Photo: Veolia Water Australia

Figure 3-4 A typical portable container housing water recycling pilot plant apparatus

Photo: Veolia Water Australia

Figure 3-5 Water recycling apparatus for a pilot plant inside a portable container

Electricity substation

The current project involves two 2 megavolt amperes (MVA) ground mounted transformers which would be installed in two separate outdoor transformer bays, constructed with two-hour rated fire walls. Negotiations are currently underway with the local energy provider regarding power supply and the exact design may change depending on supply arrangements.

Plant Building

The plant or filtration building would house the main recycling processes, including reverse osmosis and microfiltration. Figure 3-6 and Figure 3-7 below show these processes in a similarly sized water recycling plant.

Photo: Veolia Water Australia

Figure 3-6 Reverse osmosis equipment inside a similar water recycling plant

Photo: Veolia Water Australia

Figure 3-7 Microfiltration equipment inside a similar water recycling plant

Feed effluent storage tank at RWTP

The RWTP includes a 3 ML feed storage tank to assist in managing variations in feed effluent quantity and quality. This tank would provide several hours of storage of feed effluent at the design recycled water production rate of 20 ML/day. In the event of a short tem fluctuation in quality, short term suspension of effluent will be buffered to protect the RWTP without impacting on the supply of recycled water. Recycled water storage at the RWTP site (see below) and within the pipe network will also assist with maintaining recycled water supply to customers during these periods.

Flocculation Tank

At coagulant in added to the treated effluent feedstock. The effluent feedstock is then allowed time to flocculate/coagulate within the flocculation tank. The chemically conditioned effluent is then passed through the ultrafiltration process. Residual material from the ultrafiltration process sent to the waste water pit.

Reverse osmosis feed balance tank

After the ultrafiltration process, the process water is temporarily stored in the reverse osmosis feed balance tank, before being passes through the reverse osmosis process.

Degasser and reverse osmosis permeate collection tank

Following reverse osmosis, the permeate is passed through a degasser to remove dissolved carbon dioxide and then sent th reverse osmosis permeate collection tank. Wastes from the reverse osmosis process are sent to the waste water pit.

Recycled water storage tank

A 3ML recycled water storage tank will also be located at the RWTP site. This tank will be used as part of the network storage capacity. In addition, it will be used to maintain supply of recycled water to customers if the RWTP is off-line due to due to short term quality fluctuations or other short-term outages to allow for planned or emergency maintenance at the RWTP or sections of the network.

Fairfield pumping station

The proposed Fairfield pumping station at the RWTP would have a pumping capacity of 28 ML/day. Variable speed pumps are proposed in a duty/duty/standby arrangement.

Plant commissioning

The RWTP would be commissioned prior to supplying recycled water into the distribution network. The first phase of commissioning would with recycled water obtained from the local potable water distribution network.

All wastes from the initial commissioning phase would be discharged directly to sewer in accordance with a Trade Waste agreement with Sydney Water Corporation.

The final stage of commissioning of the RWTP would source treated effluent directly from the LAP, when it becomes available for use. The plant would be operated at to produce the required 20ML/day of recycled water for a period of 30 days. All recycled water produced during this commissioning phase would be discharged back into the LAP. All wastes from the recycling process would be discharged directly to the local sewer connection in accordance with a Trade Waste agreement with Sydney Water Corporation. There would be no discharges of any recycled water or waste streams to land or water during commissioning of the RWTP.

RWTP commissioning water volumes

Prior to operation the RWTP would be commissioned. Both potable water and treated effluent from the LAP would be used during the commissioning this process. The stages of the commissioning process are described below.

Pre-commissioning involves filling all equipment at the RWTP with water, both potable water and treated effluent from the LAP. All systems would then be flushed by operating at short periods. Flush water would be collected at waste tank. When all plant pipes and systems are "wetted", the plant would be filled and operated with "first water", which would be recirculated using commissioning piping. All chemical systems will be filled with potable water for calibration of dosing systems.

Following pre-commissioning with first water the plant would be commissioned in a sequential process, starting with equipment up to pre-ultra filtration. When all pre-ultra filtration equipment is completed, membranes for the ultrafiltration plant would be loaded and installed into the filtration cells. Commissioning of ultrafiltration equipment would follow to allow sufficient feed water to the reverse osmosis plant required for commissioning. When the commissioning of the ultrafiltration process is complete, reverse osmosis membranes will be installed and the reverse osmosis process commissioned. This will continue until all treatment plants have been fully commissioned. All chemical system commissioning will happen concurrently. Systems would then be tuned, including operation of the ultrafiltration and reverse osmosis processes, operation of the clean-in-place systems and operation of waste stream and permeate disposal systems. Sampling and testing would be undertaken as required. The plant would be tuned for both manual and automatic operation modes. Emergency shut down and restart procedures would also be tested.

Following commissioning with the membranes in place, proof test would be undertaken for 30 days. Treated effluent from the LAP would be sourced at 20ML/day and the plant would be operated continuously, with appropriate sampling and testing, to verify the final quality of recycled water prior to commencement of 'live' operation of the project and delivery to customers. During the 30 days proof test the recycled water will returned to the LAP via a temporary connection downstream of the feed effluent off-take.

The volumes of potable water and treated effluent required during the RWTP commissioning and the expected timings of the commissioning stages are presented below in Table 3-4. All wastes from the commissioning process would be release to the local sewer network or back into the LAP in accordance with Trade Waste agreements with Sydney Water Corporation.

Table 3-4 Potable water and treated effluent requirements for RWTP commissioning

Commissioning Stage	Potable water (m^3)	Effluent feedstock (from LAP) (m^3)	Timing
Pre-commissioning	4,500	10,000	July 2010 – October 2010
Commissioning with membrane in place	4,500	40,000	November 2010 – December 2010
Performance test	4,000	600,000	January 2011 – February 2011

3.1.2 Woodville reservoir

An elevated surface reservoir is proposed on the southern boundary of Woodville Golf Course, on the northern side of Barbers Road, as shown in Figure 3-9. The reservoir would be located between the golf course maintenance building and Sydney Water Corporation's water supply pipelines, which are located on the southern boundary of the golf course.

Construction of the reservoir would require the removal of approximately 17 Casuarina trees. The location of the reservoir has been agreed in discussions between Jemena, on behalf of AquaNet, and Parramatta City Council (the owner of Woodville Golf Course). Surrounding land uses include a turf business, the water supply pipelines, and detached residential dwellings to the south and west.

The Woodville reservoir would comprise a single, cylindrical storage tank of approximately 16 m (m) diameter and 3.6 m height. The tank would have a storage capacity of approximately 0.7 ML and would be mounted on a supporting structure. The base of the tank would be approximately 5 m above ground level, resulting in the top of the tank being approximately 8.6 m above ground level.

Pumping from the pumping station at the RWTP would be controlled by the water level in the Woodville reservoir and pressure levels measured at a customer site.

The Woodville reservoir would maintain supply to the Smithfield demand centre when the pumps at the RWTP are not operating.

3.1.3 Rosehill reservoir and pumping station

A surface reservoir and a pumping station are proposed at the corner of Durham Street and Grand Avenue, Rosehill in the north-western corner of the Parramatta Terminal area of the Clyde refinery site, as shown in Figure 3-10. The site would be leased from Shell. The site covers approximately 0.6 hectares (ha), approximately 200 m south of the Parramatta River. The site is relatively flat and predominately covered in grass.

The Rosehill Reservoir would comprise two cylindrical storage tanks of approximately 25.4 m diameter and 6 m height. Each tank would have a storage capacity of approximately 3 ML. The ultimate capacity of the pumping station is 17ML/day.

Land uses in the vicinity of the Rosehill reservoir and pumping station are industrial. There are no residential receivers in the vicinity of the proposed location.

3.1.4 Distribution system

The recycled water distribution system would comprise two key zones based on the demand centres of Smithfield (to the north-west of the RWTP) and Camellia (to the north-east of the RWTP). A schematic of the distribution system is shown in Figure 3-8.

Recycled water would be pumped from the RWTP to the Woodville reservoir and directly to the Smithfield demand centre. Recycled water would gravitate from the Woodville reservoir to the proposed Rosehill reservoir at the corner of Durham Street and Grand Avenue, Rosehill.

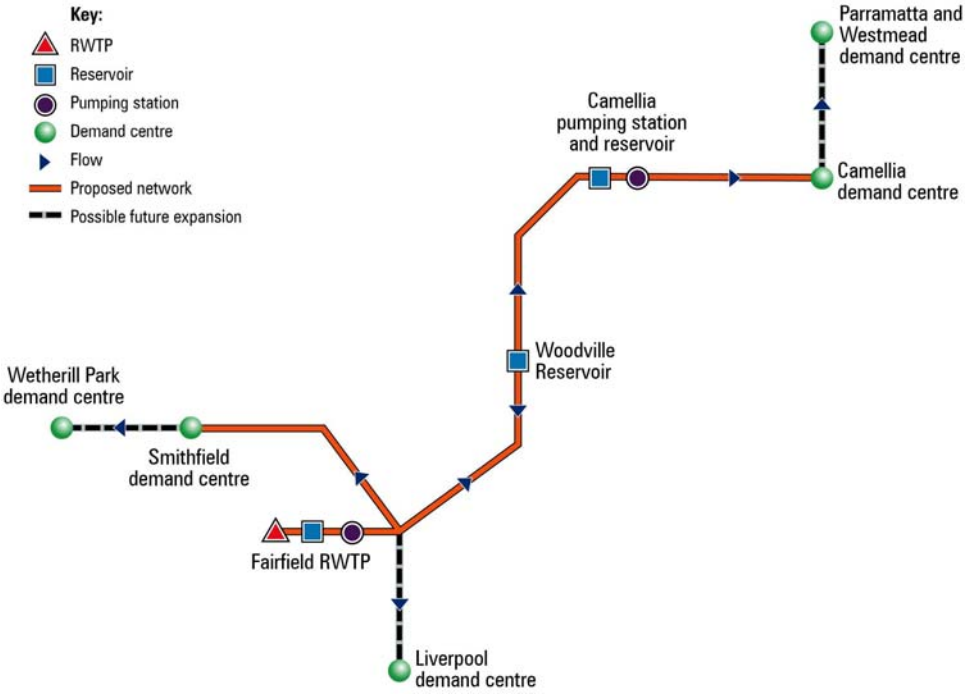

Figure 3-8 Distribution system

The storage within the distribution system is sufficient to meet the peak daily demand for the seven customers over three consecutive days without the need for top-up with potable water.

3.1.5 Recycled water pipeline

The recycled water pipeline would vary in diameter from 575 millimetres close to the RWTP to 150 mm at the extremities of the distribution network. The recycled water distribution network would be approximately 20 km in length, from the Fairfield RWTP to Smithfield and Rosehill. A breakdown of the pipe sizes and lengths are shown in Table 3-5.

Table 3-5 Pipe sizes and lengths for the recycled water distribution network

Nominal Pipe diameter (mm)	Approximate length (kilometres)
100	0.36
150	0.36
225	0.17
250	1.05
300	0.45
375	9.70
400	4.93
450	3.02
560	0.07
575	0.40

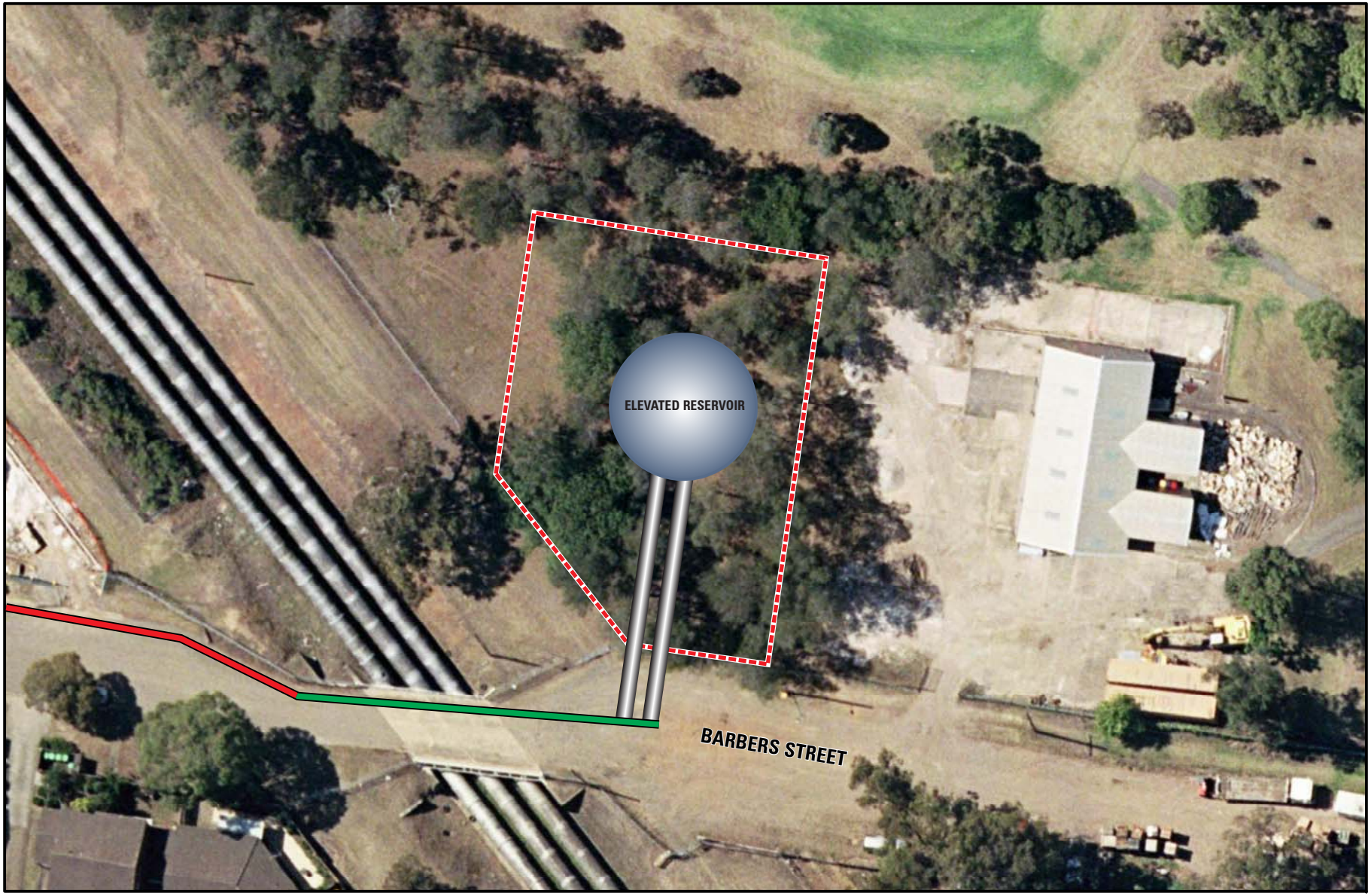

Figure 3-9 **Woodville reservoir plant detail**

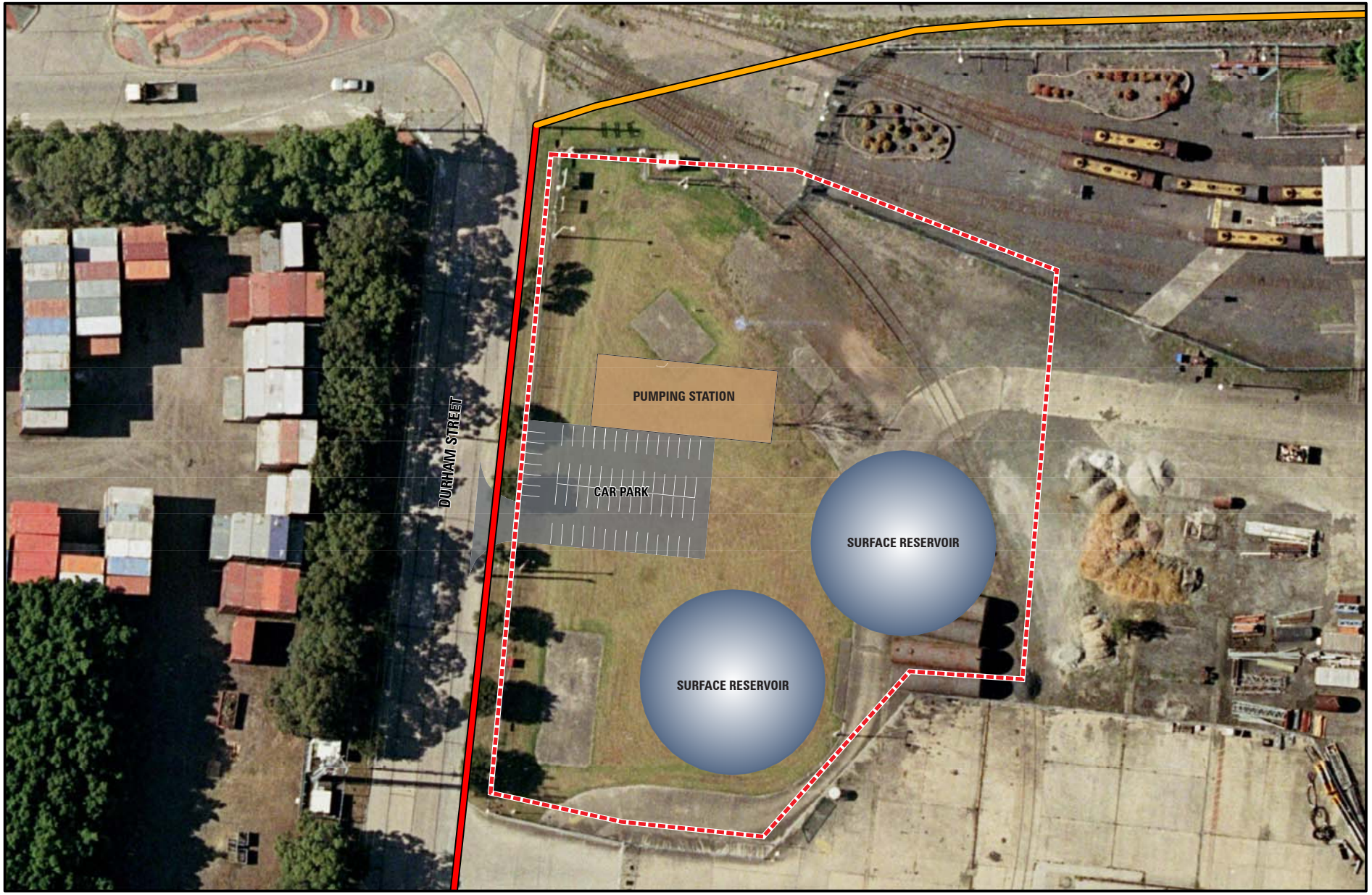

Figure 3-10 **Rosehill reservoir and pumping station plant detail**

The network pipeline would be located predominantly below ground except where pipe bridges are proposed to cross watercourses and above-ground infrastructure. The pipeline route is shown from Figure 3-12 to Figure 3-20. The route of each subject is discussed below.

Fairfield RWTP to Woodville Road

The RWTP to Woodville Road section travels in an easterly direction beneath open spaces/parklands, and urban streets, connecting with a section of isolated gas main owned by Jemena in Woodville Road. The pipeline would be constructed via trenching, except where it crosses arterial roads and watercourses. Pipe bridges and trenchless technology would be used to cross these sensitive areas.

The pipeline divides at Normanby Street off Tangerine Street to supply the Smithfield demand centre. The pipeline travels in a northerly direction beneath open space/parkland and urban streets eventually following Prospect Creek recreation reserves to Herbert Street, Smithfield. The pipeline would be constructed via trenching, except for the Burns Creek crossing (horizontal directional drill) and Yennora railway crossing (thrust boring).

Woodville Road to Elizabeth Street, Granville

Along this entire section from Tangerine Street, Fairfield East to Elizabeth Street, Granville the pipeline is to be installed via pipe bursting isolated gas mains owned by Jemena, except for a pipe bridge across the Sydney Water Corporation water supply pipeline easement in Old Guildford.

A short easterly connection to the Woodville Reservoir from Woodville Road would be constructed by trenching except for the Sydney Water Corporation water supply pipeline crossing, which would be constructed using the existing bridge on Barbers Road.

Granville to Rosehill

This section would commence with trenching along Elizabeth Street from Woodville Rd. A pipe bridge would be constructed over the first Duck Creek crossing and a thrust bore would be used to install the main under the second Duck Creek crossing. The main would be installed by trenching along New York Street, Third Street and Factory Street north to the Clyde railway station. The main will be installed under the railway line via pipe insertion into or lining of Jemena's existing isolated gas main. From the railway crossing, the pipeline would follow Berry Street then head east to cross Parramatta Road (via thrust boring) to Kendall Street, Rosehill.

From Kendall Street heading east along Martha Street, the pipeline would cross under the M4 by heading north to meet Deniehy Street and crossing under Duck Creek (via thrust boring) north to Shirley Street. From Shirley Street the pipeline would run via trenching in Unwin Street heading east to Colquhoun Street then Devon Street turning north into Durham Street to the Rosehill reservoir site. From the Rosehill reservoir, the pipeline would cross the goods railway siding at Grand Avenue via thrust boring and then extending to Thackeray Street.

3.1.6 Ancillary pipeline components

The pipeline includes a number of ancillary components for operation and maintenance requirements. These are described below and summarised in Table 3-6.

Table 3-6 Summary of ancillary equipment requirements for the pipeline

	Air valve	Scour valve	Section valve
Fairfield RWTP to Woodville Road	7	6	7
Tangerine St, Fairfield to Smithfield	3	3	6
Woodville Road to Elizabeth Street, Granville	4	3	2
Granville to Rosehill	3	3	11

Notes: this would be required following maintenance or unscheduled shut downs. Under normal circumstances, no air would be expelled to the atmosphere.

1. Subject to detailed design
2. Refer to Figures 3-12 to 3-20 for indicative locations

Air valves

Air valves would be required at high-points along the pipeline to automatically admit air into the pipeline during emptying and exhaust air during refilling. During detailed design, trench depth would be adjusted, where possible, to eliminate high-points and minimise the number of air valves required. Air valves would be located in suitable areas for accessibility during operation and maintenance. In some cases, these would be below ground and would require an access chamber.

Scour valves and sumps

Where feasible, permanent scour pipelines typically 200 millimetres in diameter, would be connected to the nearest sewer. Where there are no sewers nearby, the flow in the pipeline would be drained to a sump where it would be pumped during maintenance using portable pumps to road tankers for disposal to an appropriate sewer or treatment plant. The location of scour valves and lines would be determined during detailed design.

Section/Isolation valves

Section/Isolation valves would be located at intervals along the pipeline. These would be used to isolate a section of the pipeline for inspection, maintenance or repairs without the need to dewater or recharge the entire length of the pipeline. Isolation valves are also located at the extremities of the network to allow for any future expansion of the network. These “end-of-line” valves would be designed and constructed together with the pipeline, to avoid future shutdowns of the pipeline for expansion connections.

3.1.7 Future expansion

Whilst the project will be constructed in full as described above, the project has the potential to extend the capacity and breadth of the network. Expansion of the Smithfield demand centre to Wetherill Park in the west and expansion of the Camellia demand centre in the east to Parramatta and Westmead. Expansion to Liverpool would extend the project in a southerly direction.

Any further expansion of the project would be subject to the conditions imposed by network operator licences and may require a separate assessment and approvals process.

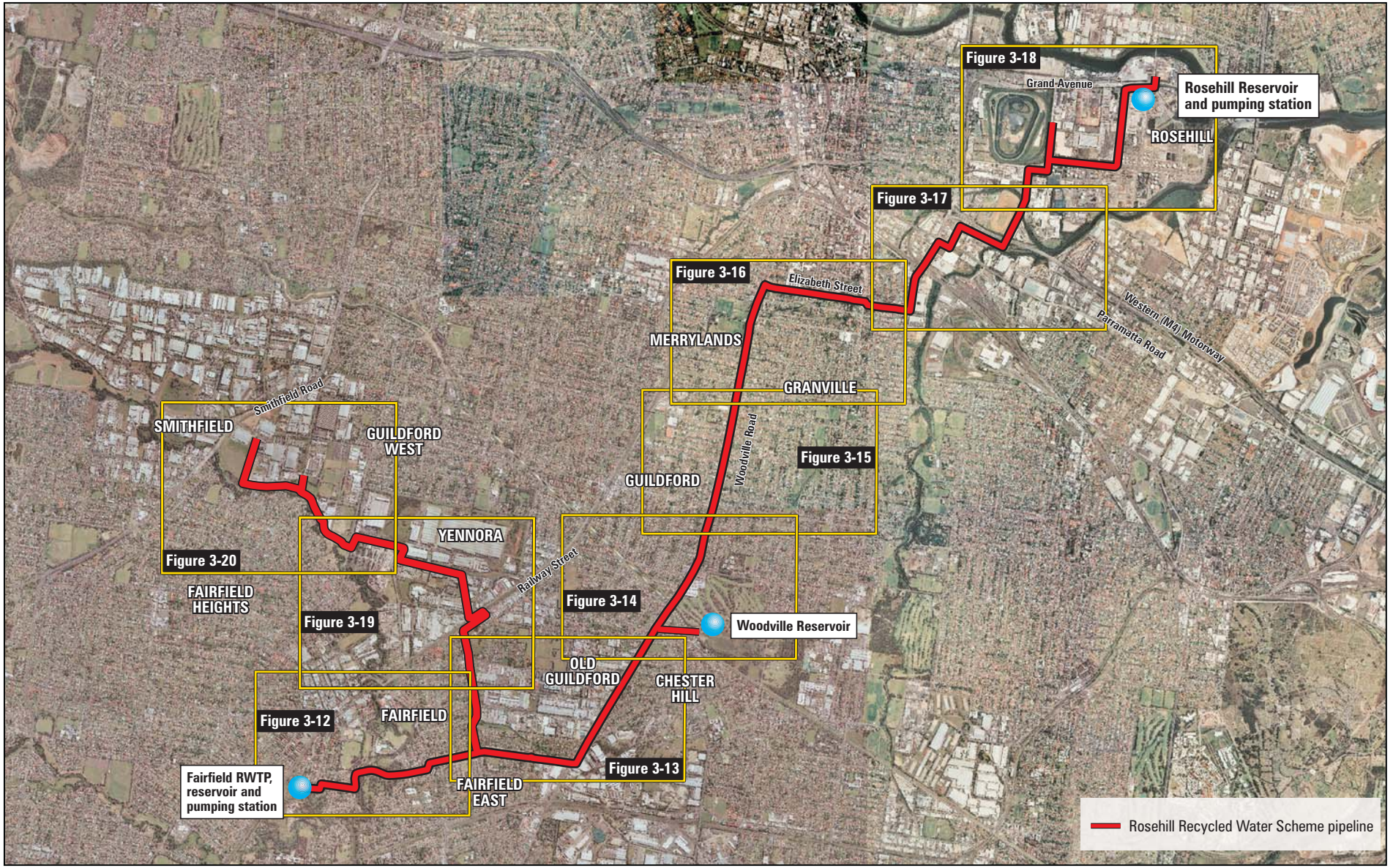

Figure 3-11 **Distribution system overview**