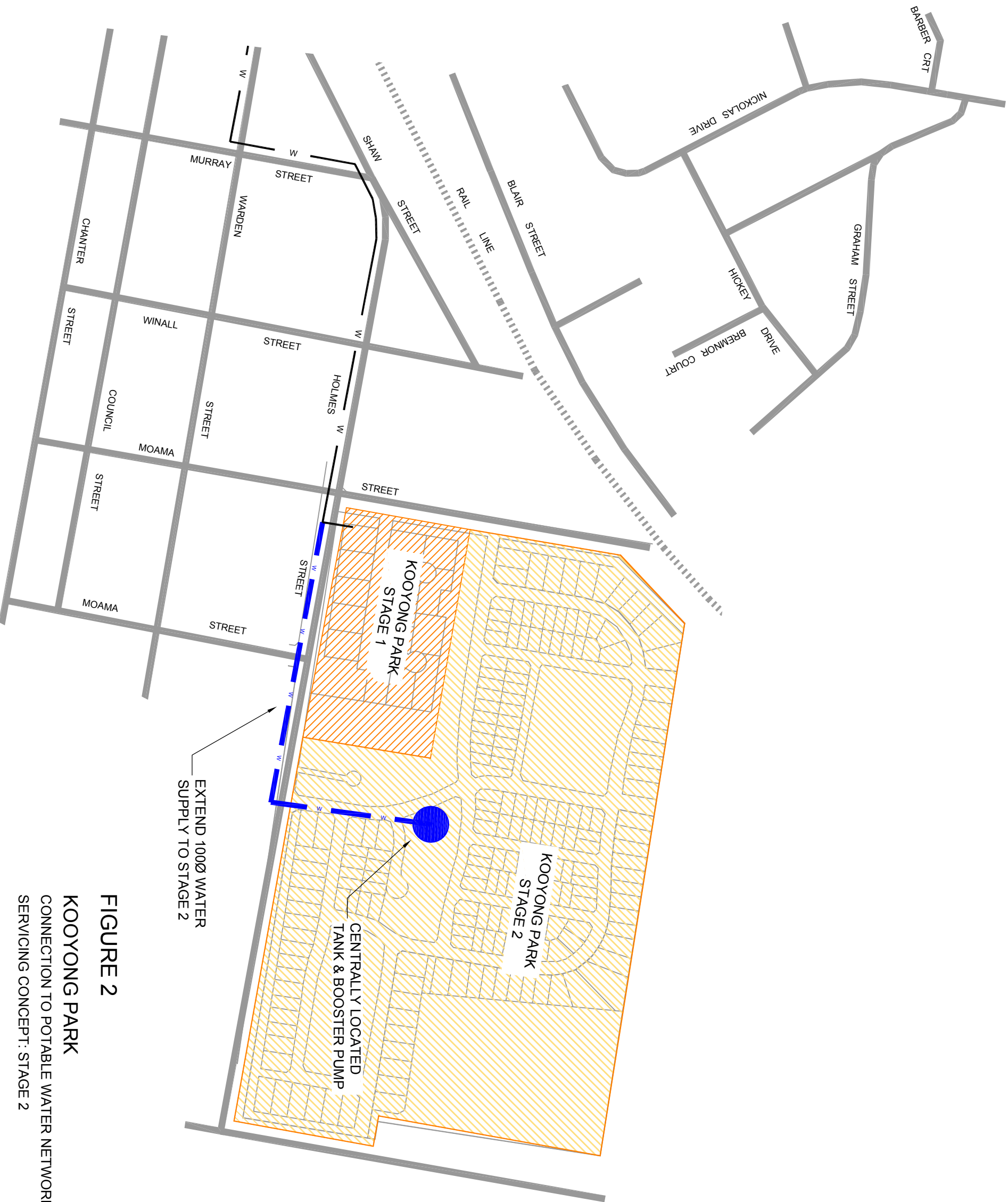
This can be achieved by installation of a pressure sustaining valve at the tank inlet to ensure that pressures upstream of that point never fall below a pre-set minimum level. This may mean that for some period during a peak demand day no flow is permitted to enter the balancing storage. The main requirement however is that over the full 24 hour period the peak day demand of approximately 160kL can be transferred. At times of offpeak demand delivery to the storage will exceed the required rate of 2.0L/s thereby making up the shortfall should pressures drop to such an extent that the tank needs to be isolated.



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FIGURE 1

KOOYONG PARK
CONNECTION TO POTABLE WATER NETWORK
SERVICING CONCEPT: STAGE 1



EXTEND 1000 WATER
SUPPLY TO STAGE 2

CENTRALLY LOCATED
TANK & BOOSTER PUMP

KOORYONG PARK
STAGE 1

KOORYONG PARK
STAGE 2

FIGURE 2

KOORYONG PARK
CONNECTION TO POTABLE WATER NETWORK
SERVICING CONCEPT: STAGE 2



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2.4 On Site Water Supply Works

2.4.1 General

Given that even an augmented town potable reticulation system will only supply water at a peak day rate to lots within Stage 2 it will be necessary for works to be constructed within the Kooyong Park development to cater for diurnal variation in demand throughout the day.

Proposed works include an on ground balancing storage together with a booster pump station.

The location of the facility is not critical but would be most effective located centrally within Stage 2 of the development.

2.4.2 On Site Storage

It is proposed that on site potable water storage be sized to provide the balancing required to cater for diurnal variation in demand in Stage 2 together with the provision of an emergency storage volume in the event of failure of the town reticulation system.

Typically provision of a balancing storage with 8 hours capacity at peak day demand is adequate to cater for the diurnal variation.

It is proposed that an on ground 100kL combined balancing and reserve storage be provided for the proposed development.

The filling rate and control mechanisms will require Council approval to ensure that pressures locally within the existing surrounding reticulation network are not adversely affected. This can be achieved by the installation of a pressure sustaining valve on the inlet of the tank which will maintain pressures upstream of that point above a pre-set minimum.

2.4.3 Pressure Booster

To provide adequate pressures within Stage 2 of Kooyong Park it will be necessary to provide a pressure booster pump set drawing water from the ground level storage tank and delivering to the internal reticulation network.

It is proposed that a booster pump set be installed adjacent to the on ground storage tank and housed in a small building. The sizing and number of pumps to be provided in the booster station will be somewhat dependent upon the rate of development of Stage 2 with additional pumps installed as development progresses.

The booster pump station will be designed to supply up to the expected peak hour demand rate of approximately 4.0 L/s whilst maintaining a residual pressure to Stage 2 consumers of 20m.

2.4.4 Reticulation

A potable reticulation network will be constructed throughout the Kooyong Park development to deliver a potable supply to each property. Whilst the layout is yet to be determined it is proposed to consist of a network of 80mm diameter PVC or PE pipes located within road reserve and open space areas within the subdivision.

As described above, Stage 1 will be supplied by direct connection to the existing potable reticulation network with Stage 2 connected to the discharge of the proposed booster pumping station.

2.4.5 Configuration and Operation

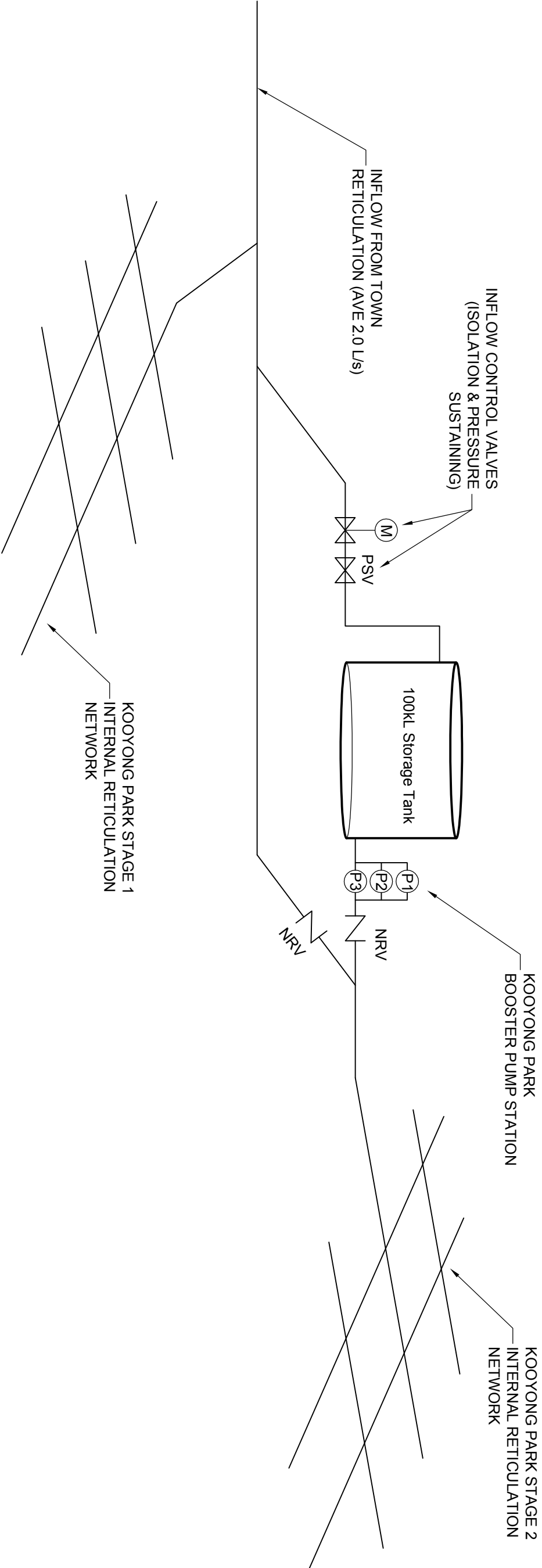
A schematic of a possible arrangement is shown in Figure 3.

With the shown arrangement potable water from the town reticulation network is delivered to the on ground storage and then boosted into the Stage 2 Kooyong Park internal reticulation.

The filling rate of the tank is governed by a pressure sustaining valve on the inlet ensuring that the consumers connected to the town reticulation are not adversely affected by flow into the tank.

An electrically actuated valve on the tank inlet opens and closes as the tank water level varies throughout the day.

On the discharge side a booster pump set, possibly consisting of two or three pumps and pressure tank, delivers water to the Stage 2 Kooyong Park consumers maintaining a consistent pressure over the full range of flows.



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FIGURE 3
KOOYONG PARK
WATER SUPPLY
SCHEMATIC

3 Sewerage

3.1 Sewerage Loads

Sewerage loadings from the proposed development have been calculated based on the methodology described in Appendix B of the Sewerage Code of Australia WSA02-2002.

Based on adoption of typical design figures of 3.5 persons per tenement and an average dry weather flow of 180 L/p/d the resultant discharges are as follows:

Average Dry Weather Flow (ADWF) = 1.55 L/s

Peak Dry Weather Flow (PDWF) = 4.63 L/s

Peak Wet Weather Flow (PWWF) = 9.44 L/s

3.2 Existing Sewerage Network

The existing gravity sewer network in the vicinity of the proposed development is unable to be extended to accept sewage discharged from the proposed development.

It will therefore be necessary to pump from the Kooyong Park development connecting to either the gravity network or directly into an existing sewer rising main.

The closest sewerage pumping station to the proposed development is located near the corner of Council St and Winall St approximately 600m to the south west of Kooyong Park. Council advises that the Council Street Sewer Pump Station has a nominal capacity of approximately 14 L/s and that it has sufficient spare capacity to accept sewage flows from Stage 1 development. The pump station does not however have sufficient capacity to service Stage 2 of Kooyong Park.

The Council Street pump station discharges to a gravity sewer in Hickey Drive via a 150mm diameter rising main. The gravity sewer in turn forms part of the catchment for the Barber Court Sewer Pump Station. Council advises that this pump station has a capacity of approximately 23 L/s.

Council have been unable to provide any advice on the ultimate catchment size or loading on these pump stations or advice on the level of spare capacity available in each.

For the purpose of this report it is assumed that the existing sewer collection network can be augmented to a level where it can accept sewage discharge from the Kooyong Park Stage 2 Development.

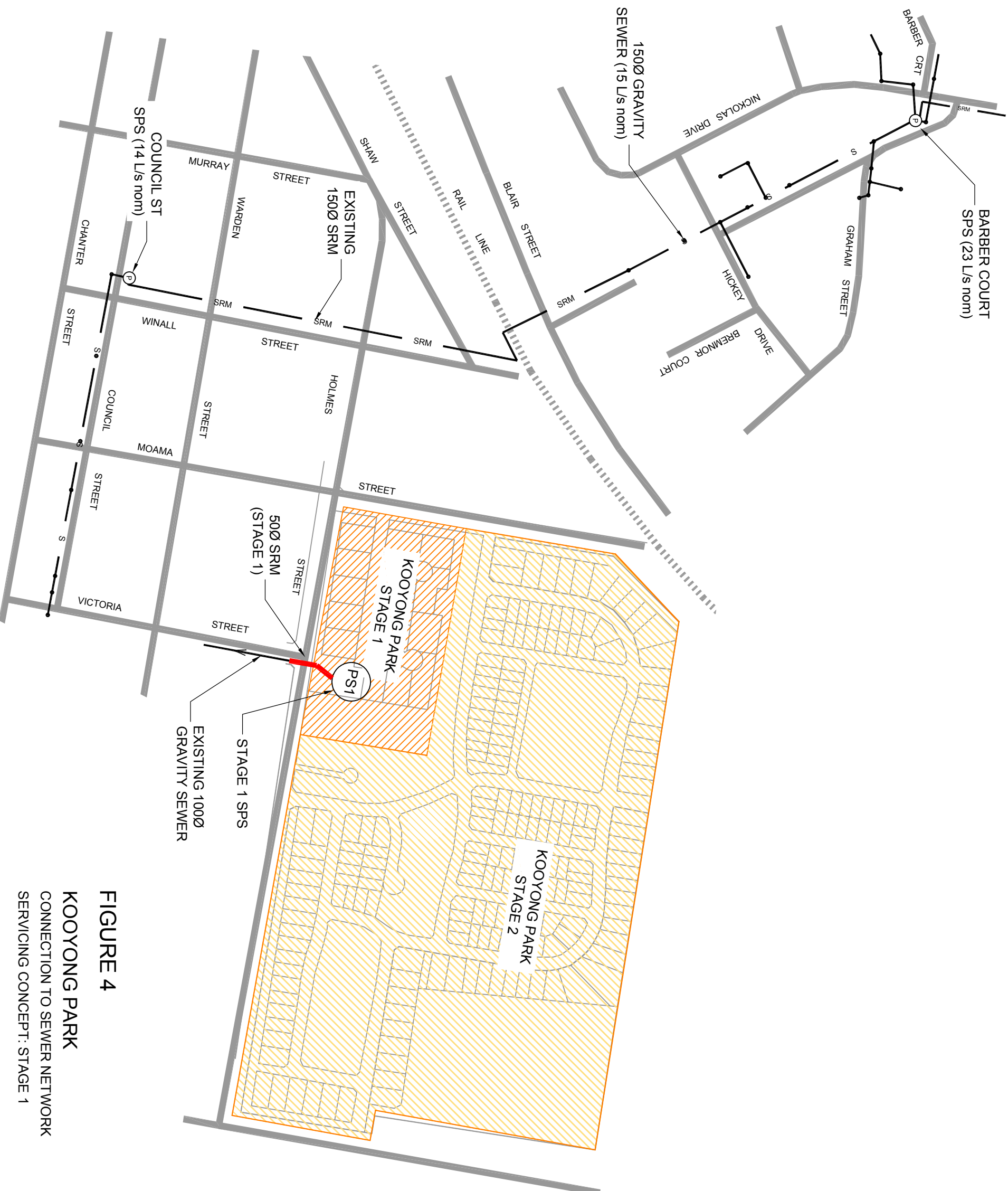
3.3 Existing System Augmentation – Stage 1

Stage 1 development is unable to be connected to the existing sewer network by gravity and it will therefore be necessary to install a sewer pump station and rising main to service the area.

It is proposed that approximately 100m of 50mm diameter sewer rising main be constructed from Stage 1 to connect to the existing Council Street gravity catchment adjacent to the corner of Holmes and Victoria Streets. The rising main will be located wholly within road reserves and common land within the Kooyong Park site.

It is not anticipated that any further augmentation of the existing sewer network will be required to accept Stage 1 flows.

A schematic showing existing assets and point of connection to enable servicing of Stage 1 Kooyong Park is presented in Figure 4.



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FIGURE 4
KOORYONG PARK
CONNECTION TO SEWER NETWORK
SERVICING CONCEPT: STAGE 1

3.4 Existing System Augmentation – Stage 2

As noted above Council have been unable to provide detailed information on any augmentation works that might be required to accept Stage 2 flows.

Based on information available however the following works may be required to be undertaken to accommodate sewage flows from the full development of Kooyong Park.

- Construction of sewer pump station(s) within the Stage 2 development
- Construction of approximately 900m of 100mm diameter sewer rising main to connect to the existing Council Street rising main adjacent to the corner of Winall and Holmes Streets
- Pump upgrade at Council St Pump Station
- Extension of the Council Street sewer rising main to Barber Court Pump Station
- Pump upgrade at Barber Court Pump Station

A schematic showing possible works required to augment the existing sewer network to cater for Stage 2 flows is presented in Figure 5.

3.5 On Site Sewerage Works

3.5.1 General

It is proposed that the lots in Kooyong Park be serviced by a conventional sewer scheme gravitating to one or more sewer pump stations. The following discussion provides general options only for provision of reticulated sewerage for Stages 1 and 2 of Kooyong Park. A more detailed and costed study is required to optimise the internal layout.

3.5.2 Stage 1 Sewer Works

The Stage 1 development can be serviced by construction of approximately 380 metres of gravity sewer discharging to a pump station approximately 4.0m deep. The pump station will require a capacity of approximately 1 L/s to cater for PWWF and would discharge via a 50 mm diameter rising main to the Council Street pump station gravity catchment at the corner of Holmes and Victoria Streets. It is proposed that duty and standby grinder pumps be installed.

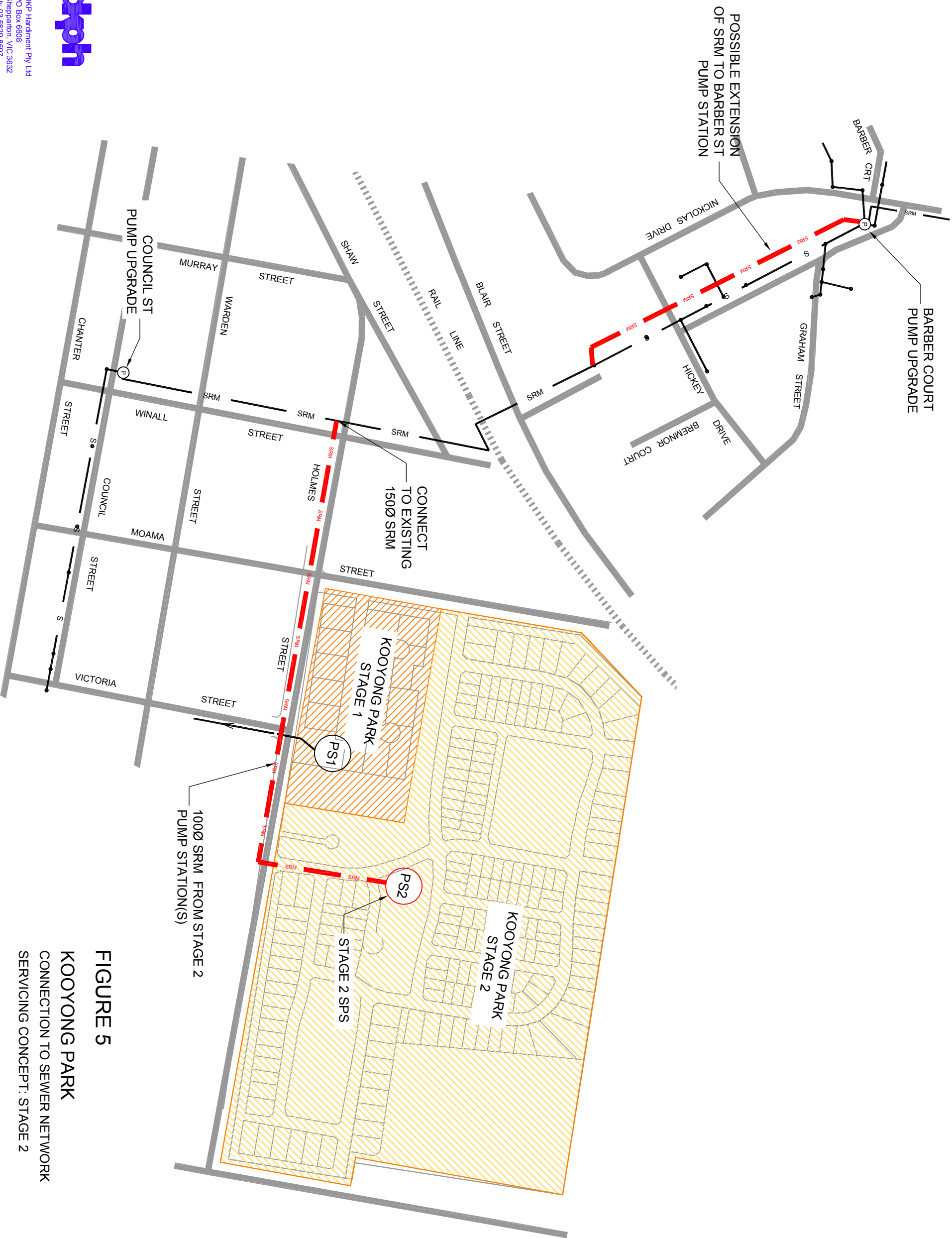
The location and depth of the pump station will be determined by whether it is constructed solely to service Stage 1 sewers or constructed to be upgraded at a later date to accept flows from part or all of Stage 2.

3.5.3 Stage 2 Sewer Works

The whole of stage two could be serviced by a single pump station located centrally within the development. If the station is designed to cater for the whole of Stage 2 it will be required to be approximately 7 metres deep. The pump station will require a capacity of approximately 8.7 L/s to cater for PWWF and would discharge via a 100 mm diameter rising main connected to the existing Council Street pump station rising main adjacent to the corner of Winall and Holmes Streets.

Dependent upon a more detailed investigation it could be more appropriate to split the Stage 2 catchment into two or more subcatchments each feeding a shallower pump station.

The internal layout, location and depth of pump stations can be determined following a more detailed and costed study taking into account proposed order of development and the final subdivisional layout.



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FIGURE 5
KOORYONG PARK
CONNECTION TO SEWER NETWORK
SERVICING CONCEPT: STAGE 2