Mundijong District Structure Plan Report

INFRASTRUCTURE AND SERVICES STRATEGY (SERVICING)

- Rev 2
- 30 April 2010

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This report has been formatted to fit into the table of content as provided by Serpentine Jarrahdale Shire on the 4 March 2010 via email.

13.0 Utilities

13.1 Servicing

13.2 Power, gas pipelines and/or easements

13.2.1 Power

13.2.1.1 Review of PB Report

An Infrastructure and Services Study was carried out by Parsons Brinckerhoff (PB) for the Shire in 2009. This study was aimed at assisting the Shire to prepare a District Structure Plan (DSP) for the area. A Preliminary Investigations Report was submitted by PB on the findings of the existing and future electrical services to the study area.

SKM reviewed the PB report for currency and adequacy as input to the DSP. As part of the review process, SKM liaised with Phillip Capper, Western Power via telephone conversations and emails to confirm the validity of the report submitted by PB. Western Power has confirmed that the findings of the report submitted by PB are still valid.

13.2.1.2 Existing Infrastructure

The existing electrical infrastructure in the Whitby area is serviced by the Byford Substation (indicated by the letter from Western Power dated 20 December 2006 – attached as part of the PB report in Appendix B). The network structure is shown in Figure 1.

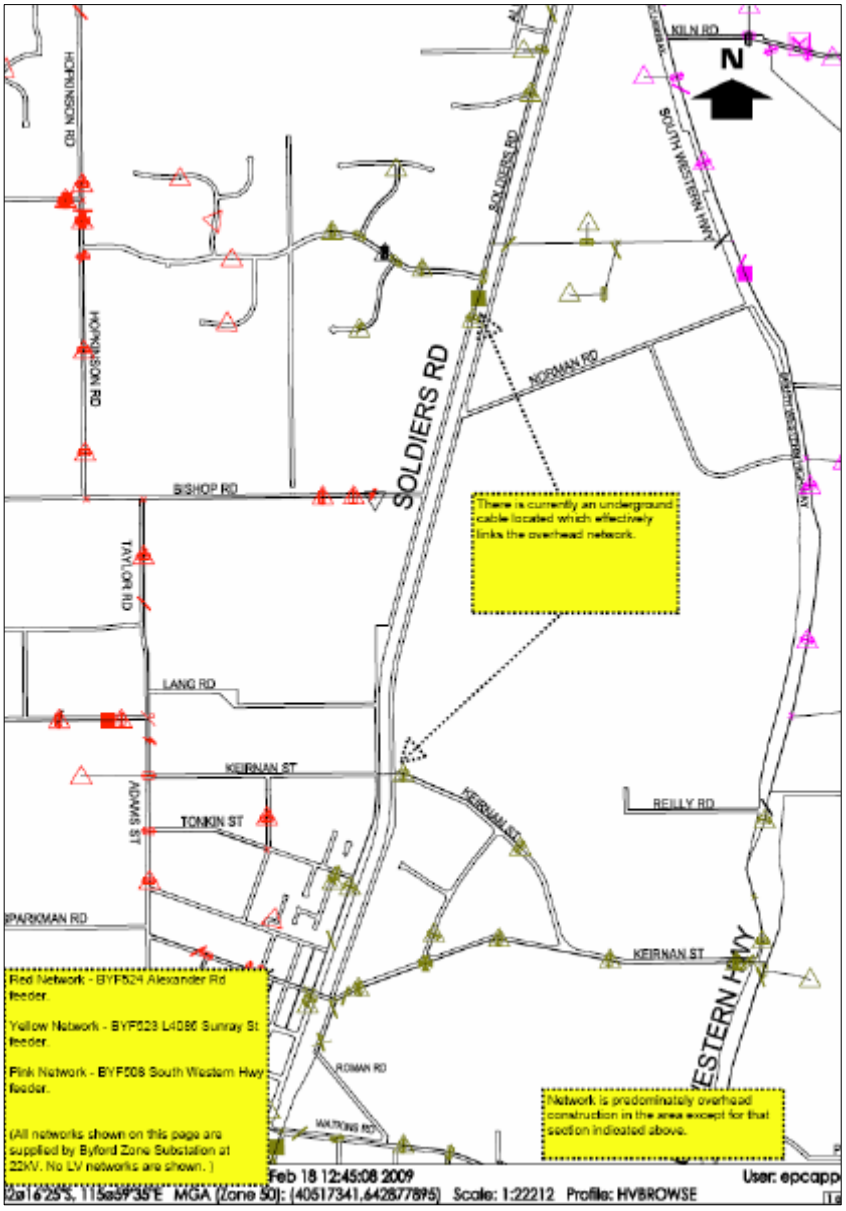

Figure 1: Existing Network Structure (DFIS Map)

The western side of the South Western Highway is electrically supplied by underground high voltage (HV) cable, extending to the eastern side of Robertson Road. The eastern side of South Western Highway is electrically supplied by HV overhead lines extending along the north side of Kiernan Street.

A tee-off is currently present along the 22kV HV aerial line along the eastern side of the South Western Highway that terminates with metered HV connection. This is depicted in Figure 2.

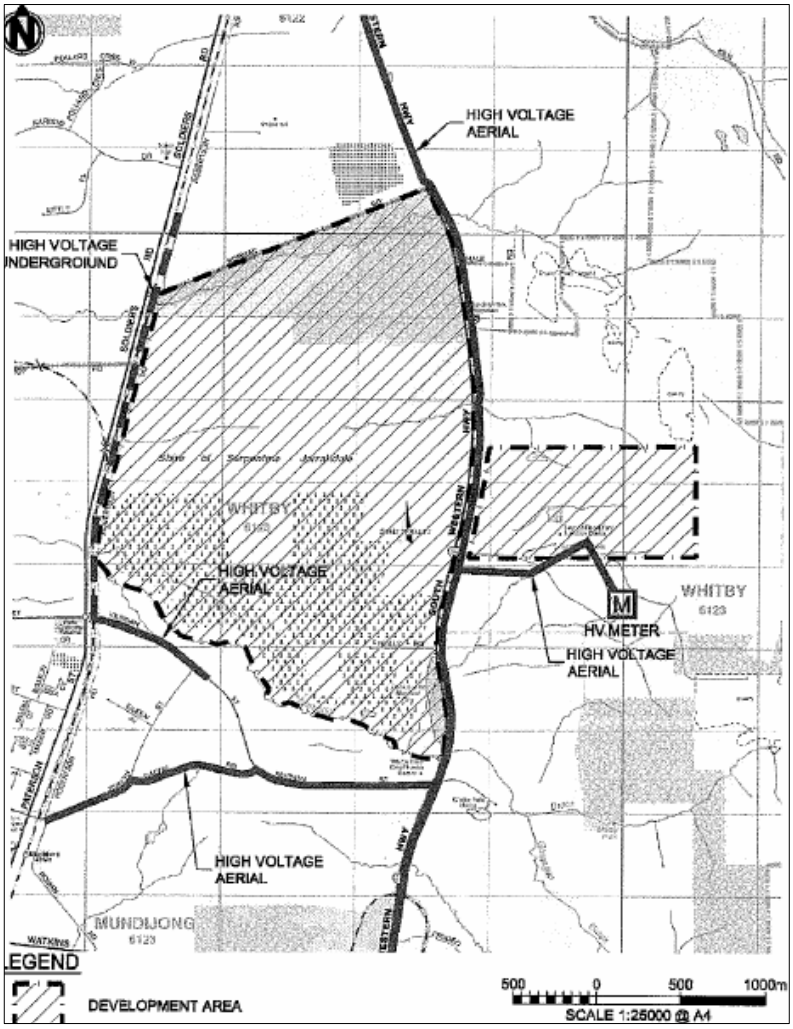

Figure 2: Tee-Off Along South Western Highway

There is currently some spare capacity available on two (2) feeders:

- Reference BYF524 Alexander Road feeder – illustrated in red in Figure 1.
- Reference BYF508 South Western Highway feeder – illustrated in pink in Figure 1.

The actual spare capacity available is not known. Confirmation from Western Power on this capacity will be required. This indicates that problems may exist with the capacity of the existing supply and discussions should be held with WPC to assess capacity and quality issues.

13.2.1.3 Planned/Future Power Infrastructure

As noted in the report submitted by PB, Western Power has plans to construct a major Zone Substation along Gossage Road in Oldbury. However, this is expected to occur only in 2025. If the supply capacity is required before this time, Western Power will charge the developer for the full capital costs.

The location of this proposed substation is shown in Figure 3:

Figure 3: Intended Location of Proposed New Zone Substation (Western Power)
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Western Power has also noted that a voltage regulator is planned for installation along Roman Road in the future.

13.2.1.4 Forecasted Load

To assist in assessing future load requirements a preliminary estimate of likely load demand was completed.

Assessment of the likely electrical capacity for the District Structure Plan (DSP) uses typical load values, split into two (2) demand categories for purposes of this report:

- Residential Lots – 4.5kVA per lot
- Commercial (at 1 hectare or 10,000m^2) – 200kVA

An "Enquiry by Design" workshop hosted by the Shire was conducted between the 25th and 27th March 2009. This workshop was aimed at providing some direction into the final district plans. As part of the outcomes report (v5 November 2009), three (3) development phases were identified:

1. Initial Development Phase
2. Medium Development Phase
3. Long Term Development Phase

- The description of each phase included the expected population, and the likely commercial developments anticipated.
-

Table 1 summarises the development phases and an indicative load (in kVA) required for each of these phases.

The residential lots were estimated utilising the expected population figures. The Australian Bureau of Statistics in a 2001 census revealed a mean household size of 2.6. For the purposes of this report, the residential lots were therefore estimated using a household size of 2.7.

Where land areas are not provided, an order of magnitude estimate was used to calculate the expected order of magnitude electrical capacity required.

- **Table 1 Indicative Load Demand Expected**

Heading	Initial Phase		Medium Phase		Long Term Phase	
	Residential	Commercial	Residential	Commercial	Residential	Commercial
Description	5,000 persons (≈ 1,851 lots)	Small supermarket Limited retail (≈ 10,000m^2)	15,000 persons (≈ 5,555 lots)	2 supermarkets 35 shops and services (≈ 25,000 m^2)	30,000 – 40,000 persons (≈ 11,111 – 14,814 lots)	Small Discount Departmental Store 2 supermarkets and 60-70 shops (≈ 50,000 m^2)
Demand (kVA)	≈ 8,330	≈ 200	≈ 25,000	≈ 500	≈ 50,000 – 66,700	≈ 1,000
Total Demand	8,530kVA		25,500kVA		51,000kVA (for 30,000 persons) 67,700kVA (for 40,000 persons)	

From Table 1, substantial increases in the load requirements are seen with the development of each phase. To meet the forecasted demand (particularly for the medium and long term phases), it is likely that the existing electrical infrastructure does not have the capacity. In the initial phase, confirmation with Western Power will be required to assess the availability of capacity to supply the demand as estimated above.

It should be noted that the above load demand estimates do not include other relevant loads like schools (≈150kVA – 200kVA for each school)[1], and the proposed wastewater pump station (≈315kVA – 4,000kVA)[2]. This will need to be taken into consideration in planning for the electrical infrastructure to support the development phases.

13.2.1.5 Summary of Outcomes

The review of the electrical infrastructure in the Mundijong Whitby district resulted in the following outcomes:

- Western Power (WPC) confirms the data provided for the Preliminary Investigations Report submitted by Parsons and Brinckerhoff (PB) in 2009 is still valid (see Appendix C).
- For the estimated 30,000 – 40,000 people expected to populate the district in the next 25 years, significant upgrading of electrical infrastructure will be necessary. This includes a Zone Substation to provide for the ultimate population/demand.
- Should the development proceed before 2025, the Zone Substation capital costs will need to be funded by the developer.
- The initial development of the district could make use of two (2) feeders supplied from the existing Byford Substation (see Section 13.2.1.2). However, the available spare capacity for use is not known. Further discussions should be entered into with WPC to determine the available spare capacity from the existing feeders, which is currently not available.

[1] Based on industry practice and SKM's experience on past projects.
[2] Based on the demand of typical wastewater pump stations in WA with the range covering the regional areas (≈315kVA) and the metropolitan areas (up to ≈4,000kVA)

13.2.2 Gas Pipelines

There is no existing gas distribution / reticulation infrastructure in the Mundijong Whitby District area and WA Gas network has no current infrastructure planning for this area.

As part of the review process, SKM liaised with WestNet Energy via telephone conversations and emails to gather preliminary advice from Marc Stubbs, Market Development Executive for WestNet Energy.

Figure 4 indicates the proposed route of the gas headworks main that will pass through the centre of the study area. Lateral gas mains would be required off this central backbone to complete the reticulation network that would service individual development pockets.

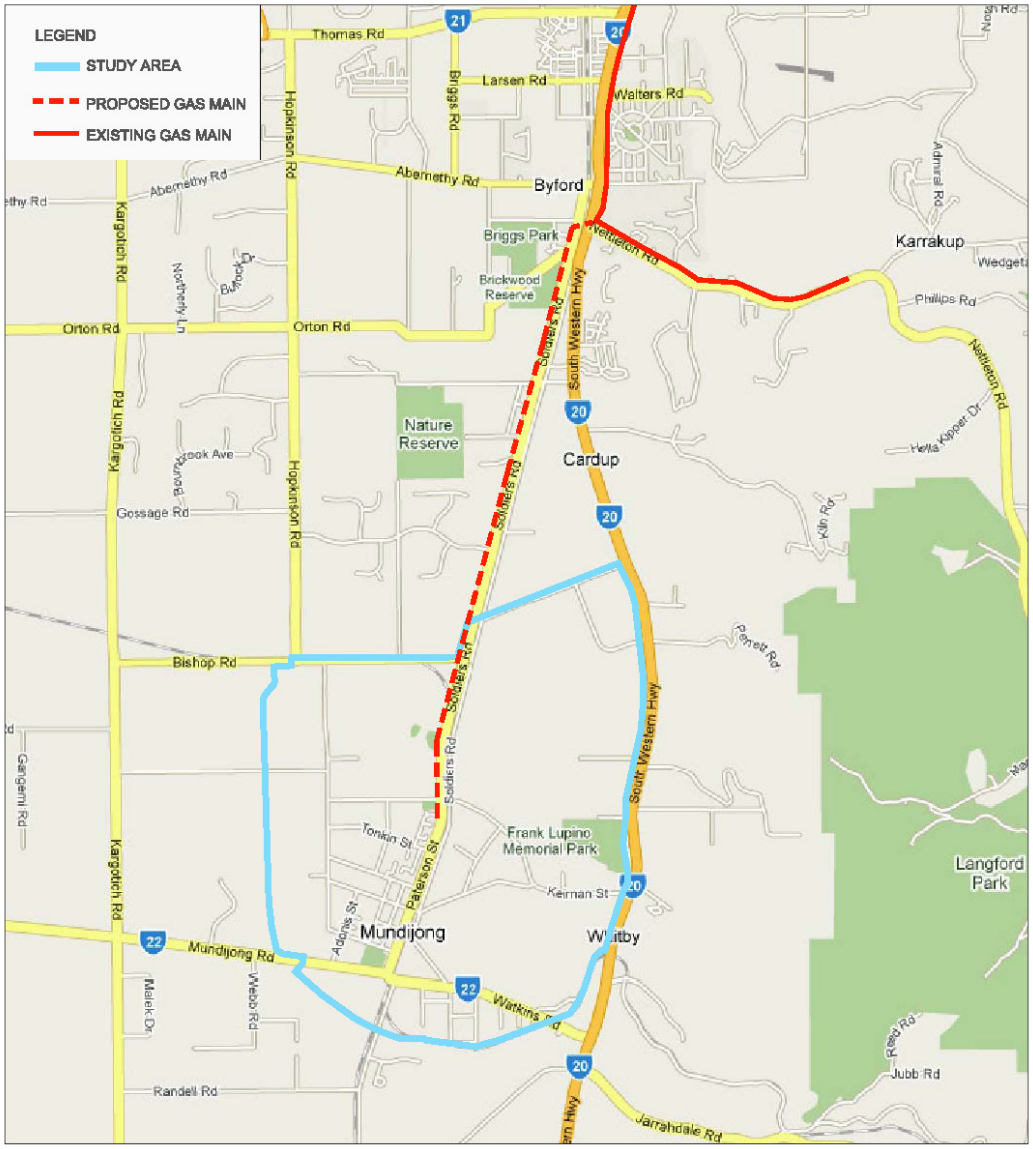

Figure 4: Indicates Proposed Route of "backbone" Gas Main

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13.2.3 Water

As part of the review process, SKM liaised with Water Corporation via telephone conversations, emails and had a meeting with Brett Coombes, Town Planner at Water Corporation office to obtain preliminary advice on the proposed works at Mundijong.

The main water supply to Mundijong is currently supplied off the Serpentine Trunk Main on Summerfield Road to the south of the study area. This supply comprises a 5.5 km length of varying diameter main on Wright Road, two sections of 150 diameter pipe at each end with a section of 300 diameter pipe in between. Modification to this main is currently being investigated by the Water Authority as this supply is inadequate for the current population. The upgrade would have the 150 diameter mains paralleled with proposed 400 diameter mains. Refer to Figure 5 – Proposed Interim Water System.

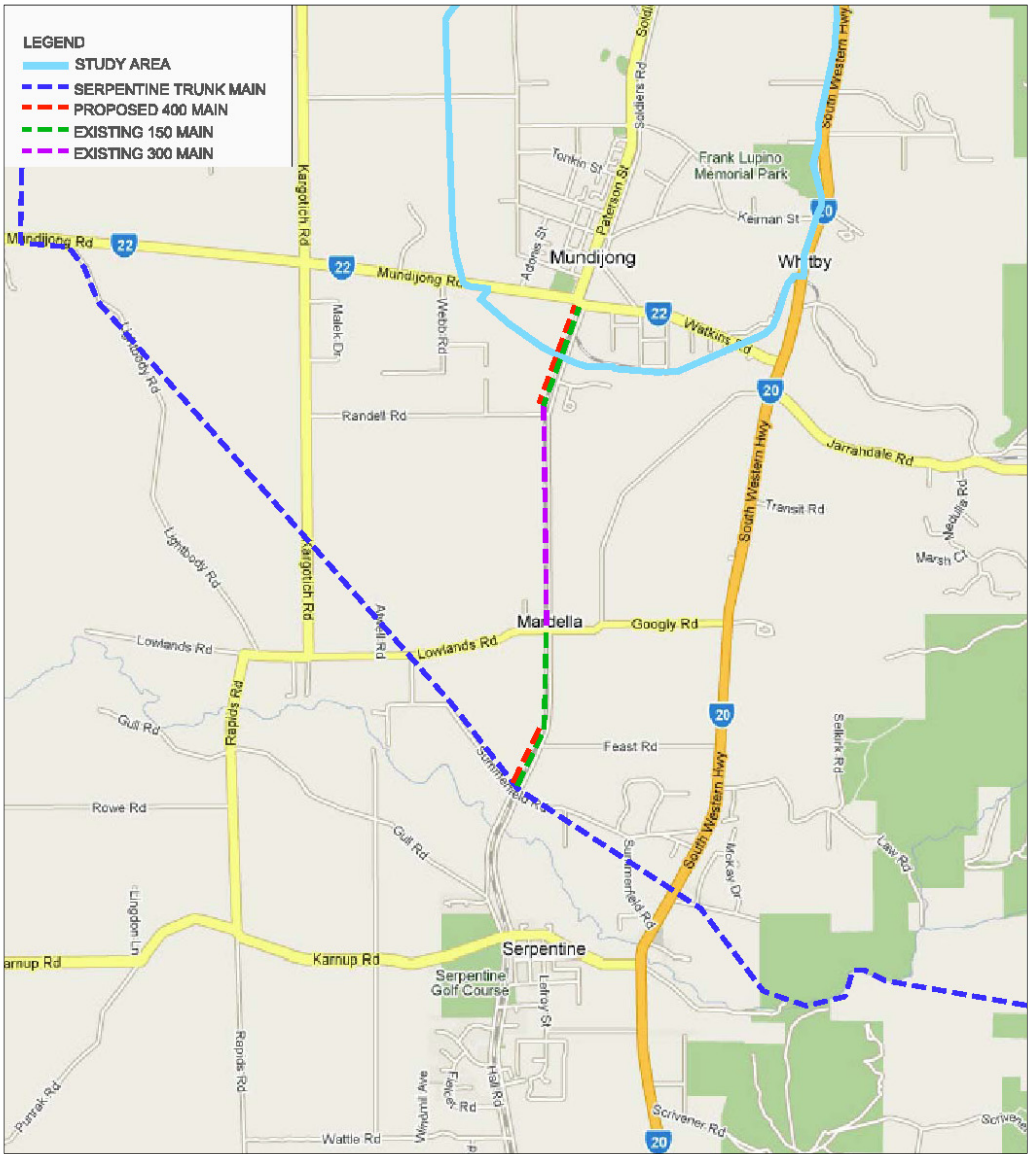

Figure 5: Proposed Interim Water System
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The long term proposed system arrangement for Mundijong would be a supply from the north along Soldier Road from Byford gravity tank. This proposed water distribution pipeline would vary in size from a 900 to 500 diameter and would supply water to the Mundijong Gravity Zone, refer Figure 6. The Mundijong High Level Zone to the east would be supplied via high level supply tanks fed from booster pumps off the trunk main.

Figure 6: Mundijong Water Supply Long Term Proposed Scheme
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*Refer to Appendix A: SKM Ultimate Water District Plan

Sections of the ultimate gravity main could be installed to allow for the staging as development occurs to the north of Mundijong, but this would need to be supplied off the current network, and works will be developer prefunded. Any development in the high level zone would result in significant upfront costs to install the infrastructure.

In addition to the mains servicing the DSP area, significant water mains associated with future desalination plant and raw water mains would extend along the eastern side of the future Tonkin Highway road reserve in a service corridor with an estimated buffer width of 50m.

13.2.4 Wastewater

There is currently no wastewater network in Mundijong.

SKM liaised with Water Corporation via telephone conversations, emails and also meeting with Brett Coombes, Town Planner from Water Corporation for preliminary advice on servicing.

Wastewater planning identifies a service corridor adjacent to the eastern side of the future Tonkin Highway road reserve. This corridor will ultimately service the Byford / Mundijong area through a network of pumping stations and pressure mains (refer to Figure 7). The Mundijong Whitby area would be serviced by a number of main gravity sewers feeding in from the eastern hills area. The proposed pumping stations, PS A, PS B and Mundijong PS A would initially pump northwards to the existing Byford PS 1 until capacity has been reached. This includes an allowance of approximately 20 l/s from the Mundijong PS A pumping station, confirmed by Russel Nelson, Senior Infrastructure Advisor from the Water Corporation. This is based on an estimate of the expected lot take up rate in Byford and on the assumption that there may be some spare capacity for some time in the catchment of the Byford Pump Station No 1. The availability of this "spare" capacity for Mundijong will be subject to ongoing monitoring and may be capped at some stage by the Water Corporation.

The approx. 20 l/s capacity available at Mundijong PS A will only be available on a staged basis (i.e. it is not immediately available) and will be dependent on progressive upgrades to the Byford PS 1 pump station (currently 40 l/s, eventually upgraded up to 180 l/s), the Wungong Main PS further to the north, and possibly duplication of pressure mains heading northwards to the Westfield PS.

Once this capacity is reached, the system would then be reversed with the discharge then being at the East Rockingham Waste Water Treatment Plant.

Interim pumping stations, pressure mains and gravity sewers would be required to cater for development prior to these major services being provided.

Transport routes need to accommodate these major services by means of wider road reserves and service corridors across the structure plan area, which can only be confirmed during future design progression.

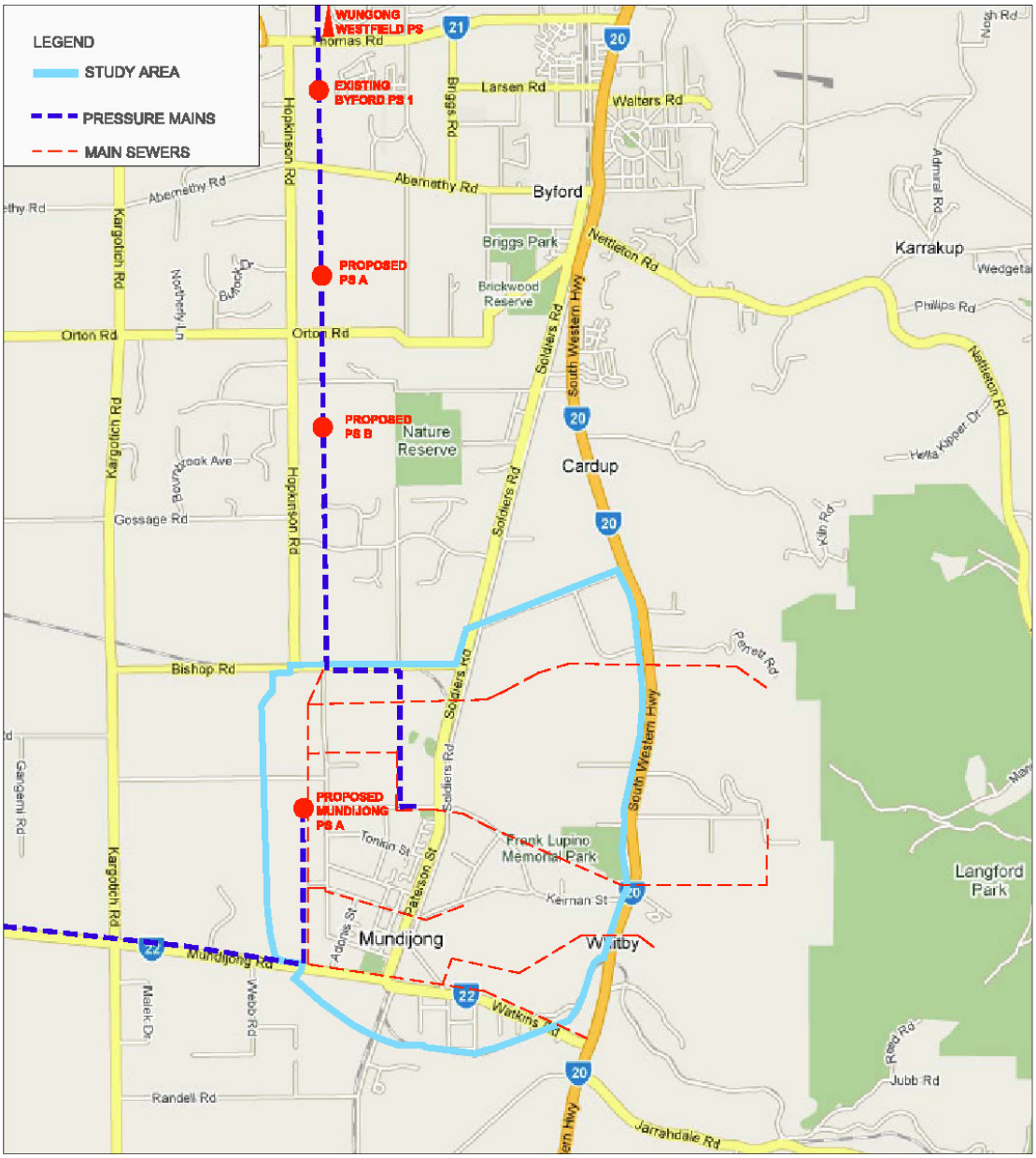

Figure 7: Mundijong Waste Water Proposed Scheme
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13.3 Impacting Land Uses/Activities and Buffer Requirements

13.3.1 Drainage

Water Corporation drainage within the DSP area is restricted to the Oaklands Sub B open drain which runs adjacent to Mundijong Road. Currently no additional catchment will be allowed to flow through these drains. It is currently envisaged that the existing Water Corporation drains will be converted into a public open space, although ongoing negotiations between the Serpentine Jarrahdale Shire and the Water Corporation will determine the final drainage strategy. Refer to Figure 8 for details.

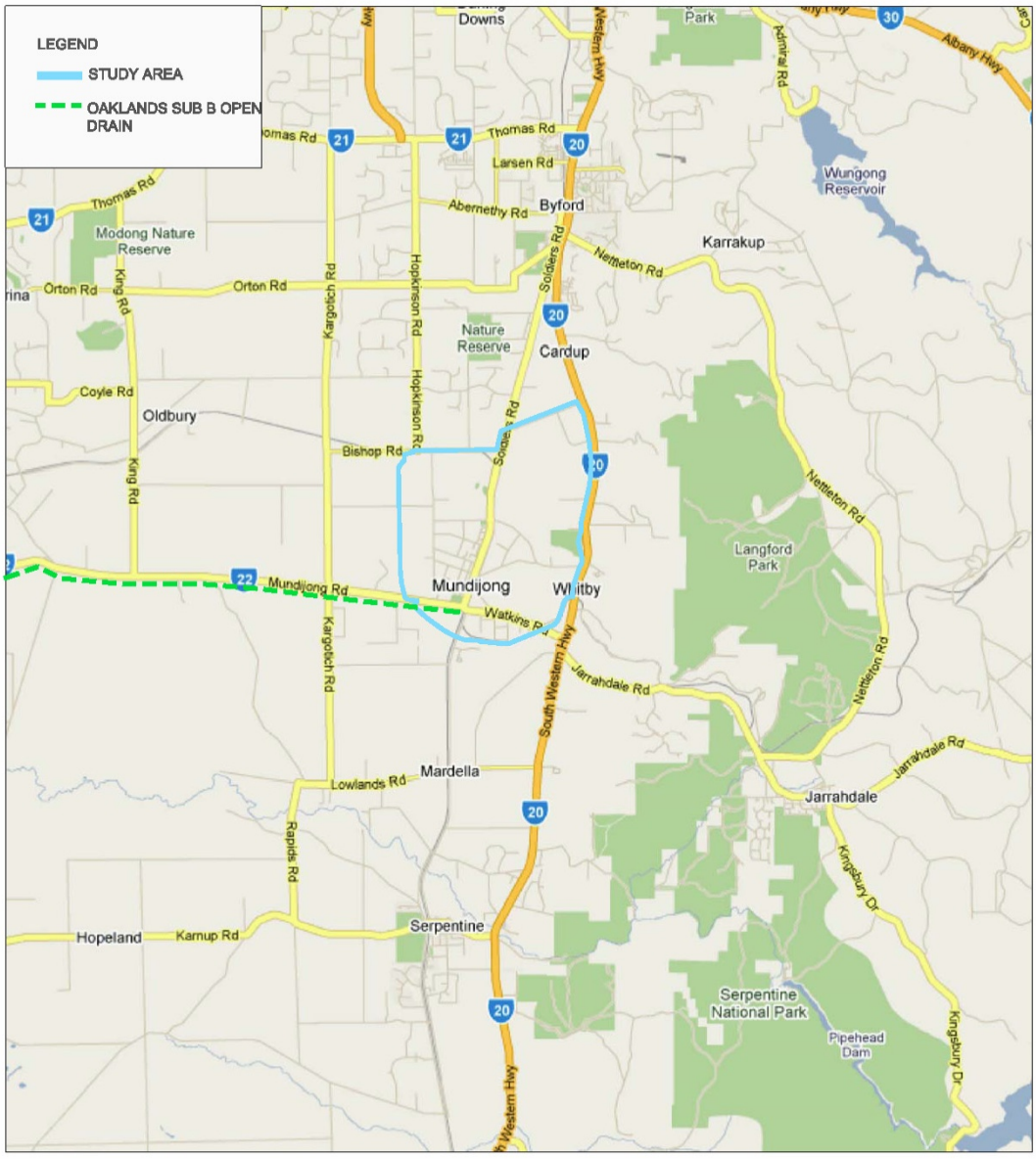

Figure 8: Mundijong Existing Drainage
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