City of Wagga Wagga

Wagga Wagga City Council

Development Servicing Plan No 1: Sewerage Services

1.1- Adopted by Council

July 2013

Executive Summary

This development servicing plan covers sewerage developer charges in regard to all proposed development areas serviced by Wagga Wagga City Council.

This DSP has been prepared in accordance with the *Developer Charges Guidelines for Water Supply, Sewerage and Stormwater* (2002) issued by the Minister for Land and Water Conservation, pursuant to section 306(3) of the *Water Management Act 2000*.

The area covered by the DSP, and the existing and proposed works serving the area are shown on the plans in **section 11**.

The timing and expenditures for works serving the area covered by this DSP are shown in **section 4**.

Standards of service to be provided in the DSP areas are summarised in **section 5**.

The developer charges for the areas covered by the DSP have been calculated to be as shown in **Table 1**.

Table 1: Summary of Developer Charges

Approx Locality (see section 11)	Developer charge ($/ET)
Ashmont-Glenfield	
Bomen Central	
Bomen West	
Boorooma West	
Bourkelands	
Collingullie	
CSU South Campus	
Estella-University	
Forest Hill	
Glenora-St Elmos-Boorooma East	
Gobbagombalin	
Gumly Gumly-East Wagga	
Kooringal	
Ladysmith	$3,538
Lake Albert	
Lloyd East	
Lloyd West	
Mangoplah	
Moorong	
Mount Austin	
Oura	
Rural Residential	
Springvale	
Tarcutta	
Tatton	
Tolland	
Uranquinty	
Wagga Wagga Central	

Developer charges relating to this DSP will be reviewed after a period of 5 to 6 years.

In the period between reviews, developer charges will be adjusted annually on the basis of movements in the Consumer Price Index for New South Wales from a base of **June 2012**.

The developer shall be responsible for the full cost of the design and construction of reticulation works within subdivisions, as well as the cost of connections from the subdivision to Wagga Wagga City Council's trunk infrastructure.

Background documents identifying the characteristics of the assets covered by this DSP are provided in the appendices. A further background document is available on request with further details.

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1. Introduction

Section 64 of the *Local Government Act 1993* enables a council to levy developer charges for water supply, sewerage and stormwater. This derives from a cross-reference in that Act to section 306 of the *Water Management Act 2000*.

A Development Servicing Plan (DSP) is a document which details the water supply, sewerage and/or stormwater developer charges to be levied on development areas utilising a water utility's water supply, sewerage and/or stormwater infrastructure.

This DSP covers **sewerage** developer charges in regard to the development areas served by Wagga Wagga City Council.

This DSP has been prepared in accordance with the *Developer Charges Guidelines for Water Supply, Sewerage and Stormwater* (2002) issued by the Minister for Land and Water Conservation[1], pursuant to section 306 (3) of the *Water Management Act 2000*.

This DSP supersedes any other requirements related to water supply and sewerage developer charges for the area covered by this DSP. This DSP takes precedence over any of Council's codes or policies where there are any inconsistencies relating to sewerage developer charges.

[1] The NSW Department of Land and Water Conservation is now defunct. The former functions of the Department which related to water supply and sewerage are, at the time of writing, administered by the NSW Office of Water, Department of Primary Industries.

2. Administration

DSP Name	Development Servicing Plan No 1: Sewerage Services.
DSP Area	The areas covered by this DSP are shown on the Plans in **section 11.**
DSP Boundaries	The basis for defining the DSP area boundaries is as follows: DSP boundaries have generally been defined by the existing serviced area, plus areas proposed for subdivision over the next ten years. Developers will be required to construct at their own cost the connections between their subdivisions and Wagga Wagga City Council's trunk infrastructure.
Payment of Developer Charges	A Compliance Certificate under s64 of the *Local Government Act 1993* will not be released until the relevant developer charges have been paid. Compliance certificate(s) will be required for subdivisions and where a development approval leads to an increased loading on sewerage infrastructure.

3. Demographic and Land Use Planning Information

3.1 Growth projections

Growth projections for population and number of ETs are shown in **Table 2** and **Table 3** below. These projections are from the present year to 2041 which is Council's current planning horizon for sewerage services.

Population projections have been developed to be consistent with projections prepared by .id, a specialist forecasting company, and commissioned by Wagga Wagga City Council[2].These projections are for population and dwellings for the period 2006 to 2031, with a 2011 update based on census results.

Table 2: Projected residential populations, 1996-2031

	1996	2006	2011	2016	2021	2026	2031
Wagga Wagga, including Gumly Gumly and Forest Hill	49,732	54,268	56,109	59,927	64,150	68,281	72,150
Villages (including non-serviced villages)	1,589	1,765	1,805	1,835	1,905	2,050	2,199
Total	51,321	56,033	57,914	61,762	66,055	70,331	74,349

The .id projections incorporate dwellings projections for each of its forecast regions. For the Wagga Wagga urban centre, these dwellings projections have been adopted to calculate growth. For the villages, the growth in dwellings has been estimated based on 2004 population growth forecasts and the .id projection of occupancy ratios[3] for the rural forecast areas. In both cases the dwellings projections have been extrapolated from 2031 to 2041 based on the rate of growth from 2026 to 2041.

The projected dwellings for the Wagga Wagga urban centre and villages is shown in **Table 3**.

[2] Available at http://forecast2.id.com.au/Default.aspx?id=304&pg=5000, accessed 15 April 2013.
[3] ie projected population divided by projected dwellings

Table 3: Projected dwellings, 1996-2041

Year	1996	2006	2011	2016	2021	2026	2031	2036	2041
Population of Wagga Wagga, including Gumly Gumly and Forest Hill (Wagga Urban Centre)	49,732	54,268	56,109	59,927	64,150	68,281	72,150		
Dwellings for Wagga Wagga Urban Centre	**19,241**	**21,238**	**22,736**	**24,280**	**25,899**	**27,560**	**29,237**	**31,221**	**33,579**
Population for Villages (including non-serviced villages)	1,589	1,765	1,805	1,835	1,905	2,050	2,199		
Rural zones occupancy ratio		2.58	2.41	2.33	2.29	2.28	2.28	2.28	2.28
Dwellings for Villages	-	684	750	789	833	901	966	1,037	1,112
Total dwellings	-	21,922	23,486	25,069	26,732	28,461	30,203	32,258	34,691
Dwellings growth rate (pa)			1.4%	1.3%	1.3%	1.3%	1.2%	1.3%	1.5%

3.2 Land use information

This DSP should be read in conjunction with the current Local Environmental Planning Instruments which apply to the Wagga Wagga Local Government Area.

4. Sewerage infrastructure

The existing and proposed sewerage assets are shown on the Plans in **section 11**, and **Appendix B**, with a description of servicing for each development area described in **Appendix A**.

4.1 Estimates of Capital Costs

The estimated capital cost of works serving the area covered by this DSP is shown in **Appendix B**. Details of the assets included in the costings are provided in the background document *Background Data used for Calculating DSP Charges for Sewerage*.

4.2 Timing of Works and Expenditure

The timing and expenditure for works serving the area covered by this DSP are shown in **Appendix B**.

5. Standards of service

Council has prepared a Strategic Business Plan (SBP) for its Sewerage business. This SBP details the level of service across the scope of this business. The level of service relevant to the preparation of this Plan is as follows:

Table 4: Target Level of Service, Sewerage (2011 Strategic Business Plan)

Description	Unit	2011 Target Level of Service
Availability of Service		
- Extent of areas serviced.	Service area	As near as practicable to 100% within the defined service area.
Standard of Treatment		All sewage received at Council's STPs will be treated to achieve NSW EPA's (ie. DECCW) Environmental Protection Licence Standards before discharge to the environment. In particular: ▪ Wastewater discharge to waterways is to meet sensitive water standards as defined by the NSW DECCW. ▪ Wastewater provided to local reuse customers is to be fit for purpose, meeting appropriate standards for the protection of public health and the environment. Biosolids management should be carried out in an environmentally responsible manner.
Response Times for System Failures (Defined as the maximum time to have staff on site to commence rectification).		
Priority One: (Major spill, significant environmental or health impact, or affecting large number of consumers i.e. a major main).		
- Response time during working hours	Hours	1
- Response time after hours	Hours	2
Priority Two: (Moderate spill, some environmental or health impact, or affecting small number of consumers i.e. other mains).		
- Response time during working hours	Hours	1
- Response time after hours	Hours	2
Priority Three: (Minor spill, little environmental or health impact, or affecting only a single property).		
- Response time during working hours.	Hours	2
- Response time after hours.	Hours	4
Response Times for Complaints		
General Complaints and Inquiries:		
Written complaints.	Working days	5
Oral complaints.	Working days	2
Note: times for 95% of complaints.		
Odour Complaints		
Treatment works	No./ year	2
Pumping Stations	No./ year	4

Description	Unit	2011 Target Level of Service
Effluent Discharge and Sludge Management		
Failure to meet licence limits and statutory requirements (100 percentile)	No. of samples/ year	0

6. Design parameters

Investigation and design of new water supply system components is generally based on the Water Services Association of Australia (WSAA) guidelines.

In particular, the loading of trunk sewerage assets is based on the WSAA guidelines, modified by the following parameters:

- The parameter 'A' (built area) is replaced by a lot density of 10 equivalent tenements per hectare.
- An occupancy ratio of 2.6 equivalent persons per equivalent tenement has been adopted.
- Average dry weather flow is set at 210 litres per equivalent person per day.
- The parameter 'IIF' (infiltration and inflow) is replaced by the term 0.029CT, where CT is the cumulative number of equivalent tenements.

Where necessary, investigation and design of sewerage system components is based on the *Manual of Practice: Sewer Design* (1984) and the *Manual of Practice: Sewage Pumping Station Design* (1986). These manuals were prepared by the former NSW Department of Public Works and are now managed by the NSW Office of Water, Department of Primary Industries.

7. Calculated Developer Charges

Developer charges are calculated by determining a capital charge for each service area and reducing the value by a 'reduction amount' (the present value of the estimated net income of the business associated with the development – see glossary).

The DLWC Guidelines require that, at minimum, capital charges be agglomerated into groups of similarly priced service areas, in 30% steps. Council then has the power to agglomerate further, including the application of a single charge for the service across the entire LGA.

7.1 Capital Charge

Council has elected to agglomerate the charges further, such that a single capital charge is applied to all areas falling under this DSP.

Table 5 shows the capital charge calculations for each of the service areas within the Wagga Wagga City sewerage systems. These areas have been agglomerated in accordance with the minimum level of agglomeration required under the DLWC guidelines.

Council has elected to agglomerate the charges further, such that a single capital charge is applied to all areas falling under this DSP.

Table 5: Capital charge calculations, sewerage

Approx Locality (see section 11)	NPV Growth (7%)	Capital Charge	Minimum agglomerated charge
Ladysmith	6	$30,580	$29,505
Oura	4	$27,834	
Gumly Gumly-East Wagga	24	$18,696	$18,696
Tarcutta	2	$11,552	$8,797
Forest Hill	2	$9,190	
Rural Residential	183	$8,921	
Lake Albert	10	$8,537	
Springvale	43	$8,203	$5,884
Gobbagombalin	17	$7,426	
Glenora-St Elmos-Boorooma East	145	$6,182	
Mangoplah	11	$5,840	
Boorooma West	123	$5,410	
CSU South Campus	16	$5,250	
Tatton	75	$4,850	$4,303
Bomen West	49	$4,622	
Bomen Central	25	$4,560	
Estella-University	226	$4,318	
Bourkelands	79	$4,170	
Tolland	11	$3,700	
Ashmont-Glenfield	53	$3,626	

Approx Locality (see section 11)	NPV Growth (7%)	Capital Charge	Minimum agglomerated charge
Mount Austin	16	$3,400	
Kooringal	61	$3,210	
Moorong	32	$3,180	
Lloyd West	151	$3,091	
Lloyd East	148	$3,056	$3,044
Collingullie	2	$3,000	
Wagga Wagga Central	165	$2,938	
Uranquinty	23	$2,800	
FULLY AGGLOMERATED CAPITAL CHARGE			$5,159

7.2 Reduction Amount

The Reduction Amount has been calculated using the NPV of Annual Charges method, using FINMOD financial planning software and spreadsheets provided by the NSW Office of Water, Department of Primary Industries. The spreadsheets are provided in **Appendix D**.

The calculated reduction amount is **$1,621** per equivalent tenement.

7.3 Review and update of calculated Developer Charges

Developer charges relating to this DSP will be reviewed after a period of 5 to 6 years.

In the period between reviews, developer charges will be adjusted on 1 July each year on the basis of movements in the Consumer Price Index for Sydney[4], in the preceding 12 months to December. The base index for calculations is **100.5**, being the value of the Consumer Price Index for the quarter ending **30 June 2012**.

7.4 Reticulation works

The developer shall be responsible for the full cost of the design and construction of water supply and sewerage reticulation works within subdivisions. In addition the developer will be financially responsible for the full cost of the design and construction of water supply and sewerage reticulation works required to connect the subdivision to Wagga Wagga City Council's trunk infrastructure.

For example a subdivision will require reticulation for sewerage to service the individual lots. The developer will also need to finance the connection between the subdivision and the trunk main, plus the cost of any storages and/or pump stations required to ensure that Wagga Wagga City Council's level of service requirements can be met for all developments within the subdivision.

[4] Australian Bureau of Statistics Publication 6041.0, Table 1

7.5 Cross-subsidy

The developer charges will raise in the order of $2.0m per annum. This is equivalent to about $85 per rates assessment per year. The adoption of these developer charges eliminates any cross-subsidy between developers and customers.

7.6 Summary

The developer charges for the area covered by the DSP are outlined below. As council has elected to apply single charge for all areas covered by this DSP, the fully agglomerated developer charge of $3,538 per equivalent tenement applies.

Table 6: Calculated developer charges, sewerage

Approx Locality (see section 11)	NPV Growth (7%)	Capital Charge	Minimum agglomerated charge	Reduction amount	Developer charge ($/ET)
Ladysmith	6	$30,580	$29,505	$1,621	$27,884
Oura	4	$27,834			
Gumly Gumly-East Wagga	24	$18,696	$18,696	$1,621	$17,075
Tarcutta	2	$11,552	$8,797	$1,621	$7,176
Forest Hill	2	$9,190			
Rural Residential	183	$8,921			
Lake Albert	10	$8,537			
Springvale	43	$8,203	$5,884	$1,621	$4,263
Gobbagombalin	17	$7,426			
Glenora-St Elmos-Boorooma East	145	$6,182			
Mangoplah	11	$5,840			
Boorooma West	123	$5,410			
CSU South Campus	16	$5,250			
Tatton	75	$4,850	$4,303	$1,621	$2,682
Bomen West	49	$4,622			
Bomen Central	25	$4,560			
Estella-University	226	$4,318			
Bourkelands	79	$4,170			
Tolland	11	$3,700			
Ashmont-Glenfield	53	$3,626			
Mount Austin	16	$3,400			
Kooringal	61	$3,210	$3,044	$1,621	$1,423
Moorong	32	$3,180			
Lloyd West	151	$3,091			
Lloyd East	148	$3,056			
Collingullie	2	$3,000			
Wagga Wagga Central	165	$2,938			
Uranquinty	23	$2,800			
FULLY AGGLOMERATED CAPITAL CHARGE			$5,159	$1,621	$3,538

8. References

.id (2011) *Wagga Wagga City Council Population Forecasts*, available at http://forecast2.id.com.au/Default.aspx?id=304&pg=5000 [accessed April 2013].

Department of Land and Water Conservation[5] (2002) *Developer Charges Guidelines: Water Supply, Sewerage and Stormwater*, NSW Crown.

Department of Land and Water Conservation (2003) *NSW Reference Rates Manual for Valuation of Water Supply, Sewerage and Stormwater Assets*, NSW Crown.

GHD (10 December 2012) *Pine Gully Road Sewage Pumping Station Investigation*, letter report to Charles Sturt University Design Architect.

Government Pricing Tribunal (1995) *Sydney Water Corporation: Prices of Developer Charges for Water, Sewerage and Drainage Services*, available at http://www.ipart.nsw.gov.au

Independent Pricing and Regulatory Tribunal (2000) *Sydney Water Corporation, Hunter Water Corporation, Gosford City Council, Wyong Shire Council: Developer Charges from 1 October 2000*, available at http://www.ipart.nsw.gov.au

NSW Department of Planning (2009) *New South Wales Household and Dwelling Projections, 2006–2036,* 2009 release.

NSW Office of Water (2012) *NSW Reference Rates Tables*, July 2012.

Rehbein AOS (2010) *Wagga Wagga Airport Master Plan 2010*.

Wagga Wagga City Council (2004) *The People of Wagga Wagga: A community profile and population projections based on the 2001 national census*, available at http://www.wagga.nsw.gov.au.

These documents can be reviewed at Council's offices by appointment.

[5] The relevant functions of the former NSW Department of Land and Water Conservation are, at the time of writing, executed by the Office of Water, NSW Department of Primary Industries.

9. Related plans

This document should be read in conjunction with council's adopted plan(s), inclusive of the following:

- Plans made under sections 94 and 94A of the *Environmental Planning and Assessment Act 1979*.
- Wagga Wagga Local Environmental Plan 2010 (or its replacement)
- Other environmental planning instruments as applicable to the relevant site.

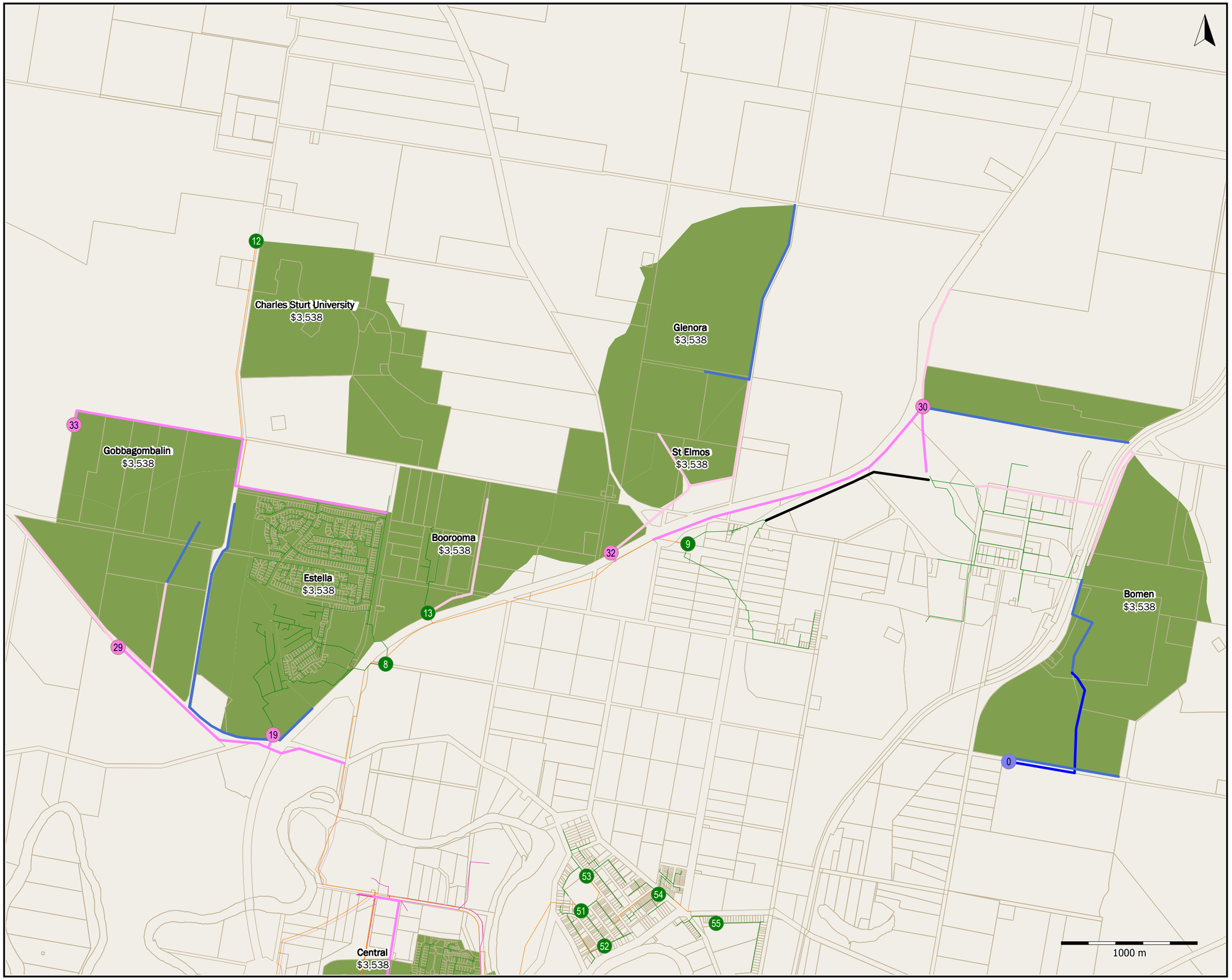
10. Glossary

Term	Meaning
ADWF	Average Dry Weather Flow
Annual Demand	Total annual water consumption
AWWF	Average Wet Weather Flow
BOD_5	Five day biochemical oxygen demand. Used as one measure of the 'strength' of sewage.
Capital Charge	Capital cost of assets per ET on a present value basis.
Capital Cost	The Present Value (MEERA basis) of assets used to service the development.
CPI	Consumer Price Index
DCP	Development Control Plan
DECCW	Department of Environment, Climate Change and Water (defunct- the environmental regulatory functions are now administered by the Environment Protection Authority, the environmental policy functions are regulated by the Office of Environment and Heritage, and the water and sewerage functions of DLWC are now administered by the Office of Water, Department of Primary Industries).
DEUS	Department of Energy, Utilities and Sustainability (defunct- the water and sewerage functions of DEUS are now administered by the Office of Water, Department of Primary Industries)
Developer Charge	A charge levied on developers to recover part of the capital cost incurred in providing infrastructure to new development.
Discount Rate	The rate used to calculate the present value of money which will be spent or received in the future.
DLWC	Department of Land and Water Conservation (defunct- the water and sewerage functions of DLWC are now administered by the Office of Water, Department of Primary Industries)
DPWS	Department of Public Works and Services (defunct- the water and sewerage functions of DWPS are now administered by the Office of Water, Department of Primary Industries)
DSP	Development Servicing Plan
DWE	Department of Water and Energy (defunct- the water and sewerage functions of DWPS are now administered by the Office of Water, Department of Primary Industries)
EP	Equivalent Person
EPA	Environment Protection Authority of New South Wales.
ET	Equivalent Tenement (ie the equivalent load deemed to be imposed by a typical household)
IPART	Independent Pricing and Regulatory Tribunal
IWCM	Integrated water cycle management
kL/d	Kilolitres per day (thousands of litres per day)
LEP	Local Environmental Plan
Major Asset	Water supply headworks assets such as dams/weirs, water treatment works, headworks pumping stations and associated pipelines and tunnels. Sewerage assets such as sewage treatment works, effluent management works, major trunk sewers, major pumping stations and rising mains.
MEERA	Modern Equivalent Engineering Replacement Asset (the equivalent modern asset which provides the same level of service as an existing older asset)
ML/d	Megalitres per day (millions of litres per day)
NHMRC	National Health and Medical Research Council
NOW	NSW Office of Water, Department of Primary Industries.
NPV	Net Present Value – the net value of future income and expenses in today's terms
OEH	Office of Environment and Heritage
OMA	Operation, maintenance and administration (costs)
Peak Day Demand	Highest water consumption on one day in a year.
Post-1996 Asset	An asset that was commissioned on or after 1 January 1996 (or that is yet to be commissioned).
Pre-1996 Asset	An asset that was commissioned by a water utility before 1 January 1996.

Present Value (PV)	The equivalent value of future money (or ETs) today.
PS	Pumping Station
PWWF	Peak Wet Weather Flow
Real Terms	The value of a variable adjusted for inflation by a CPI adjustment.
Reduction Amount	The amount by which the capital charge is reduced to arrive at the developer charge. This amount reflects the present value of the capital contribution that will be paid by the future owner of a development as part of their annual charges.
ROI	Return on investment. Represents the income that is, or could be, generated by investing money.
Service Area	An area served by a separate water supply system, an area served by a separate sewage treatment works, a separate small town or village, or a new development of over 500 lots.
SR	Service Reservoir
SS	Suspended solids, or the concentration of particles in sewage. Used as one measure of the 'strength' of sewage.
STP	Sewage Treatment Plant
TRB	Typical residential bill
WTP	Water Treatment Plant

11. Plans

Figure 1- Northern Suburbs Developer Charges



Pumping stations
- Existing
- Council provided
- Developer provided
- Privately owned

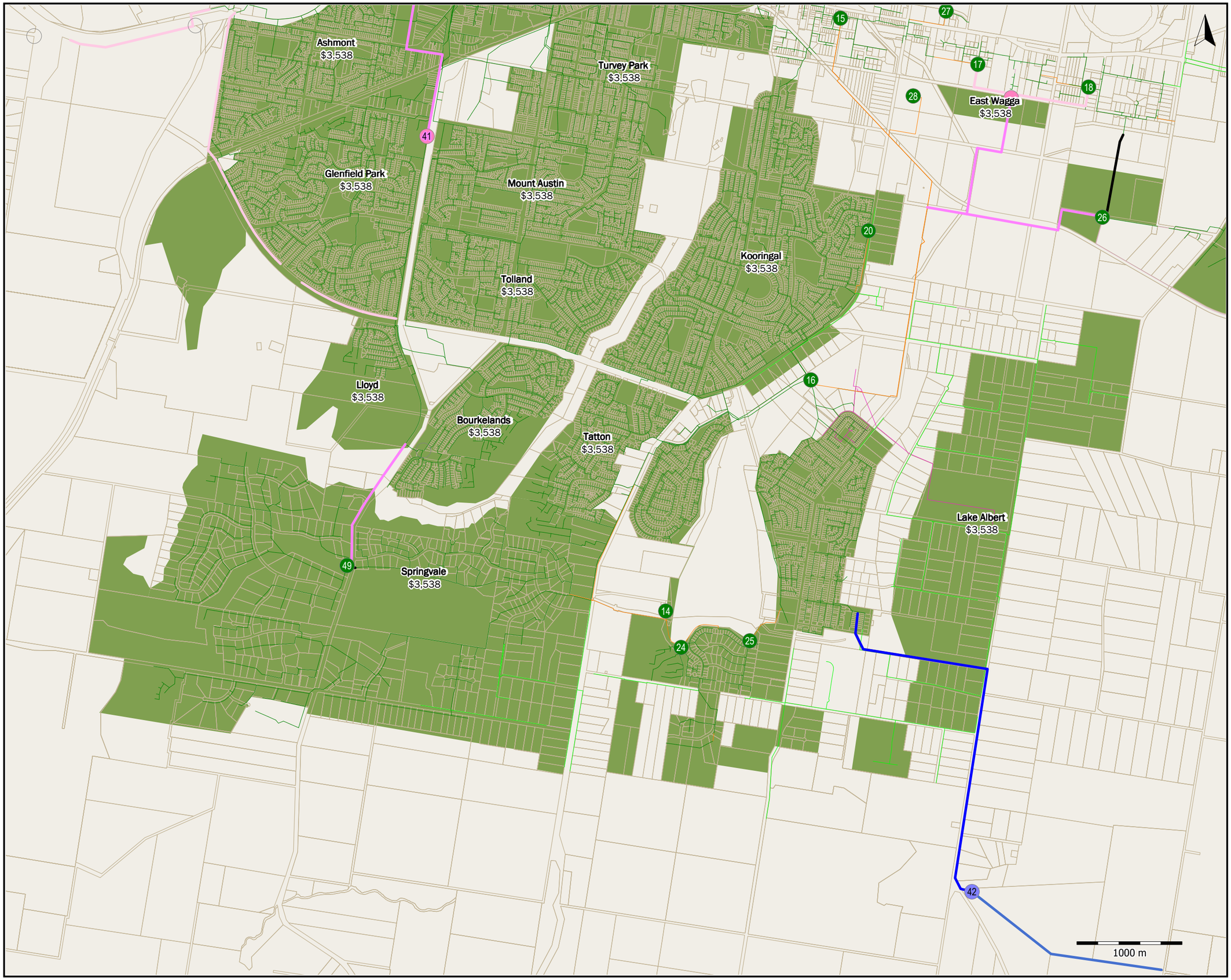
Strategy_Mains
- Abandoned
- Future Council
- Future Council Rising
- Future Developer
- Future Developer Rising

Existing Sewerage Lines
- Other
- Gravity main
- Pressure reticulation
- Rising main
- Treated Effluent

Cadastre

Developer Charges
- 1000
- 1900
- 3800
- 7600
- 15100
- 30000

Figure 2- Southern Suburbs Developer Charges



Pumping stations
- Existing
- Council provided
- Developer provided
- Privately owned

Strategy Mains
- Abandoned
- Future Council
- Future Council Rising
- Future Developer
- Future Developer Rising

Existing Sewerage Lines
- Other
- Gravity main
- Pressure reticulation
- Rising main
- Treated Effluent

Cadastre

Developer Charges
- 1000
- 1900
- 3800
- 7600
- 15100
- 30000

Figure 3- Western Suburbs Developer Charges

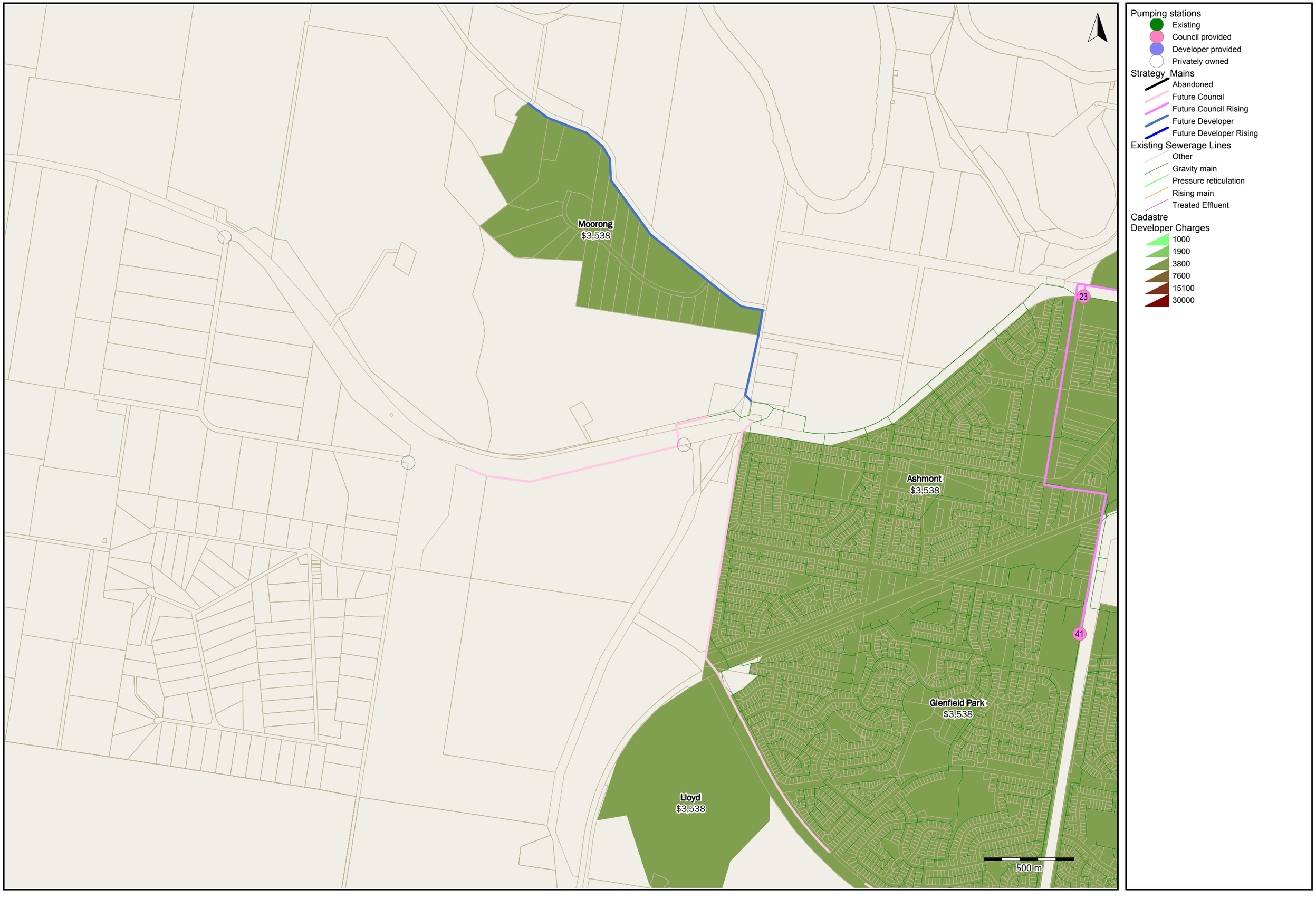
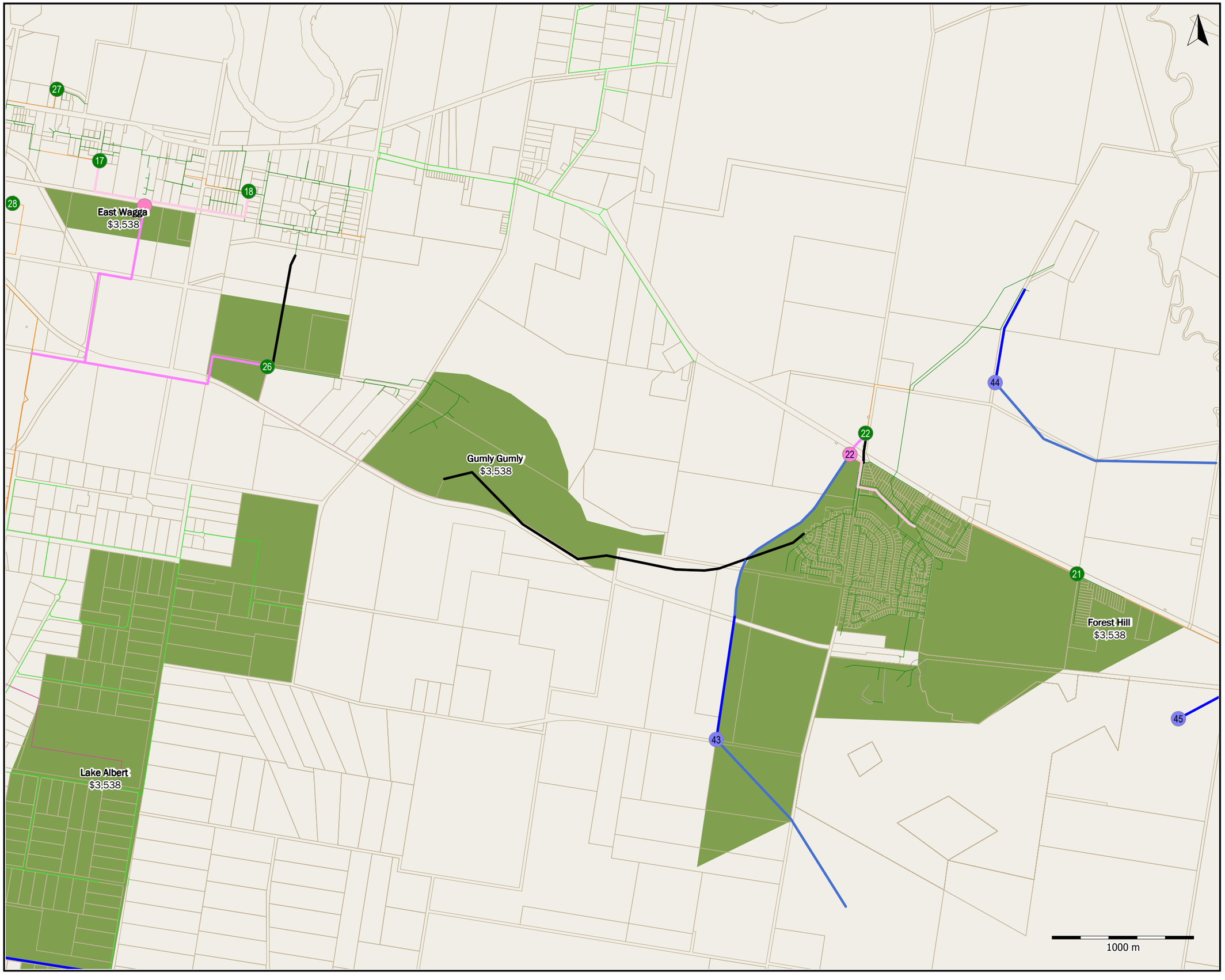


Figure 4- Eastern Suburbs Developer Charges



Pumping stations
- Existing
- Council provided
- Developer provided
- Privately owned

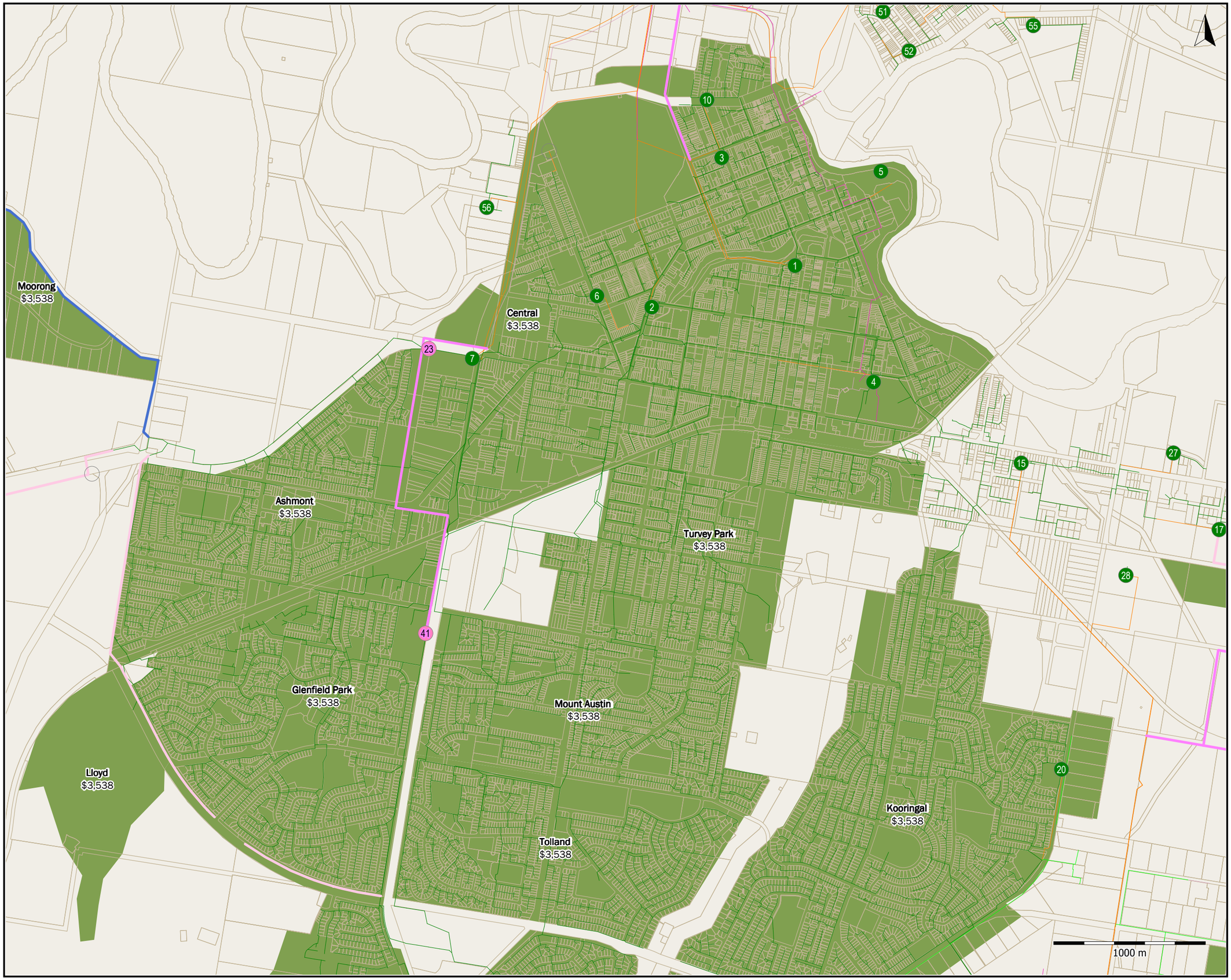
Strategy Mains
- Abandoned
- Future Council
- Future Council Rising
- Future Developer
- Future Developer Rising

Existing Sewerage Lines
- Other
- Gravity main
- Pressure reticulation
- Rising main
- Treated Effluent

Cadastre

Developer Charges
- 1000
- 1900
- 3800
- 7600
- 15100
- 30000

Figure 5- Central Suburbs Developer Charges



Pumping stations
- Existing
- Council provided
- Developer provided
- Privately owned

Strategy Mains
- Abandoned
- Future Council
- Future Council Rising
- Future Developer
- Future Developer Rising

Existing Sewerage Lines
- Other
- Gravity main
- Pressure reticulation
- Rising main
- Treated Effluent

Cadastre

Developer Charges
- 1000
- 1900
- 3800
- 7600
- 15100
- 30000

Figure 6: Collingullie Service Area

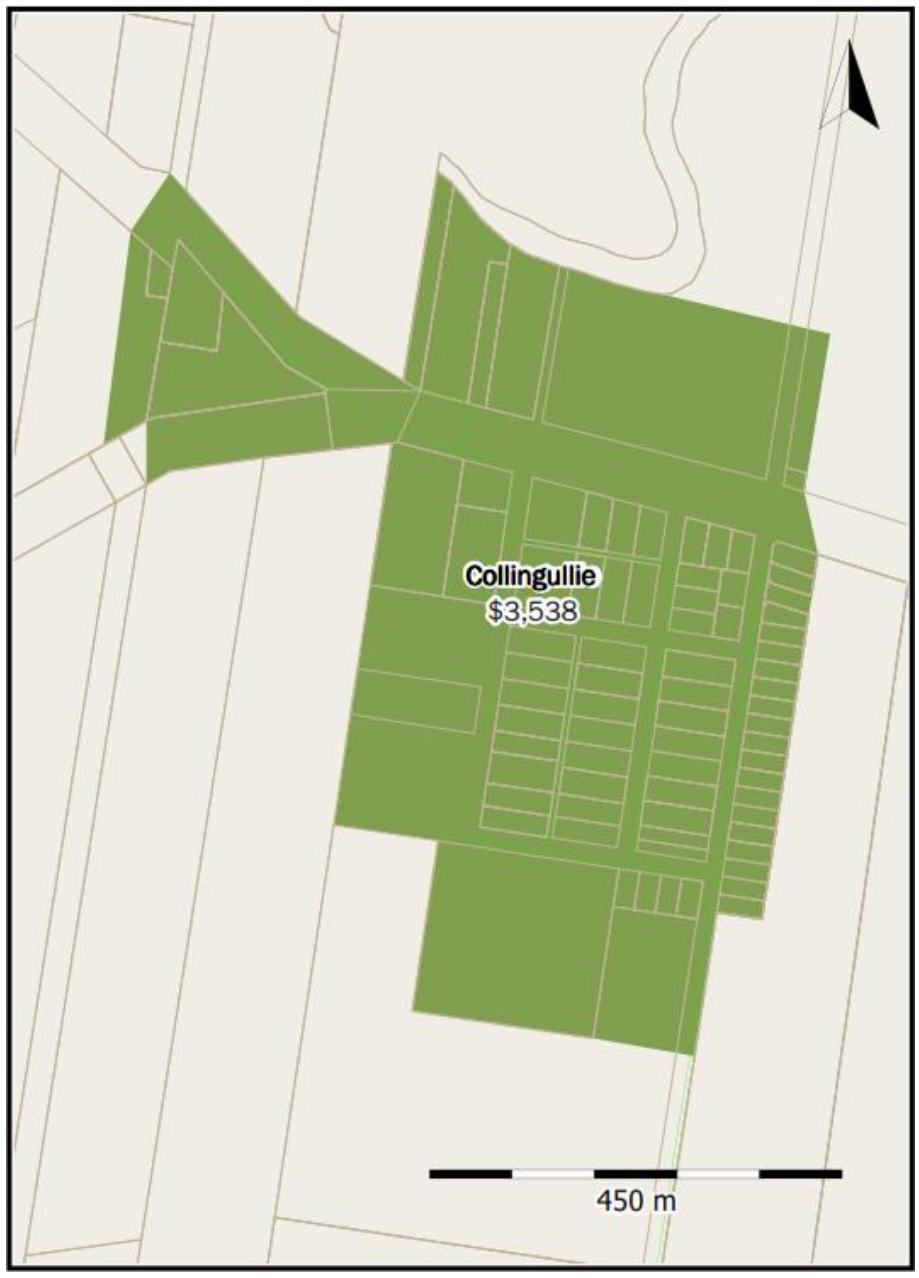


Figure 7: Ladysmith Service Area

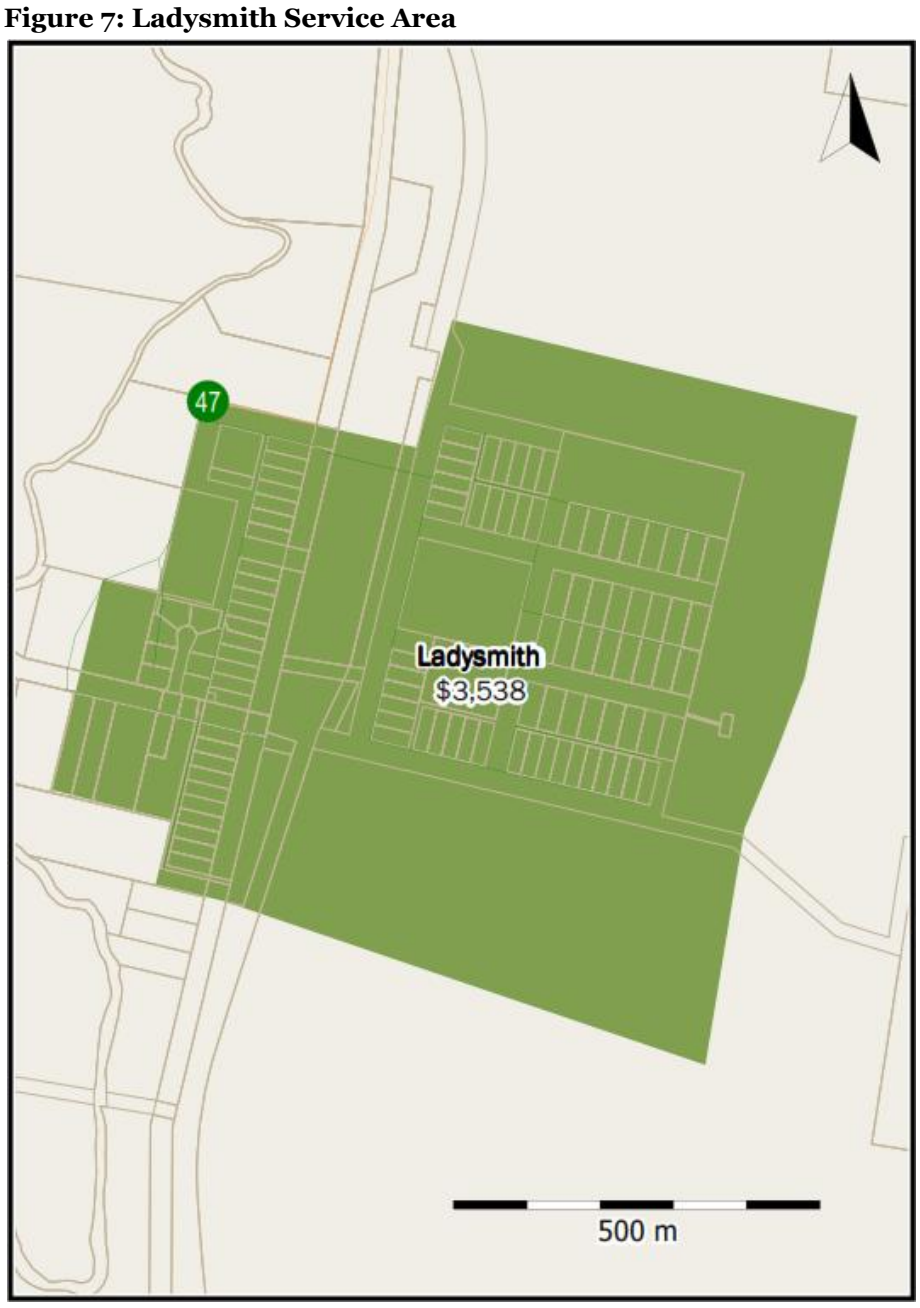


Figure 8: Mangoplah Service Area

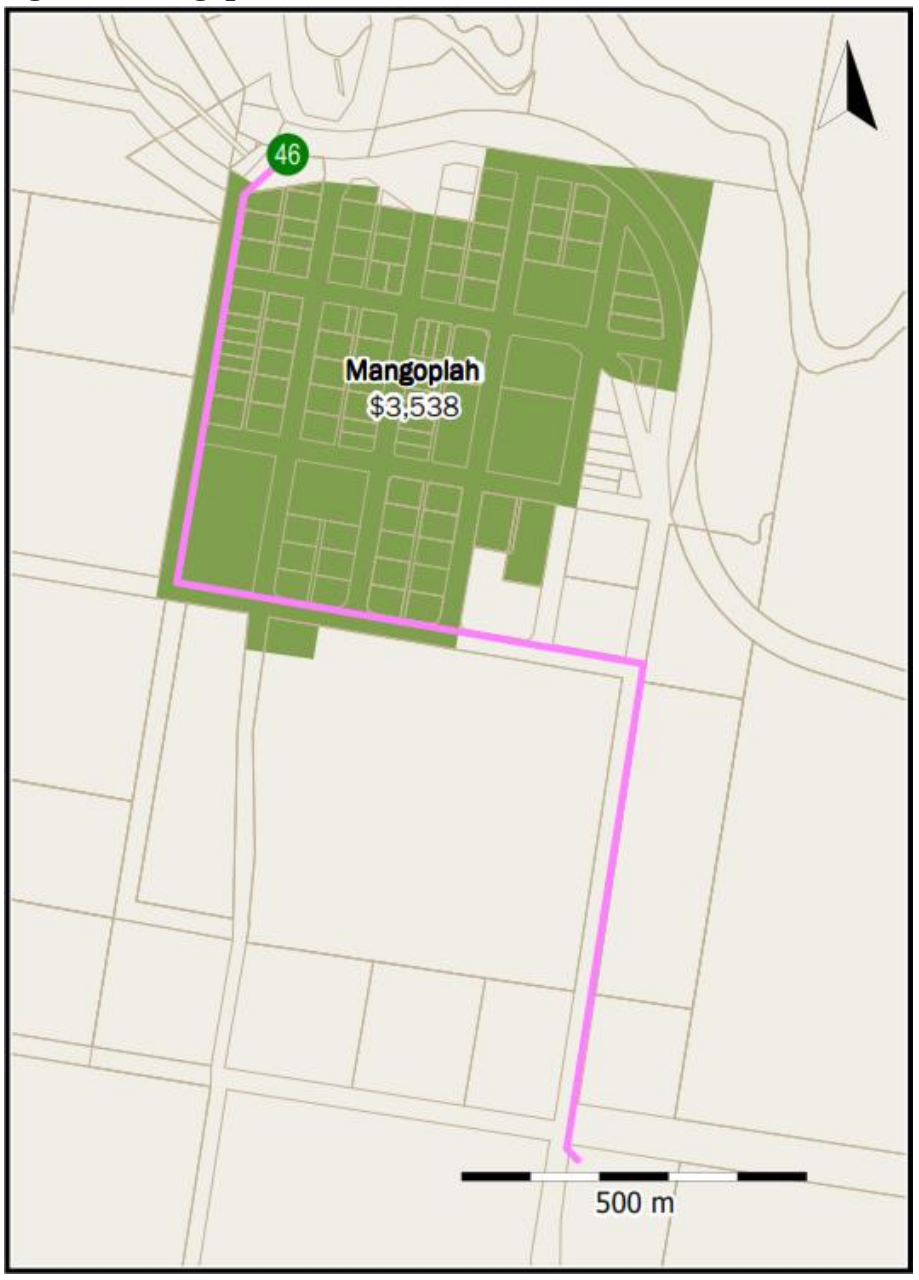


Figure 9: Oura Service Area

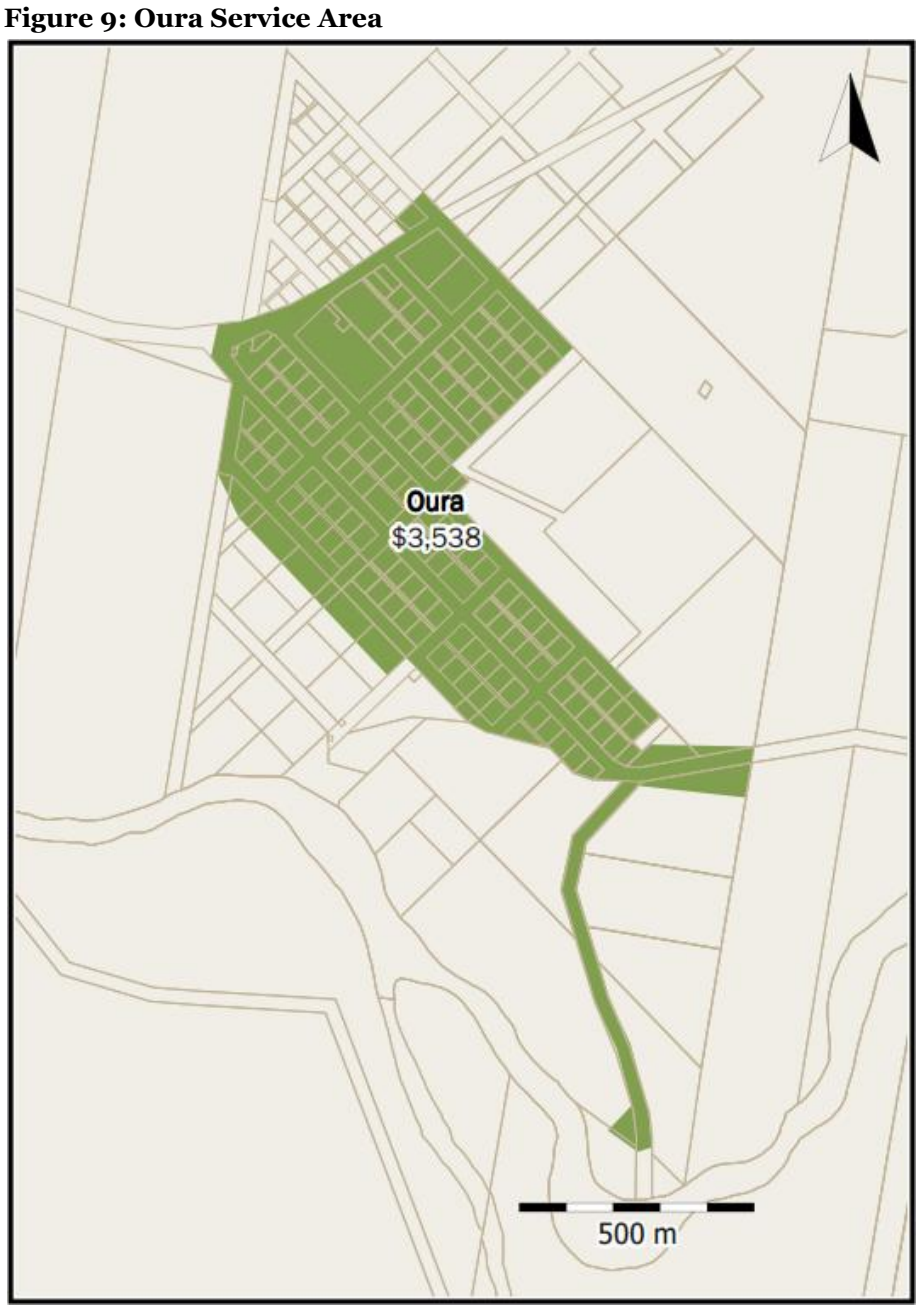


Figure 10: Tarcutta Service Area

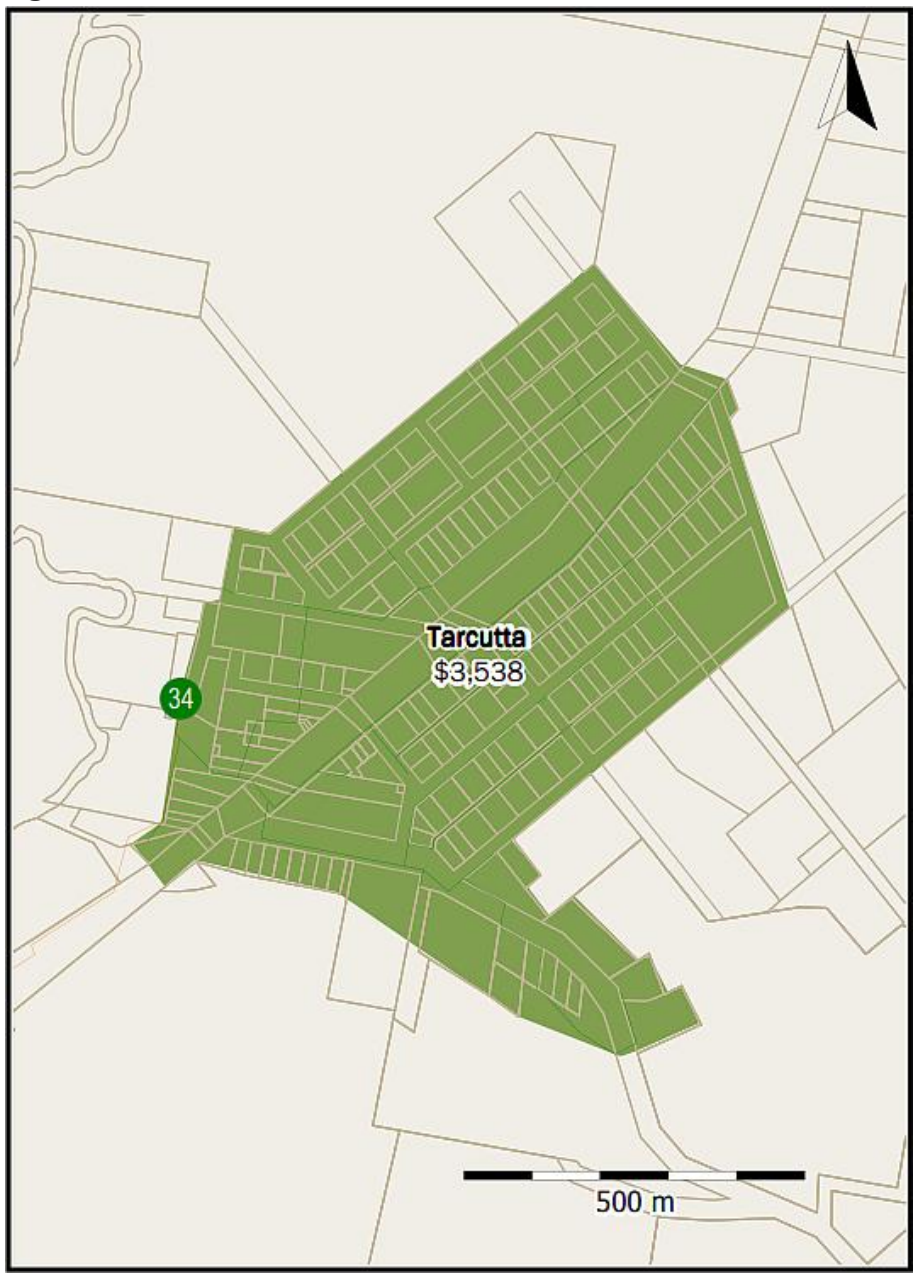
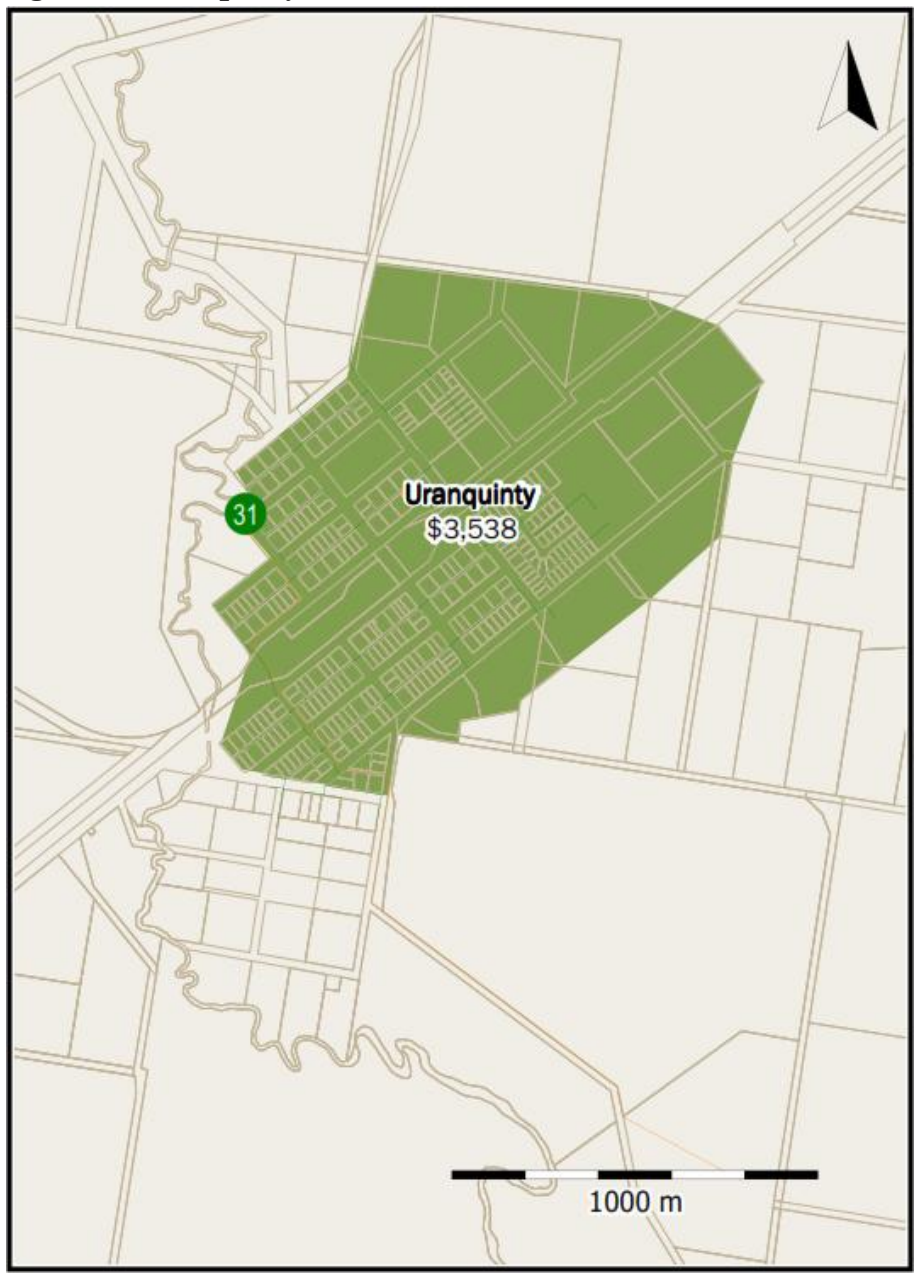


Figure 11: Uranquinty Service Area



Appendix A: Assignment of Growth

Executive Summary

This appendix outlines the methods and outcomes of the assignment of growth to the sewerage network.

The document outlines the following:

- The information used for the base growth forecasts (Section A2);
- The methods used to convert this information into the parameters required to prepare the Sewerage DSP (Section A3);
- Details of how growth has been assigned on a catchment by catchment basis (Section A4).

A tabulation of the growth figures used in the DSP is provided in Section A5.

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A1. Introduction

The Development Servicing Plan requires two key sources of data to calculate capital costs per tenement, which form the basis of the developer charges:

1. A forecast of future loads on the sewerage networks to 2041
2. A valuation of existing assets, and estimates of the cost of future assets which are required to service all development to 2041.

1.1 Purpose of Report

This appendix documents the methodology used to adjust growth projections for use in estimating future loading of the sewerage system. It outlines sources, how data was extended and conversion of population projections to Equivalent Tenement (ET) loadings.

1.2 Disclaimer

This document has been prepared by MC Environmental Consulting. The document has been prepared for a particular purpose, using information made available by the client in accordance with the client's instructions. Users of this document should note the assumptions and approximations used. Any use of the document outside of the stated purpose is at the user's risk.

A2. Sources

Population projections have been developed to be consistent with projections prepared by .id, a specialist forecasting company, and commissioned by Wagga Wagga City Council[1].These projections are for population and dwellings for the period 2006 to 2031, with a 2011 update based on census results. The forecasts are for regions of the Wagga Wagga LGA, generally made up of a collection of suburbs and localities, and two residual rural zones.

This Development Servicing Plan considers projections of dwellings to 2041. It does so by extrapolating from these forecasts, and allocating growth to undeveloped areas within the region.

The above projections are too coarse for use to project growth in villages. Projected growth for villages is based on the document *The people of Wagga Wagga: A community profile and population projections based on the 2001 national census* (Wagga Wagga City Council, 2004).

The proportion of people of working age is derived from the NSW Department of Planning document *New South Wales Household and Dwelling Projections, 2006–2036*, 2009 release.

Sewerage network asset data has been based on Wagga Wagga City Council's Pipepak Asset Management System.

[1] Available at http://forecast2.id.com.au/Default.aspx?id=304&pg=5000, accessed 15 April 2013.

A3. General methods

3.1 Data interpolation

The preparation of a Development Servicing Plan requires the estimated population growth for a period of 28 years. In addition, intermediate population forecasts are useful to identify the timing of future assets and augmentation of existing assets.

3.2 Estimation of Equivalent Persons and Equivalent Tenements

The unit of measure for growth projections is the Equivalent Tenement. For the purpose of this Development Servicing Plan, growth forecasts have been prepared on an equivalent tenement basis. Residential development is assumed to have an equivalence of one equivalent tenement per dwelling.

Table A1: Wagga Wagga City Council equivalent tenements

	Sewerage
Average daily demand/ flow	140 kL/ET/a
Equivalent Persons (EP)	1 ET = 2.6 EP in 2011 1 ET = 2.47EP in 2031
Residential equivalent loading (2011)	22,945 ET
Non-residential equivalent loading (2011)	11,581 ET

3.3 Residential growth

Population projections have been developed to be consistent with the .id forecast regions, with extrapolations to 2040. Population forecasts for villages are based on the 2004 *People of Wagga Wagga* report.

The methods used for forecasting population are summarised in Table A2.

Table A2: Method for determining population forecasts for scenario years

Scenario year	Calculated using
1996	*People of Wagga Wagga* report, based on Census data and refined using data within Council's Pipepak asset management system.
2006 2011	.id population data for Wagga Wagga urban centre, including Gumly Gumly and Forest Hill *People of Wagga Wagga* for villages Growth disaggregated to sewerage catchments based on data within Council's Pipepak asset management system.
2016 2021 2026 2031	.id population forecast for Wagga Wagga urban centre, including Gumly Gumly and Forest Hill *People of Wagga Wagga* for villages Growth disaggregated to development areas based on a likely pattern of orderly and economic development
2036 2041	No population forecast made, dwellings forecast extrapolated

The rate of residential growth is driven by two factors:

- Changes in population

- Changes in the occupancy rate of dwellings.

The resulting projections are summarised in **Table A3**.

Table A3: Projected residential populations, 1996-2031

	1996	2006	2011	2016	2021	2026	2031
Wagga Wagga, including Gumly Gumly and Forest Hill	49,732	54,268	56,109	59,927	64,150	68,281	72,150
Villages (including non-serviced villages)	1,589	1,765	1,805	1,835	1,905	2,050	2,199
Total	51,321	56,033	57,914	61,762	66,055	70,331	74,349

The Wagga Wagga urban areas are expected to follow the national trend of declining occupancy rates in housing, related to increasing affluence and changed social dynamics.

The .id projections incorporate dwellings projections for each of its forecast regions. For the Wagga Wagga urban centre, these dwellings projections have been adopted to calculate growth. For the villages, the growth in dwellings has been estimated based on population growth forecasts and the .id projection of occupancy ratios[2] for the rural forecast areas. In both cases the dwellings projections have been extrapolated from 2031 to 2041 based on the rate of growth from 2026 to 2041.

The projected dwellings for the Wagga Wagga urban centre and villages is shown in **Table A4**.

Table A4: Projected dwellings, 1996-2041

Year	1996	2006	2011	2016	2021	2026	2031	2036	2041
Population of Wagga Wagga, including Gumly Gumly and Forest Hill (Wagga Urban Centre)	49,732	54,268	56,109	59,927	64,150	68,281	72,150		
Dwellings for Wagga Wagga Urban Centre	**19,241**	**21,238**	**22,736**	**24,280**	**25,899**	**27,560**	**29,237**	**31,221**	**33,579**
Population for Villages (including non-serviced villages)	1,589	1,765	1,805	1,835	1,905	2,050	2,199		
Rural zones occupancy ratio		2.58	2.41	2.33	2.29	2.28	2.28	2.28	2.28
Dwellings for Villages	-	**684**	**750**	**789**	**833**	**901**	**966**	**1,037**	**1,112**
Total dwellings	-	**21,922**	**23,486**	**25,069**	**26,732**	**28,461**	**30,203**	**32,258**	**34,691**
Dwellings growth rate (pa)			1.4%	1.3%	1.3%	1.3%	1.2%	1.3%	1.5%

3.4 Non-residential growth

Non-residential growth is difficult to accurately forecast and there is a lack of information regarding the potential impact on the sewerage system. Growth in employment is assumed to be driven by growth in the working age population.

[2] ie projected population divided by projected dwellings

The Department of Planning forecasts identify that in the Wagga Wagga LGA the proportion of the population which is of working age will decline over the planning timeframe. The proportion of the population which is of working age is shown in **Table A5**.

Table A5: Proportion of population which is of working age, 2006-2036 (based on Table 210.2 of Department of Planning, 2009)

Year	2006	2011	2016	2021	2026	2031	2036	2041
% working age	66%	66%	65%	63%	61%	60%	59%	58%

The proportion of the population at working age was used to determine the net change in employment supply over the planning period. This then was applied to the Non-residential loadings for 2006, excluding large 'wet' industries, to derive a net increase in equivalent tenement loadings.

This approach is reasonably reliable provided that there aren't significant changes in the composition of the non-residential sector over the planning period. The resulting employment and growth rates are provided in **Table A6**.

Table A6: Projected non-residential loading growth, 2006-2040

Year	2006	2011	2016	2019	2025	2030	2035	2040
Wagga Wagga Labour Force	39,486	40,880	42,656	44,048	45,236	46,546	48,250	50,015
Net growth in labour force	6,186	1,394	1,776	1,392	1,188	1,310	1,703	1,766
Estimated growth in equivalent tenements		231	524	755	951	1,168	1,450	1,742

A4. Assignment of growth on network

4.1 Patterns of growth

Development Servicing Plans need loading growth to be assigned to smaller zones across the service area. This is because most assets in the distribution/collection parts of the network only benefit certain development areas, and therefore charges need to be calculated based on the assets actually used by the development area.

Zones where development is expected to occur have been created based on their proposed connection point to Council's infrastructure, either current or proposed.

Growth in load is assigned to a zone or catchment where that load is likely to be delivered. This generally is a trunk or carrier main immediately adjacent to the development area. It is not necessary to assign load within the development area, as the DSP process assumes the developer(s) will provide the infrastructure within the area. The model routes the additional load through the downstream network, recalculating system loadings and the total ETs utilising the infrastructure.

Service zones or catchments are generally based on existing infrastructure boundaries, such as the area serviced by a trunk main or sewage pumping station.

Below is a discussion of how growth has been assigned to each development area.

Refer to **Attachment 1** for a map showing the potential development areas identified by Wagga Wagga City Council for the current and proposed serviced centres.

4.2 Northern Development Areas

4.2.1 Estella West

Description of servicing

Estella forms part of the "Estella-University" .id forecast area.

Estella has been divided into four primary catchments as follows:

Table A7: Estella Sewerage Catchments

Catchment	Description
ES-A	Existing development area east of the north-south and north-west to south-east ridgelines
ES-B	Future development area bounded by the north-west to south-east ridgeline, the north-south ridgeline and Colin Knott Dr
ES-C	Future development area west of north-south ridgeline and to the east of Pine Gully Rd.

Catchment A is essentially developed. Catchment B is currently being developed, with Catchment C expected to commence once catchment B approaches capacity.

Catchment B falls to the junction of Colin Knott Dr and Old Narrandera Rd, where a new sewage pumping station is being constructed. This pumping station will also service Catchment C via a carrier main running down Pine Gully Rd and Old Narrandera Rd.

Assignment of growth

All growth is assigned to Catchment B until it approaches 80% of capacity. At this point growth is progressively diverted to Catchment C. The suburb essentially is at capacity by 2041.

New assets required

The development servicing plan works required are:

- The new Estella West sewage pumping station (SPS19), currently under construction, inclusive of a rising main connection to the existing rising main near the junction of Boorooma St and Gardiner St.
- A developer provided carrier main to connect Catchment C to the new sewage pumping station.

4.2.2 Gobbagombalin

Description of servicing

Gobbagombalin forms part of the "Estella-University" .id forecast area.

Gobbagombalin is expected to commence development in the short term, between 2011 and 2016. From a servicing perspective, Gobbagombalin is serviced via its own pumping station, discharging into the same rising main as the Estella West sewage pumping station. This pumping station can service the areas along Old Narrandera Rd (catchments GB-A and GB-C), however the western extent of catchment GB-B will require careful design to achieve fall.

The northern catchment (GB-B) will be serviced using a pumping station at the north-western corner of the suburb. The rising main from this pumping station will discharge into the Boorooma St carrier main in the vicinity of Estella Rd.

Assignment of growth

Initially development will occur in Catchment A, nearest to Pine Gully Rd. Once this catchment approaches 80% of capacity between 2026 and 2030, development commences in Catchment B. The suburb will still have spare capacity as of 2040.

New assets required

The development servicing plan works required are:

- A new sewage pumping station south of Old Narrandera Rd to service Catchments A and C, inclusive of a rising main connection to the rising main servicing Estella West SPS 19.
- A new sewage pumping station in the north-western corner of the suburb, with the associated rising main discharging into the Boorooma St carrier main in the vicinity of Estella Rd.

4.2.3 Charles Sturt University (Boorooma Campus)

Description of servicing

Charles Sturt University (Boorooma Campus) forms part of the "Estella-University" .id forecast area.

The Charles Sturt University Boorooma Campus is serviced via two routes:

- The western catchment (CSU-W) carries the majority of the existing loading and drains to CSU Sewage Pumping Station (SPS12). The sewage pumping station discharges into the existing Estella catchment (ES-A).
- The eastern catchment (CSU-E) services a light non-residential loading, including a number of liquid trade waste activities. This catchment drains to the Estella catchment (ES-A) under gravity.

Assignment of growth

Charles Sturt University has provided a study to Council[3] forecasting future growth to approximately 2020. The majority of growth relates to an increased residential population on the campus with some increased non-residential loading.

As a result all growth to 2021 has been assigned to catchment CSU-W. Following this the minor growth projected for the campus has been assigned to the less developed CSU-E.

New assets required

The study identified that SPS12 CSU will require a capacity upgrade before 2016 to cater for projected growth.

4.2.4 Boorooma

Description of servicing

Boorooma forms part of the "North Wagga Wagga - Bomen" .id forecast area.

The suburb spans three sewage drainage catchments:

- **Catchment BOR-AB** covers the western half of the study area. This area is serviced by Olympic Hwy Sewage Pumping Station (SPS13), discharging into the Northern Rising Main nearby. The future suburb of Hillgrove will also drain through this catchment.
- **Catchment BOR-C** covers the eastern half of the suburb. This area will be serviced using a pump station adjacent to the Olympic Highway, discharging into the Northern Rising Main nearby.

There is an area between the above catchments which is not economically serviceable using conventional sewerage. This area has been excluded from the DSP service area.

[3] GHD (10 December 2012) *Pine Gully Road Sewage Pumping Station Investigation*, letter report to Charles Sturt University Design Architect.

Assignment of growth

All of the growth forecast for the "North Wagga Wagga - Bomen" area has been initially assigned to catchment BOR-AB, until the catchment approaches 40% of its capacity between 2036 and 2041. Growth is then progressively assigned to BOR-C.

New assets required

The development servicing plan works required are:

- A trunk main to service the western portion of catchment BOR-AB, plus the future suburb of Hillgrove.
- A new sewage pumping station to service the eastern catchment BOR-C, inclusive of a rising main connection to the existing rising main in the vicinity of the Olympic Hwy and Coolamon Rd. The pumping station will also service the future suburbs of Glenora and St Elmos.

4.2.5 Glenora

Description of servicing

Glenora forms part of the "North Wagga Wagga - Bomen" .id forecast area.

The suburb traverses a ridgeline, meaning that the suburb will be serviced using two major routes, yielding two sub-catchments, as shown in Table A8.

Table A8: Glenora Sewerage Catchments

Catchment	Description
GA-A	Eastern portion of suburb, bounded by Poiles Rd to the east, and constrained by ridges to the north and west.
GA-B	North-western portion of suburb bounded by Coolamon Rd to the west and ridges to the north and east.

Assignment of growth

Dwellings forecasts indicate that it is not necessary for Glenora to commence development during the life of this Development Servicing Plan. Once development commences is likely that catchment GA-A will initially develop with catchment GA-B following once GA-A approaches capacity.

New assets required

- For catchment GA-A, council funded trunk mains passing through the St Elmos development area would connect the development area to the future Kingsford Smith Sewage Pumping Station (SPS32), which also services the western catchment of Boorooma (BOR-C).
- For catchment GA-B, a council funded trunk main, passing through the future suburb of Hillgrove and Boorooma would drain the catchment to Olympic Highway Sewage Pumping Station (SPS13).

4.2.6 Hillgrove

Description of servicing

Hillgrove forms part of the "North Wagga Wagga - Bomen" .id forecast area.

The future suburb is well suited to servicing with gravity sewerage, with the full suburb being capable of being drained through a single trunk main.

Assignment of growth

Dwellings forecasts indicate that it is not necessary for Hillgrove to commence development during the life of this Development Servicing Plan. Development may occur in tandem with the north-western catchment of Glenora (GA-B).

New assets required

In the event that this suburb commences development during the life of this DSP, the following assets would be required:

- A council funded trunk main, passing through Boorooma would drain the catchment to Olympic Highway Sewage Pumping Station (SPS13). This main will also extend to service catchment GA-B (Glenora).

4.2.7 St Elmos

Description of servicing

St Elmos forms part of the "North Wagga Wagga - Bomen" .id forecast area.

The service area for the suburb is reasonably small due to environmental constraints, essentially only representing the area downstream of the eastern catchment of Glenora (GA-A). It is possible to extend gravity service to some areas to the east if considered appropriate.

Assignment of growth

Dwellings forecasts indicate that it is not necessary for St Elmos to commence development during the life of this Development Servicing Plan. Development may occur in tandem with the southern catchment of Glenora (GA-A).

New assets required

Council funded trunk mains pass through the St Elmos development area to allow the eastern Glenora catchment (GA-A) to be serviced. These would connect the development area to the future Kingsford Smith Sewage Pumping Station (SPS32), which also services the western catchment of Boorooma (BOR-C).

4.2.8 Bomen Business Park

Description of servicing

The existing sewerage network services an abattoir and meat cannery as well as various 'dry' industries. The Wagga Livestock Marketing Centre occasionally discharges to sewer on an opportunity basis to manage excess wastewater.

The catchment is served by the Bomen Industrial Sewage Treatment Facility (BISTF)[4]. This facility partially treats industrial sewage before further treatment at the Narrung Street Sewage Treatment Works. The BISTF has a processing capacity of 4.5 megalitres per day[5] and is readily expandable to 6 megalitres per day. The BISTF has been designed to allow higher strength industrial wastes to be pre-treated locally to capture the benefits of pre-treatment and waste mixing at the same site.

The presence of the BISTF has a significant influence on the servicing approach for Bomen. The benefits of the BISTF are best realised if new 'wet' industry[6] pumps liquid trade wastes directly to the plant for pre-treatment and controlled mixing with other industrial streams.

The sewerage layout for the development area needs to have the following characteristics:

- Gravity sewers need be sized for 'dry'[7] industrial development. This will reduce the initial development cost and reduce the likelihood of operational problems due to underloading.
- Sewerage easements need to be large enough to allow the laying of additional pumped lines at a later stage.

The Bomen Business Park has been broken into four major catchments, as described in Table A9:

Table A9: Bomen Business Park Sewerage Catchments

Catchments	Description
Central: BO-C00	Existing service area
Central: BO-C01	Area to the east of the Great Southern Railway in the vicinity of the Riverina Investments and the BOC properties, which is capable of draining by gravity to the Bomen Industrial Sewage Treatment Facility.
Western: BO-W11 BO-W12 BO-W13	Area bounded by the Wagga Wagga Livestock Marketing Centre, the Olympic Highway, the Great Southern Railway and Trahairs Road.

[4] The Bomen Industrial Sewage Treatment Facility, as with other major treatment plants in Wagga Wagga, is operated by a contractor on behalf of Wagga Wagga City Council.
[5] Based on a high nitrogen/high carbon influent stream and effluent discharge at domestic strength
[6] 'Wet' industries include food processors and other industries where raw materials need to be cleaned, leading to significantly higher water consumption and wastewater generation, compared to other industry.
[7] Most industrial premises only require wastewater services for employee facilities and low volume activities such as cleaning parts. These areas have a lower sewer loading per hectare than residential areas. Guideline design values are available from sources such as NSW Water Directorate (2005) *Section 64 Determinations of Equivalent Tenements Guidelines.*

Southern: BO-S40	Area in the vicinity of Bavin Road
Eastern: BO-E20 BO-E21 BO-E30	Areas east of the Great Southern Railway and north of the East Bomen Reservoir.

All catchments are well graded for sewerage services, meaning that sewerage servicing will not represent a significant limitation when considering lot density and layout.

Assignment of growth

Growth is initially anticipated to occur in the Central and Western catchments, with the Central catchment receiving the majority of the growth in early years. The projected growth is capable of being accommodated within these two catchments.

In the event that a new large wet industry seeks to establish in Wagga Wagga, the servicing strategy seeks for this activity to occur in the Eastern catchments with wastewater pumped directly to the BISTF.

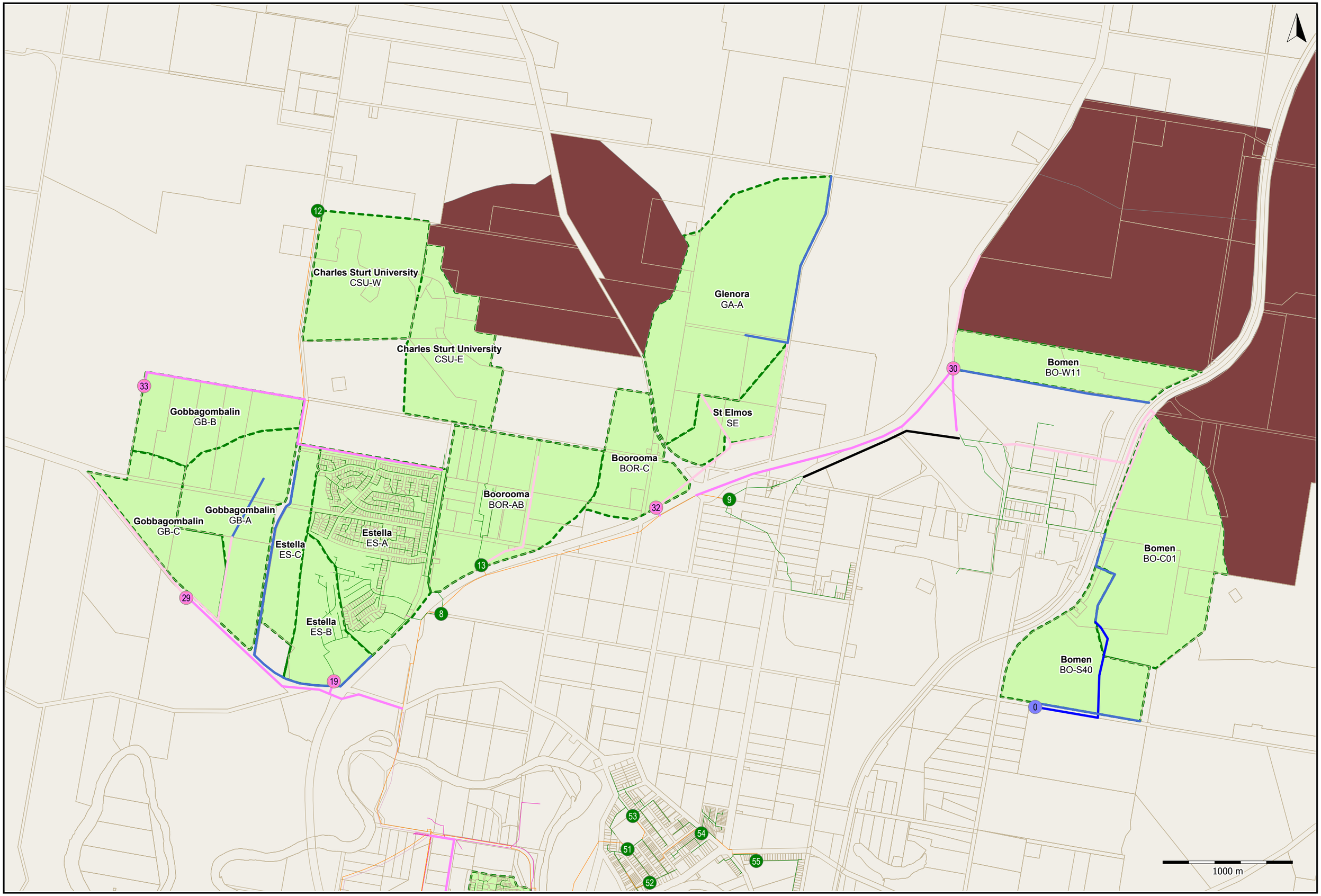
New assets required

Based on the growth projection, the following assets would be required to be funded by the DSP:

- A council funded sewage pumping station (SPS30 Bomen) to service the western catchments BW-11 and BW-12, in addition to decanted flows from the Bomen Industrial Sewage Treatment Facility (BISTF).
- A new link from the BISTF to the proposed SPS30 to enable the overloaded SPS9 Cartwrights to be bypassed.
- A council funded trunk main to link catchments BO-W11 and BO-W12 to the future sewage pumping station.
- A new council funded trunk main to provide drain the northern portion of catchment BO-C01.

Any development in the southern catchment BO-S40 will require a developer funded sewage pumping station and rising main connection to trunk mains in catchment BO-C01.

Figure A1- Northern Suburbs Development Areas



4.3 Southern Development Areas

4.3.1 Glenfield Park

Description of servicing

The Glenfield Park suburb is separately projected in the .id forecasts.

Glenfield is an established suburb, currently draining to SPS7 Flowerdale. New development in the suburb is proposed to utilise existing sewerage infrastructure.

Assignment of growth

Moderate growth is projected for the suburb, and is most likely to consist of infill within and redevelopment of existing serviced areas.

New assets required

Sewage from the suburb will be diverted to the proposed SPS23 Ashmont and SPS41 Glenfield East to address existing overloading problems and the effect of development in Lloyd. These pump stations will be Council funded.

4.3.2 Lloyd

Description of servicing

Lloyd forms part of the "Springvale - Lloyd" .id forecast area.

The Lloyd area is characterised by well graded land which is well suited to conventional sewerage systems. The sewerage network immediately downstream of Lloyd has limited spare capacity available, meaning that significant infrastructure upgrades are required to avoid downstream assets becoming overloaded.

The suburb is been divided into two main catchments, divided by a rise intersecting Redhill Road near Dalman Parkway. This has been subdivided into further subcatchments which approximately align to the master plan for the suburb, as shown in Table A10.

Table A10: Lloyd Sewerage Catchments

Catchment	Description
Lloyd East LL-1	Existing development area adjacent to Holbrook Rd, western boundary near Hudson Dr, Lloyd
Lloyd East LL-2	Area to the west of LL-1 draining towards Holbrook Rd, western boundary near Dalman Pkwy, Glenfield. Excluded from DSP.
Lloyd East LL-4	Area adjacent to the Great Southern Railway, , eastern boundary near Otama Rd Glenfield Park
Lloyd East LL-3B Lloyd East LL-3A	Areas to the east of LL-4 draining towards Great Southern Railway, eastern boundary near Dalman Pkwy, Glenfield. Excluded from DSP.

Lloyd East (LL-1 and LL-2) will be serviced using a trunk main parallel to Redhill Rd, draining towards Glenfield Rd, where it connects into the existing trunk sewer network. The anticipated load from this catchment will lead to overloading problems in the Pearson Street area, including overloading the existing pumping station, SPS7 Flowerdale. This overloading problem will need to be addressed by constructing an interceptor pump station to divert peak loads from the lower catchment.

Lloyd West (LL-4, LL-3B and LL-3A) will be serviced using a trunk main parallel to Redhill Rd, draining towards the Great Southern Railway. Sewage will then be routed through an existing alignment, which will require upsizing or duplication due to projected overloading. The sewage will then be pumped to the Narrung Street sewage treatment works via new pumping station (SPS23 Ashmont) in the vicinity of Best Park.

Assignment of growth

Growth is expected to occur in the lowest catchments first (ie LL-1 and LL-4) and progressively move towards the more uphill areas. Catchments LL-1 and LL-4 provide adequate capacity to accommodate new dwellings until about 2031. The suburb essentially is at capacity by 2041.

New assets required

- The eastern catchments (LL-1 and LL-2) will require a Council funded trunk main to divert loads along Redhill Rd to the trunk main running along Glenfield Rd. A Council funded pumping station (SPS41 Glenfield Eest) will then intercept flows near Fernleigh Rd and connect to the rising mains running along Moorong Street (Olympic Hwy).
- The western catchments (LL4, LL-3B and LL-3A) will require a Council funded trunk main to divert loads along Redhill Rd to the junction of Redhill Rd and Great Southern Railway. Mains will then require upsizing along Sturt Hwy, with load diverted into a new sewage pumping station (SPS23 Ashmont), which will connect to the rising mains running along Moorong Street (Olympic Hwy).

4.3.3 Springvale

Description of servicing

Springvale forms part of the "Springvale - Lloyd" .id forecast area.

Springvale currently drains towards Plumpton Rd through a gravity network, linking into the Tatton Trunk Main. This network is overloaded due to changes in the planned dimensions of the network. The overloading issue is planned to be addressed by installing an interceptor sewage pumping station on Holbrook Rd. The subcatchments are outlined in Table A11.

Table A11: Springvale Sewerage Catchments

Catchment	Description
Springvale SV-X	Original development area near Plumpton Rd, largely developed
Springvale SV-A2	Area bounded by Holbrook Rd, Lloyd Rd and catchment SV-X, largely developed.

Springvale SV-A1	Area bounded by Holbrook Rd to the east and Dunns Rd to the south. Serviced by proposed interceptor sewage pumping station.
Springvale SV-B	Area to the south of Lloyd Rd.

Assignment of growth

In early years the majority of growth has been assigned to catchment SV-A1 as this is the area with available lots in the rural residential format. In later years infill development will dominate in the suburb.

New assets required

4.3.4 Bourkelands

Description of servicing

Bourkelands forms part of the "Bourkelands - Tatton" .id forecast area. The suburb is extensively developed. Remaining areas for development will be able to utilise existing sewerage infrastructure.

Assignment of growth

Bourkelands has been assigned the majority of the growth in the "Bourkelands – Tatton" forecast area due to a higher availability of lots than the Tatton area. The suburb will be essentially developed by 2021.

New assets required

No new assets are directly required for this development area, however the suburb will contribute load to the proposed interceptor sewage pumping station SPS41 Glenfield East.

4.3.5 Tatton

Description of servicing

Tatton forms part of the "Bourkelands - Tatton" .id forecast area. The suburb is extensively developed. Remaining areas for development will be able to link to the existing Tatton Trunk Main.

Table A12: Tatton Sewerage Catchments

Catchment	Description
Tatton TT-AB	Largely developed zone in the portion of the suburb north of Stirling Blvd
Tatton TT-C	Zone currently under development between Stirling Blvd and Springvale Dr.

Assignment of growth

The majority of growth has been assigned to catchment TT-C given the limited spare land in catchment TT-AB. The suburb is essentially fully developed by 2021.

New assets required

No new assets are required to service this development area.

4.3.6 Lake Albert

Description of servicing

The Lake Albert suburb is separately projected in the .id forecasts.

The suburb consists of three low density developed areas, with an extensive rural residential area to the east. The suburb is serviced using a combination of conventional and pressure sewerage systems. Development is anticipated in the form of densification of existing rural residential areas, and some extensions to the rural residential area. For the purpose of this DSP, the "Governors Hill" development area has been incorporated into the Lake Albert growth projections. The identified development catchments are outlined in Table A13.

Table A13: Lake Albert Sewerage Catchments

Catchment	Description
Lake Albert LA-X	Existing low density residential zones- Lake Albert, Lakehaven and Lakeside
Lakehaven West LA-IF4	Portion of Lakehaven West of Depazzi Pl
Grange LA-G	"The Grange" over 55's village, Gregadoo Rd
Main St LA-A	Existing rural residential area bounded by Main St, Gregadoo Rd and Lakehaven development
Gregadoo Rd LA-RR5	Existing rural residential areas along Gregadoo Rd in the vicinity of Redbank Rd and Olearia Pl
Bakers Ln LA-6A	Area between Bakers Ln and Mitchell Rd, north of Kyeamba Ave
Governors Hill GUM-RR1	"Governors Hill", east of Bakers Ln and north of Tumbarumba Railway.
Mitchell Rd LA-IFRR	Potential infill zone west of Mitchell Rd and north of Inglewood Rd.
Rocklea LA-RXX	"Rocklea Park". Not serviced and excluded from DSP.
Gregadoo LA-RR6	Area to north-east of Gregadoo Rd. Excluded from DSP.

Assignment of growth

80% of the growth in the suburb has been assigned to the low density development areas of Lakehaven West (LA-IF4), Main St (LA-A) and Gregadoo (LA-RR5), as well as the Grange (LA-G). The balance of the growth is assigned to the existing rural residential zones. The projections indicate that it is not necessary to increase the density of the Mitchell Rd area (LA-IFRR).

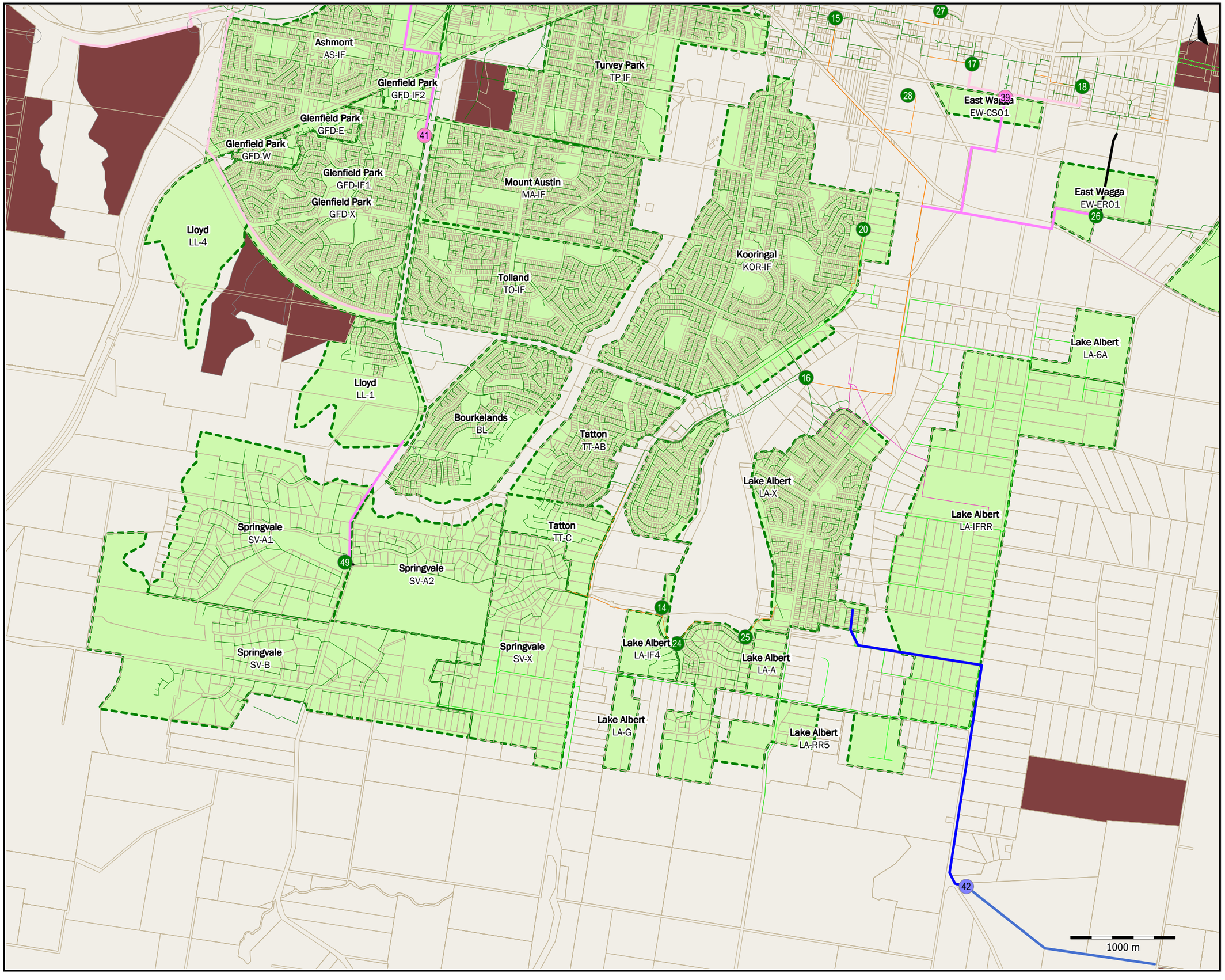
New assets required

The following assets are required under this DSP:

- SPS24 Lakehaven West needs to be upgraded to accommodate loads from Lakehaven West and The Grange (LA-IF4 and LA-G). This will be Council funded.

In the event that the Gregadoo (LA-RR6) development were to proceed, the developer would be required to provide a 2km trunk main, a sewage pumping station and a 4km rising main to allow the development area to be connected to the existing network.

Figure A2- Southern Suburbs Development Areas



Pumping stations
- Existing
- Council provided
- Developer provided
- Privately owned

Strategy Mains
- Abandoned
- Future Council
- Future Council Rising
- Future Developer
- Future Developer Rising

Existing Sewerage Lines
- Other
- Gravity main
- Pressure reticulation
- Rising main
- Treated Effluent

Cadastre
DevelopmentAreas
- Excluded from DSP
- Part of DSP

4.4 Western Development Areas

4.4.1 Ashmont

Description of servicing

The Ashmont suburb is separately projected in the .id forecasts.

Ashmont is an established suburb, currently draining to SPS7 Flowerdale. New development in the suburb is proposed to utilise existing sewerage infrastructure.

Assignment of growth

Minimal growth is projected for the suburb, and is most likely to consist of infill within existing serviced areas.

New assets required

Sewage from the suburb will be diverted to the proposed SPS23 Ashmont to address existing overloading problems. This pump station will be Council funded.

4.4.2 Moorong

Description of servicing

Moorong forms part of the "Springvale - Lloyd" .id forecast area.

This land is currently owned by the New South Wales government and is not expected to be available for development in the short or medium term. The area is capable of draining to the existing sewerage system by gravity.

Assignment of growth

Moorong receives spill-over growth from the Lloyd development areas. Projections indicate that it may be necessary from 2031.

New assets required

- Council funded connection to the Ashmont Trunk Main. This main will be upgraded to allow for loadings from Lloyd and Moorong.

4.4.3 San Isidore

Description of servicing

San Isidore forms part of the "Springvale - Lloyd" .id forecast area.

In the event that the Moorong site is not available for development, San Isidore could be infilled to low density and provided with sewerage services. The potential catchments are shown in Table A14.

Table A14: San Isidore Sewerage Catchments

Catchment	Description
San Isidore SAN	Existing San Isidore rural residential area to the west of Kapooka Rd
San Isidore East SAN-E	Hillside to the east of Kapooka Rd

Assignment of growth

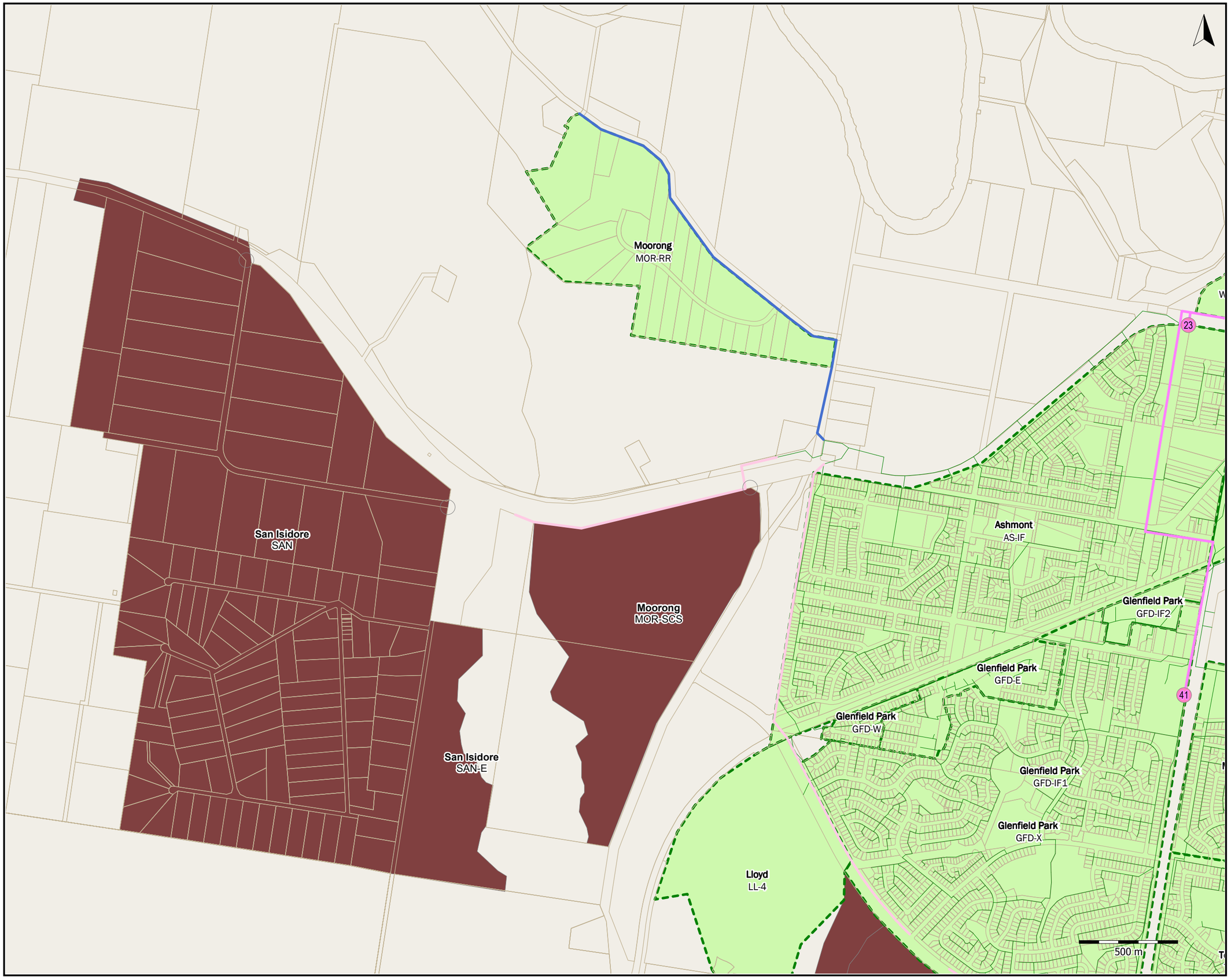
Growth projections indicate that it is not necessary to develop San Isidore before 2041, provided that the Moorong area can be developed. In the event that this is not the case, the growth assigned to Moorong would transfer to San Isidore.

New assets required

In the event that San Isidore is developed, the following assets would be provided:

- Council funded carrier main through the development area to Sturt Hwy and Cummins Dr
- A council funded sewage pumping station near the intersection of Sturt Hwy and Cummins Dr, with a rising main over Pomiglarna Hill
- A gravity carrier connection to the existing sewerage network.
- The existing Ashmont Trunk Main would be upgraded to allow for loadings from Lloyd and San Isidore.

Figure A3- Western Suburbs Development Areas



Pumping stations
- Existing
- Council provided
- Developer provided
- Privately owned

Strategy_Mains
- Abandoned
- Future Council
- Future Council Rising
- Future Developer
- Future Developer Rising

ASSETS_SEWER_MAINS
- Other
- Gravity main
- Pressure reticulation
- Rising main
- Treated Effluent

Cadastre

DevelopmentAreas
- Excluded from DSP
- Part of DSP

4.5 Eastern Development Areas

4.5.1 Forest Hill

Description of servicing

Forest Hill forms part of the "Forest Hill - East Wagga Wagga" .id forecast area.

Forest Hill currently consists of two separate networks discharging to parallel sewage treatment plants. Council plans to integrate the networks through a new pumping station in the "Brunslea Park" estate. The proposed catchments are outlined in Table A15.

Table A15: Forest Hill Sewerage Catchments

Catchment	Description
RAAF Base FH-M	RAAF Wagga Base
Forest Hill existing FH-C	Existing development in Forest Hill circa 2006 to the west of the RAAF base
Brunslea Park FH-W	Development area to the west of catchment FH-C, bounded by Inglewood Rd to the south, Sturt Hwy to the north.
Smith St FH-AS	Area south of Sturt Hwy and east of the RAAF base proposed for redevelopment under the Wagga Wagga Airport Master Plan.
O'Heirs Rd FH-OH	O'Heirs Rd development area. Proposed location of relocated passenger terminal under the Wagga Wagga Airport Master Plan.
Inglewood FH-AI	Area west of Inglewood Rd south of Tumbarumba and north of the extension of the main runway.
Brunskill FH-AB	Area east of the intersection of Inglewood Rd and Elizabeth Ave, north of Brunskill Rd, proposed for industrial development under the Wagga Wagga Airport Master Plan. Excluded from DSP.
Cowells Rd FH-N	Elevated area north of Sturt Hwy between Cowells Rd and Braehour Rd. Excluded from DSP.

Assignment of growth

Residential growth for Forest Hill has been assigned to the Brunslea Park area (FH-W) up 2026, when it is projected to reach capacity. Growth is then allocated to the Cowells Rd (FH-N) development area.

30% of the non-residential growth for the Wagga Wagga LGA has been assigned to the Forest Hill non-residential zones. Initially growth is assigned to the Railway, Smith St and O'Heirs Rd zones (FH-AR, FH-AS and FH-OH). Once these zones exceed 60% capacity, growth is spilled to the Inglewood (FH-AI) zone. The growth projection indicates that the Brunskill (FH-AB) zone does not need to be developed before 2041.

New assets required

The following assets are required under this DSP:

- Replacement SPS22 Elizabeth St located in the Brunslea Park estate, inclusive of rising main connection;
- Diversions to the new pumping stations along Brunskill Ave and Elizabeth Ave.

The airport developments will require the following developer provided assets:

- O'Heirs Rd area (FH-OH)- sewage pumping station and rising main connection to existing rising main at the intersection of Sturt Hwy and O'Heirs Rd
- Inglewood Rd area (FH-AI)- sewage pumping station, rising main and trunk main connection to replacement SPS22 Elizabeth St.
- Brunskill Rd area (FH-AB)- gravity carrier main connection to Inglewood Rd area (FH-AI).

In the event that the Cowells Rd (FH-N) residential area commences development during the life of this DSP, a carrier main, sewage pumping station and rising main connection to the Forest Hill Sewage Treatment Works will be required.

4.5.2 East Wagga Wagga Industrial Area

Description of servicing

The East Wagga Industrial Area is currently serviced using a string of sewage pumping stations, progressively transferring sewage to SPS15 Hammond Ave. Projected development at the end of this string is projected to lead to several pumping stations exceeding capacity.

Council plans to implement a strategy of intercepting these loads and diverting them to a new route, unloading downstream pumping stations.

Table A16: East Wagga Industrial Sewerage Catchments

Catchment	Description
Copland St EW-CS01	Area south of Copland St, east of Marshalls Ck and west of Blaxland Rd
Gumly Industrial EW-GU01	Sturt Hwy between Eunony Bridge Rd and Bakers Ln
Edison Rd EW-ER01	Area west of Tasman Rd, north of Tumbarumba Railway and east of Blaxland Rd. Excluded from DSP.

Assignment of growth

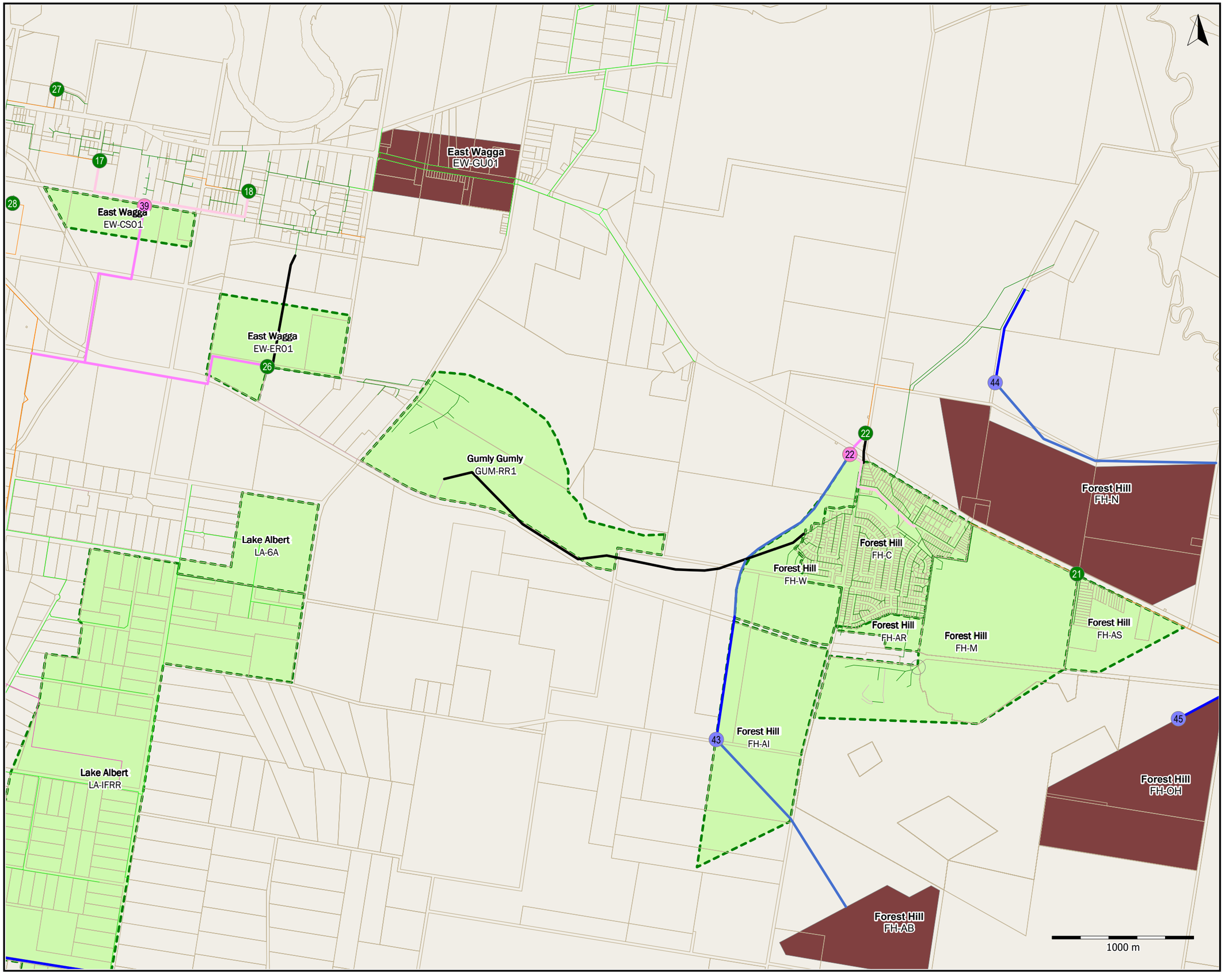
10% of the non-residential growth for the Wagga Wagga LGA has been allocated to the East Wagga industrial area. This growth has initially been assigned to the Copland St area (EW-CS01). Once this area reaches 60% of capacity, after 2021, growth starts to spill to the Gumly Industrial Area (EW-GS01), which accommodates all growth to 2041.

New assets required

The following assets are required under this DSP:

- A new sewage pumping station (SPS39) and rising main connection to service Copland St (EW-CS01). This will also provide capacity for development in the Gumly Industrial Area (EW-GS01).
- Development at Governors Hill will require a capacity upgrade of SPS26 Edison Rd and the construction of a rising main junction to the rising main from the proposed SPS39. This will also benefit development at the Edison Rd (EW-ER01) should it occur.

Figure A4- Eastern Suburbs Development Areas



Pumping stations
- Existing
- Council provided
- Developer provided
- Privately owned

Strategy_Mains
- Abandoned
- Future Council
- Future Council Rising
- Future Developer
- Future Developer Rising

Existing Sewerage Lines
- Other
- Gravity main
- Pressure reticulation
- Rising main
- Treated Effluent

Cadastre
DevelopmentAreas
- Excluded from DSP
- Part of DSP

4.6 Central Infill Areas

Description of servicing

The Central Infill Areas are made up of the following .id forecast areas:

- Wagga Wagga
- Turvey Park
- Mount Austin
- Tolland

These areas have been assigned to the catchments outlined in Table A17.

Table A17: Central Infill Sewerage Catchments

Catchment	Description
WWA-X	Existing service area for Central Wagga Wagga
WWA-IF2A	Spring St & West Pde
WWA-IF2B	Gurwood St & Shaw St
WWA-IF5	Travers Street near Beckwith St
TP-IF	Existing service area for Turvey Park
WWA-TPCSU WWA-TPW WWA-TPNW WWA-TPNW	CSU South Campus site, bounded by Fernleigh Rd, College Ave, Urana St and Juvenile Justice Centre.
MA-IF	Existing service area for Mount Austin
TO-IF	Existing service area for Tolland
WWA-MO01 WWA-MO02	Pocket of land north-west of the intersection of Edward St & Moorong St (Sturt Hwy & Olympic Hwy). Light industrial development.

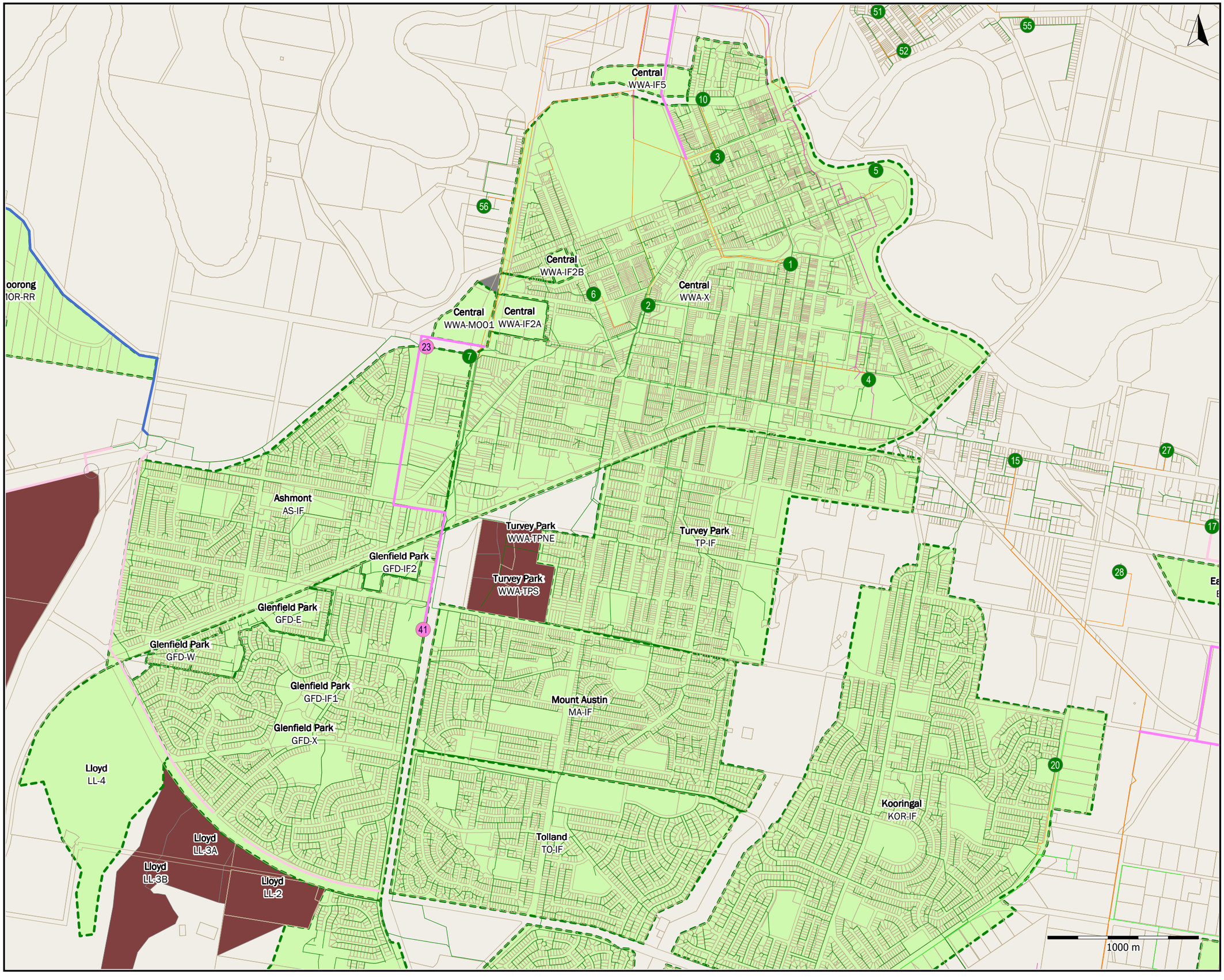
Assignment of growth

Identified development areas have been given priority in growth assignment, and have been allowed to reach medium density development levels before being deemed to reach capacity. Once this has occurred development is spilled to the existing service areas as generic infill.

New assets required

No specific new assets have been identified; however additional loadings will contribute to the upgrade of some existing assets.

Figure A5- Central Suburbs Infill Area



Pumping stations
- Existing
- Council provided
- Developer provided
- Privately owned

Strategy_Mains
- Abandoned
- Future Council
- Future Council Rising
- Future Developer
- Future Developer Rising

Existing Sewerage Lines
- Other
- Gravity main
- Pressure reticulation
- Rising main
- Treated Effluent

Cadastre

DevelopmentAreas
- Excluded from DSP
- Part of DSP

4.7 Village Development Areas

4.7.1 Collingullie

Description of servicing

Collingullie is serviced using a pressure sewerage system, discharging to an oxidation lagoon sewage treatment plant. The network has ample capacity for growth.

Assignment of growth

The DSP service area includes an allowance for system extensions within a single catchment. System extensions will be on the basis of a developer provided conventional gravity system injecting into the pressure sewerage network.

New assets required

No new assets are required, other than developer provided reticulation.

4.7.2 Ladysmith

Description of servicing

Ladysmith is serviced using conventional sewerage. The village is drained to a single sewage pumping station which transfers sewage to Forest Hill via Alfredtown. The network has adequate capacity for growth.

Assignment of growth

The DSP service area includes an allowance for system extensions within a single catchment.

New assets required

No new assets are required, other than developer provided reticulation.

4.7.3 Mangoplah

Description of servicing

Mangoplah is proposed to be serviced using conventional sewerage. The majority of the village is drained to a single sewage pumping station, which is proposed to transfer sewage to an oxidation lagoon sewage treatment plant in the vicinity of Creasys Rd. A small pumping station is proposed for the south-eastern corner of the village.

Assignment of growth

The DSP service area includes an allowance for system extensions within a single catchment. The village has considerable infill opportunities.

New assets required

The assets proposed to be chargeable under this DSP are:

- The primary sewage pumping station and rising main;
- The proposed oxidation lagoon sewage treatment plant.

4.7.4 Oura

Description of servicing

Oura is proposed to be serviced using pressure sewerage. The current proposal is to transfer sewage to a membrane bioreactor sewage treatment plant at the western end of the village with treated water discharged to a reuse site or the Murrumbidgee River as required.

Assignment of growth

The DSP service area includes an allowance for system extensions within a single catchment.

New assets required

The assets proposed to be chargeable under this DSP are:

- The proposed sewage treatment plant.

4.7.5 Tarcutta

Tarcutta is serviced using conventional sewerage. The village is drained to a single sewage pumping station which transfers sewage to an oxidation lagoon sewage treatment plant. The network has adequate capacity for growth.

Assignment of growth

The DSP service area includes an allowance for minor extensions within a single catchment.

New assets required

No new assets are required, other than developer provided reticulation.

4.7.6 Uranquinty

Uranquinty is serviced using conventional sewerage. The village is drained to a single sewage pumping station which transfers sewage to an oxidation lagoon sewage treatment plant. The network has adequate capacity for growth.

Assignment of growth

The DSP service area includes an allowance for extensions to the existing service area where grades and flood protection requirements allow.

New assets required

No new assets are required, other than developer provided reticulation.

A5. Growth Tables

Table A18: Growth Assignment for Sewerage (Equivalent Tenements)

.id Forecast Area	Catchment ID	Catchment area (ha)	1996 Total	1996-2006	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2031-2036	2036-2041
Residential growth											
Ashmont	AS-IF		1328	860	47	14	10	25	25	25	26
Bourkelands - Tatton		149	518	756	526	332	21	-	-	-	-
	TT-AB	101	242	316	100	20	4	-	-	-	-
	TT-C	48	1	22	239	48	10	-	-	-	-
	BL	151	275	418	187	264	7	-	-	-	-
Estella - University			810	104	136	337	493	451	450	537	641
	CSU-E	69	50	-	-	-	-	-	-	-	-
	CSU-W	80	340	-	-	27	36	39	43	48	52
	ES-A	114	420	104	136	144	87	53	32	19	12
	ES-B	42	-	-	-	72	137	134	27	5	1
	ES-C	32	-	-	-	-	-	15	141	107	21
	GB-A	82	-	-	-	95	232	202	168	34	7
	GB-B	59	-	-	-	-	-	7	39	207	220
	GB-C	54	-	-	-	-	-	-	-	8	72
Forest Hill - East Wagga Wagga			544	55	73	68	125	162	165	192	222
	FH-C	83	544	55	73	-	-	-	-	-	-
	FH-W	46	-	-	-	68	125	162	45	9	2
	FH-N	150	-	-	-	-	-	-	120	183	220
	FH-M		154		742	8	7	4	4	3	3
Glenfield Park			1611	375	262	51	3	-	-	-	-
	GFD-X	257	1413	372							
	GFD-E	23	-	3	209						
	GFD-W	6	-	-	53						
	GFD-IF1	3	-	-	-	21	3	-	-	-	-
	GFD-IF2	10	198	-	-	30	-	-	-	-	-
Kooringal	KOR-IF	425	3254	66	59	35	52	66	82	84	86
Lake Albert			1805	158	65	158	95	8	5	5	5
	LA-X	317	1805	123	-	-	-	-	-	-	-
	LA-IF4	27	-	-	52	44	7	3	1	0	0
Lake Albert	LA-A	19	-	-	-	59	2	1	1	1	1
	LA-G	20	-	-	-	7	60	3	2	3	3
	GUM-RR1	118	-	-	5	19	10	1	0	0	0
	LA-RR5	60	-	21	7	26	14	1	1	1	1
	LA-6A	38	-	-	1	2	1	0	0	0	0
	LA-IFRR	346	-	14	-	-	-	-	-	-	-
	LA-RR6	316	-	-	-	-	-	-	-	-	-
Mount Austin	MA-IF	199	1775	31	21	20	20	20	20	20	20
North Wagga Wagga - Bomen			151	207	18	27	139	255	255	337	444
	NW		151	207							
	BOR-AB	106	-	-	18	27	139	255	255	337	226
	BOR-C	45	-	-	-	-	-	-	-	-	219
	GA-A	163	-	-	-	-	-	-	-	-	-
	GA-B	88	-	-	-	-	-	-	-	-	-

.id Forecast Area	Catchment ID	Catchment area (ha)	1996 Total	1996-2006	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2031-2036	2036-2041
	HG	127	-	-	-	-	-	-	-	-	-
	SE	33	-	-	-	-	-	-	-	-	-
Springvale - Lloyd			128	472	188	298	449	452	450	552	677
	LL-1	102	45	99	95	138	208	210	99	20	4
	LL-2	29	-	-	-	-	-	-	110	121	24
	LL-4	85	-	-	-	145	218	220	144	29	6
	LL-3a	21	-	-	-	-	-	-	75	94	19
	LL-3b	31	-	-	-	-	-	-	-	145	109
	MOR-SCS	109	-	-	-	-	-	-	-	115	481
	SAN-E	45	-	-	-	-	-	-	-	-	-
	SAN	440	-	-	-	-	-	-	-	-	-
	SV-X	193	83	13	35	3	1	0	-	-	-
	SV-A1	252	-	84	32	12	22	22	4	1	0
	SV-A2	161	-	85	-	-	-	1	18	7	1
	SV-B	350	-	155	26	-	-	-	-	20	32
	MOR-RR	81	-	36	-	-	-	-	-	-	-
Tolland	TO-IF	194	1839	31	9	19	13	10	10	10	10
Turvey Park			2014	11	24	6	10	12	15	15	15
	TP-IF	221	1964	11	-	-	-	-	-	-	-
	WWA-TPCSU	14	-	-	15	4	6	7	9	9	9
	WWA-TPW	3	-	-	3	1	1	1	2	2	2
	WWA-TPNW	3	-	-	3	1	1	1	2	2	2
	WWA-TPNE	3	50	-	3	1	1	2	2	2	2
	WWA-TPS										
Wagga Wagga			8105	67	70	179	189	200	200	205	209
	WWA-IF2B	3	4	-	-	63	13	3	1	0	0
	WWA-IF2A	9	-	-	-	116	95	19	4	1	0
	WWA-IF5	10	82	-	-	-	81	68	14	3	1
	WWA-X	647	8019	67	70	-	-	110	182	201	208
Collingullie	COL	42	-	64	8	5	3	0	-	-	-
Ladysmith	LAD	72	82	-	9	6	7	10	11	12	13
Mangoplah	MAN	40	-	37	3	1	2	3	3	3	3
Oura	OUR	61	-	56	7	5	5	6	6	6	7
Tarcutta	TC	58	151	-	11	7	3	1	-	-	-
Uranquinty	UQ	139	314	-	21	12	22	44	44	49	54
Non-residential growth											
Bomen Business Park			1722	6	148	88	104	88	98	102	107
	BO-C00		1722	6							
	BO-C01	133	-	-	148	71	28	11	5	2	1
	BO-W11	52	-	-	-	17	52	21	8	3	1
	BO-W12	240	-	-	-	-	23	56	85	97	105
	BO-W13	115	-	-	-	-	-	-	-	-	-
	BO-S40	66	-	-	-	-	-	-	-	-	-
	BO-E30	181	-	-	-	-	-	-	-	-	-
	BO-E20	172	-	-	-	-	-	-	-	-	-
	BO-E21	447	-	-	-	-	-	-	-	-	-
East Wagga Industrial				-	33	19	23	20	22	27	33

.id Forecast Area	Catchment ID	Catchment area (ha)	1996 Total	1996-2006	2006-2011	2011-2016	2016-2021	2021-2026	2026-2031	2031-2036	2036-2041
	EW-CS01	24	-	-	33	19	13	5	2	1	0
	EW-GU01	46	-	-	-	-	10	15	20	26	32
	EW-ER01	50	-	-	-	-	-	-	-	-	-
Airport Business Park				-	-	157	69	59	65	80	98
	FH-OH	94	-	-	-	110	48	41	46	56	69
	FH-AR	8	-	-	-	10	4	2	1	0	0
	FH-AS	31	-	-	-	37	15	6	2	1	0
	FH-AI	94	-	-	-	-	2	10	16	23	29
	FH-AB	45	-	-	-	-	-	-	-	-	-
Moorong St Industrial				-	16	10	12	10	11	13	16

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Appendix B: Asset Upgrades Required by DSP

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B1. Introduction

1.1 Purpose of Report

This appendix documents assets that have been identified for upgrades between 2013 and 2041 provides a likely upgrade approach. The purpose of this work is to calculate capital costs per ET (the "capital charge") as an input to the developer servicing plan process. It is not a detailed engineering assessment of available options, nor does the appendix examine potential latent conditions that could substantially alter the approach used to implement system upgrades.

1.2 Disclaimer

This document has been prepared by MC Environmental Consulting on behalf of Wagga Wagga City Council. The document has been prepared for a particular purpose, using information made available by the client in accordance with the client's instructions. Users of this document should note the assumptions and approximations used. Any use of the document outside of the stated purpose is at the user's risk.

B2. General methods

2.1 Design load

The adopted design loads for upgrades are the loads forecast for the year 2041. Some high cost point assets such as sewage treatment works and sewage pumping stations are often staged, particularly where growth takes place over an extended period of time. Staging options are considered when the loading of an asset increases over a period of time.

New assets have been assumed to be created immediately prior to the asset being required either to provide service to a new development or to relieve overloaded infrastructure.

Loadings have been converted from 'equivalent tenements' to design flows using the methodology described in **Attachment 1**.

2.2 Standards

New assets have been specified based on current day design standards, including allowances for contingency management and minimising the risk of environmental pollution.

- **Gravity mains** are sized to meet peak wet weather flows.
- **Sewage pumping stations** are sized to pump at least peak dry weather flows, and where possible provide detention for excess wet weather flows and allow for emergency situations.
- **Sewage treatment works** are sized to process dry weather flows and detain excess where necessary for later processing.

2.3 Asset costing

Existing assets have been costed based on the most recent valuation of sewerage assets, to a base of June 2012. Assets are generally costed according to MEERA[1] principles, using the 2012 NSW Office of Water Reference Rates Tables or other common guides such as the *Rawlinsons Construction Cost Guide*. The exceptions are where actual costs are available for recently constructed (post 2006) assets. In all cases costs have been adjusted to June 2012 prices using a producer price index[2]. Gravity mains requiring upsizing are valued using a varied methodology- see section 4.1.

Important note: *The following chapters report valuations to the nearest dollar. This is an effect of the indexing approach, and does not suggest this level of precision is present in the costing.*

[1] Modern Engineering Equivalent Replacement Asset, ie the costing is based on the asset which would be constructed today which gives the same performance.
[2] ABS Publication 6427.0 Table 15, road construction Australia (ANZIC 412).

2.3.1 Exclusions

The following assets have been excluded from the costing process:

1. Assets constructed prior to 1970 other than sewage treatment works and major pump stations. The pre-1970 major pump stations are SPS1 Sheppard St, SPS2 Forsyth St, SPS7 Flowerdale and SPS15 Hammond Ave.
2. Assets provided by developers.
3. 'Reticulation' assets considered part of the cost of development.

B3. Sewage pumping stations

3.1 SPS1 Sheppard St

SPS1 is located in the Wagga Central Business District, which it serves. It was originally constructed in the 1920s and has been largely reconstructed in the last 10 years.

3.1.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	6,102	6,102	6,212	6,394	6,803
Peak Dry Weather Flow	75 L/s	75 L/s	76 L/s	78 L/s	83 L/s
Peak Wet Weather Flow	252 L/s	252 L/s	256 L/s	264 L/s	280 L/s

Forecast growth in load is due to growth in non-domestic loading in the CBD area as well as increases in load contributions from SPS4 Bolton Park. The high proportion of non-domestic load sources (shopping centres and motels) means that the peak wet weather flow estimate is likely to be high.

3.1.2 Future works

The existing pump station does not have sufficient emergency storage capacity, nor sufficient wet weather pumping capacity to meet modern perceptions of environmental risk. Site constraints mean that it is not feasible to install emergency detention. Pumping capacity is also constrained by the part of the rising main shared with SPS2 Forsyth St.

Planned future works for this station will consist of:

- Reconfiguration of rising main network to remove the portion of rising main shared with SPS2 Forsyth St. This will increase the pumping capacity of both stations in wet weather.
- Permanent installation of a generator or diesel pump to manage power failures, including during wet weather events.
- Installation of a third pump to allow a duty pumping capacity of 140 litres per second during wet weather conditions.

3.1.3 Costing

3.1.3.1 Existing works

Construction	Item	Valuation
2002 (refurbished)	Structural	$473,008
2002 (refurbished)	Mechanical/electrical, 85L/s duty capacity	$677,552
		$1,150,560

3.1.3.2 Future works

No future upgrades have been included in DSP costings.

3.2 SPS2 Forsyth St

SPS2 is located west of the Wagga CBD and services the western part of the Central Wagga, Turvey Park and the eastern part of the Dobney Ave Industrial Area.

3.2.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	5,567	5,675	5,696	5,700	5,701
Peak Dry Weather Flow	69 L/s	70 L/s	71 L/s	71 L/s	71 L/s
Peak Wet Weather Flow	231 L/s	235 L/s	236 L/s	236 L/s	236 L/s

The growth data suggests there is very little increase in load during the next 30 years. Peak flow estimates are likely to be higher than experienced due to the high proportion of non-domestic load in the catchment.

3.2.2 Future works

The existing pump station does not have sufficient emergency storage capacity, nor sufficient wet weather pumping capacity to meet modern perceptions of environmental risk. Site constraints mean that it is not feasible to install sufficient emergency detention Pumping capacity is also constrained by the part of the rising main shared with SPS1 Sheppard St.

Planned future works for this station will consist of:

- Reconfiguration of the rising main network to remove the portion of rising main shared with SPS1 Sheppard St. This will increase the pumping capacity of both stations in wet weather.
- Permanent installation of a generator or diesel pump to manage power failures, including during wet weather events.

3.2.3 Costing

3.2.3.1 Existing works

Construction	Item	Valuation
1924	Structural	$1,639,099
1975	Mechanical/Electtrical, 205L/s duty capacity	$1,144,277
		$2,783,376

3.2.3.2 Future works

No future upgrades have been included in DSP costings.

3.3 SPS3 Simmons St

SPS3 serves the northern part of Central Wagga and also receives the discharge from SPS10. As a small pre-1970 asset it isn't included in costings.

3.3.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	650	731	799	813	817
Peak Dry Weather Flow	11 L/s	12 L/s	13 L/s	13 L/s	13 L/s
Peak Wet Weather Flow	30 L/s	33 L/s	36 L/s	37 L/s	37 L/s

No growth in load is expected for the catchment. In future years load will be halved by diverting SPS10 Wiradjuri out of the catchment to improve the pump station's wet weather and power failure contingency management capabilities.

3.3.2 Future works

Future works consist of augmenting storage to provide 4 hours of detention at peak wet weather flow conditions.

3.3.3 Costing

3.3.3.1 Future works

Construction	Item	Valuation
2016	Wet weather storage – 207kL	$116,186
		$116,186

3.4 SPS4 Bolton Park

SPS4 serves the eastern part of Central Wagga and the Lake Albert Rd industrial area. The original pump station was constructed prior to 1970.

3.4.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	1,739	1,739	1,739	1,739	1,739
Peak Dry Weather Flow	25 L/s	25 L/s	25 L/s	25 L/s	25 L/s
Peak Wet Weather Flow	75 L/s	75 L/s	75 L/s	75 L/s	75 L/s

No growth is projected. It is possible that some load growth will occur with the redevelopment of low-density housing into medium density and hospitality developments.

3.4.2 Future works

SPS4 Bolton Park currently discharges into a gravity main in Biroomba Lane, draining to SPS1 Sheppard St. This main is considerably overloaded. The most cost-effective method for resolving this problem is to extend the rising main to SPS1 Sheppard St. If pump characteristics permit the main could be directly connected to the rising main for SPS1 Sheppard St, reducing overflow risk. Additional emergency detention storage is also required to allow for 4 hours of storage at peak wet weather flow conditions.

3.4.3 Costing

3.4.3.1 Future works

No future upgrades have been included in DSP costings.

3.5 SPS5 Beach

SPS5 services the Beach caravan park and amenities area. As a small pre-1970 asset it has not been costed. No growth is forecast in its service area.

3.6 SPS6 Shaw St

SPS6 serves the north-western part of Central Wagga and also receives discharge from SPS11 Turf Club. The original pump station was constructed prior to 1970.

3.6.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	446	459	461	461	461
Peak Dry Weather Flow	8 L/s	8 L/s	8 L/s	8 L/s	8 L/s
Peak Wet Weather Flow	21 L/s	22 L/s	22 L/s	22 L/s	22 L/s

Growth is attributed to changes in land use within the catchment. The proportionately small projected growth has minimal impact on the loading of the pumping station.

3.6.2 Future works

Future works consist of providing emergency detention storage to allow 4 hours detention at peak wet weather flow. This cost has not been included as part of the DSP charge calculations.

3.7 SPS7 Flowerdale

SPS7 Flowerdale was constructed in 1966, but as Wagga's largest pumping station has been classed a major asset. The station was extensively upgraded in 2011 with additional pumping capacity and a duplicate rising main. SPS7 has a very large gravity catchment with considerable growth forecast.

3.7.1 Current and future loading

Future growth in load is related to residential development in Glenfield, Bourkelands and Lloyd.

The servicing strategy to address this loading is to construct two new pumping stations to intercept existing and future catchments, thereby substantially reducing loadings at this station.

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	5,763	5,805	5,846	5,891	5,982
Peak Dry Weather Flow	71 L/s	72 L/s	72 L/s	73 L/s	74 L/s
Peak Wet Weather Flow	238 L/s	240 L/s	242 L/s	244 L/s	247 L/s

3.7.2 Future works

Future works to reduce these issues consist of the following:

- Construction of SPS23 Ashmont and SPS41 Glenfield West to divert growth out of the catchment.

3.7.3 Costing

3.7.3.1 Existing works

Construction	Item	Valuation
1966	Structural	$2,727,027
2011 (capacity upgrade)	Mechanical/electrical, xxL/s duty capacity	$1,903,773
		$4,630,800

3.7.3.2 Future works

SPS23 Ashmont and SPS41 Glenfield West are costed separately.

3.8 SPS8 Boorooma St

SPS8 Boorooma St was constructed in 1977 as part of a project to connect the Bomen Industrial Area to the sewage treatment system. SPS8 originally was a staging station for SPS9, however it now services Estella and Charles Sturt University.

3.8.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	1,732	1,867	1,979	2,107	2,698
Peak Dry Weather Flow	25 L/s	27 L/s	28 L/s	29 L/s	36 L/s
Peak Wet Weather Flow	75 L/s	81 L/s	85 L/s	91 L/s	115 L/s

By 2041 development of the catchment will increase the loading on the sewage pumping station by 50%, through the completion of the eastern parts of Estella, the expansion of the CSU campus and the receipt of flows from SPS33 Harris Rd (Gobbagombalin north).

3.8.2 Future works

Future works consist of detention capacity to meet growth:

- Wet weather detention capability will be required in the short term to address increasing loads, given the limited capacity in the northern rising main to manage wet weather flows from the northern catchments.
- Nominal pump capacity will be reached at about 2031, however completion for the shared rising main may require earlier upgrades.

3.8.3 Costing

3.8.3.1 Existing works

Construction	Item	Valuation
1977	Structural	$306,111
1977	Mechanical/electrical, 35L/s duty capacity	$243,889
		$550,000

3.8.3.2 Future works

Construction	Item	Valuation
2016	Wet weather storage – 207kL	$1,109,412
		$1,109,412

3.9 SPS9 Cartwrights Hill

SPS9 Cartwrights Hill was constructed in 1977 as part of a project to connect the Bomen Industrial Area to the sewage treatment system. It now services the village of Cartwrights Hill and discharge from the Bomen Industrial Sewage Treatment Facility.

3.9.1 Current and future loading

Council proposes to construct a new sewage pumping station to receive flows from the Bomen catchments, including the Bomen Industrial Sewage Treatment Facility. This means that SPS9 Cartwrights Hill will be substantially unloaded, and not be subject to growth. Cartwrights Hill is not in a DSP service area.

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	37	37	37	37	37
Peak Dry Weather Flow	1 L/s	1 L/s	1 L/s	1 L/s	1 L/s
Peak Wet Weather Flow	2 L/s	2 L/s	2 L/s	2 L/s	2 L/s

3.10 SPS10 Wiradjuri

SPS10 Wiradjuri was reconstructed in response to the development of the suburb of Wiradjuri.

3.10.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	326	407	475	489	493
Peak Dry Weather Flow	6 L/s	8 L/s	9 L/s	9 L/s	9 L/s
Peak Wet Weather Flow	16 L/s	19 L/s	22 L/s	23 L/s	23 L/s

Some minor growth is expected in the catchment due to the release of the development area IF5, which will complete the suburb.

3.10.2 Future works

Currently SPS10 discharges to SPS3 Simmons Street. The effect of this is to double the pumping requirement for SPS3 and reduce available emergency detention time at this location. Diverting SPS10 to the rising main immediately downstream, will eliminate the issue and reduce operating costs. Other work consists of providing wet weather detention.

3.10.3 Costing

3.10.3.1 Existing works

Construction	Item	Valuation
1982	Structural	$197,111
1982	Mechanical/electrical,18xL/s duty capacity	$182,889
		$380,000

3.10.3.2 Future works

Construction	Item	Valuation
2026	Wet weather storage – 125kL	$71,893
		$71,893

3.11 SPS11 Turf Club

SPS11 is a privately owned and funded pump station serving the Murrumbidgee Turf Club.

3.12 SPS12 C.S.U.

SPS12 services the western side of Charles Sturt University, Wagga, and the Wagga Agricultural Research Institute. It was constructed to replace a small sewage treatment works. Overflows from the pump station discharge into the sewage treatment works.

3.12.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	367	403	455	512	645
Peak Dry Weather Flow	7 L/s	8 L/s	8 L/s	9 L/s	11 L/s
Peak Wet Weather Flow	18 L/s	19 L/s	22 L/s	24 L/s	30 L/s

Growth in load is entirely related to growth in university activities, and an assumed corresponding growth in the residential student population.

3.12.2 Future works

The existing pump station is dependent on the former sewage treatment works for handling overflows. It is planned to replace this with a wet weather detention storage.

3.12.3 Costing

3.12.3.1 Existing works

Construction	Item	Valuation
1991	Structural	$270,006
1991	Mechanical/electrical, 30L/s duty capacity	$226,494
		$496,500

3.12.3.2 Future works

Construction	Item	Valuation
2016	Wet weather storage – 99kL	$57,815
		$57,815

3.13 SPS13 Olympic Hwy

SPS13 is a pump station located in the vicinity of Messenger Ave, servicing the developing suburb of Boorooma to the east of Boorooma Street, up to the crest of a ridge in the vicinity of the existing Amundsen Street.

3.13.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	45	184	439	694	1,257
Peak Dry Weather Flow	1.4 L/s	4.1 L/s	8.1 L/s	11.7 L/s	19.0 L/s
Peak Wet Weather Flow	2.7 L/s	9.5 L/s	21 L/s	32 L/s	56 L/s

The loading of the station is expected to increase considerably with development over the next two decades.

3.13.2 Future works

The works required consist of:

- The pump capacity will be need meet 1.2 times peak dry weather flow at 2041 loading conditions. The pump capacity will need to consider sharing of the rising main with two other pump stations, and will require sophisticated variable speed drive controls and radio telemetry to allow effective sharing of the northern rising main. As this upgrade will not need to be implemented until the existing pumps require renewal, this has not been costed as part of the DSP works.
- Wet weather detention capability is to be provided as there will be limited capacity in the northern rising main to manage wet weather flows from the northern catchments.

3.13.3 Costing

3.13.3.1 Existing works

Construction	Item	Valuation
1991	Structural	$240,555
1991	Mechanical/electrical, 25L/s duty capacity	$209,444
		$449,999

3.13.3.2 Future works

Construction	Item	Valuation
2016	Wet weather storage – 1535kL	$821,093
		$821,093

3.14 SPS14 Boat Club

SPS14 is a small pump station exclusively serving the Wagga Wagga Boat Club on Lake Albert. No growth is forecast for this catchment.

3.15 SPS15 Hammond Ave

SPS15 was constructed in the 1970s to enable the development of the East Wagga Industrial Area. The pump station serves the northern part of Kooringal, and the westernmost part of the East Wagga Industrial Area. It also receives pumped flows from SPS17 Cleardale and SPS27 Tarcoola. The pump station has been classed as a major asset.

3.15.1 Current and future loading

Council plans to divert flows from the easternmost stations (SPS18 Industrial and SPS26 Kyeamba) away from this catchment by directly pumping to the downstream rising main. The effect of this is that growth for SPS15 is quite limited. The following table is based on the current configuration.

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	1,101	1,111	1,126	1,146	1,204
Peak Dry Weather Flow	17 L/s	17 L/s	17 L/s	18 L/s	18 L/s
Peak Wet Weather Flow	49 L/s	49 L/s	50 L/s	51 L/s	53 L/s

3.15.2 Future works

No future works are proposed.

3.15.3 Costing

3.15.3.1 Existing works

Construction	Item	Valuation
1967	Structural	$352,089
2004	Mechanical/electrical, 42L/s duty capacity	$263,911
		$616,000

3.16 SPS16 Kooringal

SPS16 Kooringal services almost the entire residential catchment of the Kooringal Sewage Treatment Works. The pump station was replaced in 2002 with a larger station.

3.16.1 Current and future loading

Parameter	2016	2021	2026	2031	2041

Load - Equivalent Tenements	6,717	6,867	6,942	7,047	7,287
Peak Dry Weather Flow	82 L/s	84 L/s	84 L/s	86 L/s	88 L/s
Peak Wet Weather Flow	277 L/s	283 L/s	286 L/s	290 L/s	300 L/s

The majority of load growth is due to residential development in Tatton. Some minor growth is anticipated through infill development and rural residential subdivisions.

3.16.2 Future works

No future works are proposed as part of the DSP.

3.16.3 Costing

3.16.3.1 Existing works

Construction	Item	Valuation
2001	Structural	$1,201,333
2001	Mechanical/electrical, 150L/s duty capacity	$838,667
		$2,040,000

3.17 SPS17 Cleardale

SPS17 is a minor pump station serving part of the East Wagga Industrial Area. It also receives pumped flows from SPS18 Industrial. There is potential to upstream flows to SPS39 Copland St once this station is constructed.

3.17.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	338	348	363	383	441
Peak Dry Weather Flow	7 L/s	7 L/s	7 L/s	7 L/s	8 L/s
Peak Wet Weather Flow	16 L/s	17 L/s	18 L/s	18 L/s	21 L/s

3.17.2 Future works

No future works are proposed as part of the DSP.

3.17.3 Costing

3.17.3.1 Existing works

Construction	Item	Valuation
1971	Structural	$231,689
1971	Mechanical/electrical, 24L/s duty capacity	$204,311
		$436,000

3.18 SPS18 Industrial

SPS18 is a minor pump station serving the western end of the East Wagga Industrial Area. SPS18 also receives pumped flows from the Gumly Gumly Pressure Sewerage Scheme and

SPS26 Kyeamba. There is potential to upstream flows to SPS39 Copland St once this station is constructed.

3.18.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	249	259	274	294	352
Peak Dry Weather Flow	5 L/s	5 L/s	6 L/s	6 L/s	7 L/s
Peak Wet Weather Flow	12 L/s	13 L/s	14 L/s	14 L/s	17 L/s

Growth in load is related to industrial development and growth in discharge volumes from SPS26 Kyeamba. There is no forecast increase in load from the Gumly Gumly Pressure Sewerage Scheme.

3.18.2 Future works

No future works are proposed as part of the DSP.

3.18.3 Costing

3.18.3.1 Existing works

Construction	Item	Valuation
1971	Structural	$231,689
1971	Mechanical/electrical, 24L/s duty capacity	$204,311
		$436,000

3.19 SPS19 Estella SPS

This pumping station is currently being designed and will service the southern and western catchments of Estella. It will discharge into the northern rising main in the vicinity of the intersection of Boorooma St and Gardiners Rd.

3.19.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	72	209	358	526	660
Peak Dry Weather Flow	2 L/s	5 L/s	7 L/s	9 L/s	11 L/s
Peak Wet Weather Flow	4 L/s	11 L/s	17 L/s	25 L/s	30 L/s

3.19.2 Future works

The works required consist of:

- Operating well, pumps and associated mechanical/electrical equipment. The pump capacity will be need meet 1.2 times peak dry weather flow at 2041 loading conditions. The pump capacity will need to consider sharing of the rising main with two other pump stations, and will require sophisticated variable speed drive controls and radio telemetry to allow effective sharing of the northern rising main.

- Wet weather detention capability is to be provided as there will be limited capacity in the northern rising main to manage wet weather flows from the northern catchments.

3.19.3 Costing

Construction	Item	Valuation
2013	Structural	$170,425
2013	Mechanical/electrical	$164,259
2013	Wet weather storage – 406kL	$223,678
		$558,362

3.20 SPS20 Gracelands

SPS20 serves the portion of Kooringal to the east of Rocky Hill.

3.20.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	204	204	204	204	204
Peak Dry Weather Flow	4 L/s	4 L/s	4 L/s	4 L/s	4 L/s
Peak Wet Weather Flow	10 L/s	10 L/s	10 L/s	10 L/s	10 L/s

No growth is forecast in the limited catchment for this pumping station.

3.20.2 Future works

No future works are proposed as part of the DSP.

3.20.3 Costing

3.20.3.1 Existing works

Construction	Item	Valuation
1991	Structural	$208,889
1991	Mechanical/electrical, 20L/s duty capacity	$191,111
		$400,000

3.21 SPS21 Smith St

SPS21 serves the part of Forest Hill west of the RAAF base and receives discharge pumped from Ladysmith via SPS48 Shanty. The pumping station would also receive flows injected into the upstream rising main from the O'Heirs Rd region identified in the *Wagga Wagga Airport Master Plan*, as well as the redevelopment of the local catchment as proposed in the same document.

3.21.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	297	367	424	483	634

Peak Dry Weather Flow	6 L/s	7 L/s	8 L/s	9 L/s	11 L/s
Peak Wet Weather Flow	15 L/s	18 L/s	20 L/s	23 L/s	29 L/s

3.21.2 Future works

Future works are designed to cater for wet weather conditions by providing on-site detention. This will avoid the need to upgrade pumps in response to increased load, and provides some balancing storage to even out flows into the Forest Hill Sewage Treatment Works under wet weather conditions.

3.21.3 Costing

3.21.3.1 Existing works

Construction	Item	Valuation
1983	Structural	$126,444
1983	Mechanical/electrical, 6L/s duty capacity	$133,556
		$260,000

3.21.3.2 Future works

Construction	Item	Valuation
2021	Wet weather storage – 65kL	$38,298
		$38,298

3.22 SPS22 Elizabeth St

SPS22 serves the part of Forest Hill to the east of the RAAF base and receives discharge from SPS21 Smith St. The pumping station is planned to be replaced with another, servicing a larger catchment and also receiving flows from RAAF Wagga, and areas proposed for development under the *Wagga Wagga Airport Master Plan*.

3.22.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	1,089	1,297	1,532	1,657	1,877
Peak Dry Weather Flow	17 L/s	20 L/s	22 L/s	24 L/s	27 L/s
Peak Wet Weather Flow	48 L/s	57 L/s	67 L/s	72 L/s	81 L/s

3.22.2 Future works

The future works consist of:

- Providing a new sewage pumping station west of Elizabeth Street, servicing the full "Brunslea Park" estate by gravity;
- Providing wet weather/emergency detention at the new site which also will function as a remote balance tank for the treatment plant;
- Diversion mains to connect the existing gravity catchment to the new station;
- A diversion main running down Brunskill Ave to intercept flows from RAAF Wagga to the new site; and

- A rising main connection from the new pumping station to the existing rising main.

3.22.3 Costing

3.22.3.1 Existing works

Construction	Item	Valuation
1975	Structural	$382,311
1975	Mechanical/electrical, 45L/s duty capacity	$273,689
		$656,000

3.22.3.2 Future works

Construction	Item	Valuation
2016	Pump Station Structural	$285,778
2016	Pump Station Mechanical/electrical, 32L/s duty capacity	$234,222
2016	Wet weather storage – 1886kL	$1,008,848
2016	Rising main connection to existing main (KFH2)	$64,724
2016	Gravity connections to existing catchment and RAAF interception line	$188,249
		$1,781,821

3.23 SPS23 Ashmont

This proposed pumping station will unload SPS7 Flowerdale by intercepting the majority of the suburb of Ashmont, and the western portions of Lloyd. The station would be located in the vicinity of Best Reserve. Wet weather/emergency detention would be shared between SPS7 and SPS23 using the existing gravity main connection.

3.23.1 Current and future loading

This table shows the loading of the station once constructed.

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	1,202	1,430	1,675	1,919	2,968
Peak Dry Weather Flow	18 L/s	21 L/s	24 L/s	27 L/s	40 L/s
Peak Wet Weather Flow	53 L/s	63 L/s	73 L/s	83 L/s	126 L/s

3.23.2 Future works

The works will consist of the following:

- Provision of the new sewage pumping station, inclusive of short interceptor mains to direct adjacent trunk mains into the new station;
- A short rising main connection to the existing rising main pair exiting SPS7 Flowerdale;
- Wet weather/emergency storage attached to the gravity main connecting SPS23 to SPS7.

3.23.3 Costing

3.23.3.1 Future works

For costing purposes the station has been sized to meet 2041 loads.

Construction	Item	Valuation
2015	Structural	$385,085
2015	Mechanical/electrical, 47L/s duty capacity	$274,586
2015	Wet weather storage – 1966kL	$1,051,641
		$1,711,312

3.24 SPS24 Lakehaven West

SPS24 serves the western portion of Lakehaven (immediately south of Lake Albert), the Mater Dei schools, and receives pumped inflows from "The Grange" lifestyle village.

3.24.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	190	257	263	266	272
Peak Dry Weather Flow	4 L/s	5 L/s	5 L/s	5 L/s	6 L/s
Peak Wet Weather Flow	10 L/s	13 L/s	13 L/s	13 L/s	13 L/s

3.24.2 Future works

Development in the catchment means that an increased storage will be required in the medium term.

3.24.3 Costing

3.24.3.1 Existing works

Construction	Item	Valuation
2004	Structural	$144,700
2004	Mechanical/electrical, 9L/s duty capacity	$146,300
2004	Wet weather storage – 142kL	$81,075
		$372,075

3.24.3.2 Future works

Construction	Item	Valuation
2021	Wet weather storage – 103kL	$60,009
		$60,009

3.25 SPS25 Lakehaven East

SPS25 serves the eastern portion of Lakehaven.

3.25.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	216	232	234	236	240

Peak Dry Weather Flow	5 L/s	5 L/s	5 L/s	5 L/s	5 L/s
Peak Wet Weather Flow	11 L/s	12 L/s	12 L/s	12 L/s	12 L/s

Forecast growth is related to the rural residential subdivisions in the catchment that are served via the pressure sewerage system.

3.25.2 Future works

No future works are proposed as part of the DSP.

3.25.3 Costing

3.25.3.1 Existing works

Construction	Item	Valuation
1988	Structural	$132,333
1988	Mechanical/electrical, 7L/s duty capacity	$137,667
		$270,000

3.26 SPS26 Kyeamba

SPS26 serves the former Kyeamba Shire Council industrial area near Bakers Lane. The SPS will also service development area EW-RR1 ("Governor's Hill").

3.26.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	49	59	60	60	60
Peak Dry Weather Flow	2 L/s	2 L/s	2 L/s	2 L/s	2 L/s
Peak Wet Weather Flow	3 L/s	3 L/s	4 L/s	4 L/s	4 L/s

3.26.2 Future works

The current configuration of the pumping station is adequate for the medium term. Once loadings increase, a new rising main will need to be constructed, joining the rising main exiting the proposed SPS39 Copland St. This is to unload downstream pump stations.

3.26.3 Costing

3.26.3.1 Existing works

Construction	Item	Valuation
1978	Structural	$197,111
1978	Mechanical/electrical, 18L/s duty capacity	$182,889
		$380,000

3.26.3.2 Future works

Construction	Item	Valuation
2016	Rising main connection SPS26 to rising main exiting SPS39 Copland St – 1500m	$167,828

	$167,828

3.27 SPS27 Tarcoola

SPS27 serves a very small portion of the East Wagga Industrial Area in the vicinity of Tarcoola and Gillard Rds.

3.27.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	5	5	5	5	5
Peak Dry Weather Flow	0.3 L/s	0.3 L/s	0.3 L/s	0.3 L/s	0.3 L/s
Peak Wet Weather Flow	0.4 L/s	0.4 L/s	0.4 L/s	0.4 L/s	0.4 L/s

3.27.2 Future works

No future works are proposed.

3.27.3 Costing

Given the extremely small catchment, the costs have been attributed at SPS15 Hammond Ave.

3.27.3.1 Existing works

Construction	Item	Valuation
1989	Structural	$165,311
1989	Mechanical/electrical, 13L/s duty capacity	$160,689
		$326,000

3.28 SPS28 Equex

SPS28 exclusively serves the Equex centre near the intersection of Kooringal Rd and Copland St. The limited gravity service area within the facility means that future development is unlikely to increase loads to the pump station.

3.28.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	5	5	5	5	5
Peak Dry Weather Flow	0.3 L/s	0.3 L/s	0.3 L/s	0.3 L/s	0.3 L/s
Peak Wet Weather Flow	0.4 L/s	0.4 L/s	0.4 L/s	0.4 L/s	0.4 L/s

3.29 SPS29 Gobbagombalin South

SPS29 serves the southern half of the future suburb of Gobbagombalin. It will be located on the southern side of Old Narrandera Rd to allow gravity carriers to fall to the station.

3.29.1 Current and future loading

The following table shows the projected loadings for the SPS once constructed:

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	95	327	529	697	818
Peak Dry Weather Flow	3 L/s	6 L/s	9 L/s	12 L/s	13 L/s
Peak Wet Weather Flow	5 L/s	16 L/s	25 L/s	32 L/s	37 L/s

3.29.2 Future works

The pumping station will need to incorporate a wet weather detention storage to manage limited available capacity in the northern rising main. The actual duty pumping capacity of the station will need to be considerably higher than stated due to shared rising main operations.

3.29.3 Costing

3.29.3.1 Future works

For costing purposes the station has been sized to meet 2041 loads.

Construction	Item	Valuation
2015	Structural	$185,463
2015	Mechanical/electrical, 16L/s duty capacity	$174,757
2015	Wet weather storage – 510kL	$279,662
		$639,882

3.30 SPS30 Bomen

SPS30 Bomen is proposed to unload SPS9 Cartwrights Hill, which presents a high risk of overflow due to significant limitations in storage. The pumping station will also be located permit the commencement of development in the western Bomen catchment between the Olympic Hwy and the Great Southern Railway.

3.30.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	1,819	1,922	2,010	2,108	2,317
Peak Dry Weather Flow	26 L/s	27 L/s	28 L/s	29 L/s	32 L/s
Peak Wet Weather Flow	79 L/s	83 L/s	87 L/s	91 L/s	99 L/s

3.30.2 Future works

The works consist of:

- The sewage pumping station. The actual duty pumping capacity of the station will need to be considerably higher than stated due to shared rising main operations.
- A balancing/wet weather storage to buffer decant cycles.
- A syphon-style connection from the Bomen Industrial Sewage Treatment Facility to the pumping station.
- A new rising main connecting the pumping station to the existing northern rising main in the vicinity of Horseshoe Rd.

3.30.3 Costing

For costing purposes the station has been sized to meet 2041 loads.

Construction	Item	Valuation
2014	Structural	$328,408
2014	Mechanical/electrical, 38L/s duty capacity	$254,489
2014	Wet weather storage – 1521kL	$813,604
2014	Rising main connection	$864,028
		$2,260,529

3.31 SPS31 Uranquinty

SPS31 serves the village area of Uranquinty and discharges into the Uranquinty Sewage Treatment Works.

3.31.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	364	386	430	474	577
Peak Dry Weather Flow	7 L/s	7 L/s	8 L/s	9 L/s	10 L/s
Peak Wet Weather Flow	18 L/s	19 L/s	20 L/s	22 L/s	27 L/s

3.31.2 Future works

Future works are required to improve the performance of the pump station under wet weather and power failure conditions. The works consist of providing emergency storage to assist during power failures.

3.31.3 Costing

3.31.3.1 Existing works

Construction	Item	Valuation
1986	Structural	$188,278
1986	Mechanical/electrical, xxL/s duty capacity	$176,722
		$365,000

3.31.3.2 Future works

Construction	Item	Valuation
2016	Emergency storage – 71kL	$41,742
		$41,742

3.32 SPS33 Kingsford Smith

This future pumping station will service the eastern portion of the suburb of Boorooma, the southern portion of Glenora and potentially the suburb of St Elmos. The pumping station would need to be located near the intersection of Coolamon Rd and Olympic Hwy.

3.32.1 Current and future loading

Growth projections indicate that the pumping station would be required by 2026.

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	-	-	7	46	473
Peak Dry Weather Flow	-	-	0 L/s	1 L/s	9 L/s
Peak Wet Weather Flow	-	-	1 L/s	3 L/s	22 L/s

3.32.2 Future works

The works consist of:

- Providing a sewage pumping station. The actual duty pumping capacity of the station will need to be considerably higher than stated due to shared rising main operations.
- Providing wet weather detention storage due to limited capacity in the northern rising main.

3.32.3 Costing

For costing purposes the station has been sized to meet 2041 loads.

Construction	Item	Valuation
2021	Structural	$151,911
2021	Mechanical/electrical, 11L/s duty capacity	$151,334
2021	Wet weather storage – 284kL	$157,778
		$461,023

3.33 SPS34 Tarcutta

SPS34 serves the village area of Tarcutta and discharges into the Tarcutta Sewage Treatment Works.

3.33.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	159	162	163	163	163
Peak Dry Weather Flow	4 L/s	4 L/s	4 L/s	4 L/s	4 L/s
Peak Wet Weather Flow	8 L/s	8 L/s	8 L/s	8 L/s	8 L/s

3.33.2 Future works

No future works are proposed as part of the DSP.

3.33.3 Costing

3.33.3.1 Existing works

Construction	Item	Valuation
1989	Structural	$340,000
1989	Mechanical/electrical, 40L/s duty capacity	$260,000
		$600,000

3.34 SPS39 Copland St

This pumping station is proposed to be located on Copland St, approximately mid-way between SPS17 and SPS18. There is potential for discharges from these stations to be redirected through the station to by-pass SPS15 Hammond Ave.

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	19	32	37	39	40
Peak Dry Weather Flow	0.8 L/s	1.1 L/s	1.2 L/s	1.3 L/s	1.3 L/s
Peak Wet Weather Flow	1.3 L/s	2.1 L/s	2.3 L/s	2.4 L/s	2.5 L/s

3.34.1 Future works

The works consist of:

- Providing a sewage pumping station. The actual duty pumping capacity of the station will need to be considerably higher than stated due to shared rising main operations.
- Providing wet weather detention storage. This could take the form of oversized gravity sewers given the flat topography.

3.34.2 Costing

For costing purposes the station has been sized to meet 2041 loads.

Construction	Item	Valuation
2015	Structural	$100,457
2015	Mechanical/electrical, 11L/s duty capacity	$115,413
2015	Wet weather storage – 16kL	$10,171
		$226,041

3.35 SPS41 Glenfield East

Glenfield East SPS is proposed to be constructed in the vicinity of Glenfield Rd and Fernleigh Rd. It will intercept flows from Glenfield, Lloyd East, Bourkelands and part of Mt Austin to provide load relief for SPS7.

3.35.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	2,801	3,041	3,273	3,486	3,656
Peak Dry Weather Flow	38 L/s	40 L/s	43 L/s	46 L/s	47 L/s
Peak Wet Weather Flow	119 L/s	129 L/s	138 L/s	147 L/s	154 L/s

Forecast growth in load is related to development in Glenfield (East Catchment), Lloyd (East), Bourkelands and the western parts of Springvale.

3.35.2 Future works

The works consist of:

- Providing a sewage pumping station.

- Providing wet weather detention storage. This could be remote from the station, or spills could be allowed to transfer to SPS7's catchment if detention capacity was made available.

3.35.3 Costing

Construction	Item	Valuation
2019	Structural	$456,432
2019	Mechanical/electrical, 57L/s duty capacity	$318,641
2019	Wet weather storage – 2443kL	$1,306,795
		$2,081,868

3.36 SPS46 Mangoplah

This station will drain the majority of the Mangoplah backlog sewerage scheme and pump the wastewater to the proposed sewage treatment works.

3.36.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	46	48	51	54	60
Peak Dry Weather Flow	1.5 L/s	1.5 L/s	1.6 L/s	1.7 L/s	1.8 L/s
Peak Wet Weather Flow	2.8 L/s	2.9 L/s	3.1 L/s	3.2 L/s	3.5 L/s

3.36.2 Future works

The works consist of:

- Providing a sewage pumping station.
- Providing emergency detention storage to assist during power failures.

3.36.3 Costing

Construction	Item	Valuation
2014	Structural	$103,720
2014	Mechanical/electrical, 2L/s duty capacity	$117,691
2014	Wet weather storage – 27kL	$16,485
		$237,896

3.37 SPS47 Ladysmith

SPS47 serves the village of Ladysmith and discharges to SPS48 Shanty for further transport to Forest Hill Sewage Treatment Works.

3.37.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	126	133	143	154	179
Peak Dry Weather Flow	3 L/s	3 L/s	3 L/s	4 L/s	4 L/s
Peak Wet Weather Flow	7 L/s	7 L/s	8 L/s	8 L/s	9 L/s

Growth is related to infill development in Ladysmith, plus developer funded network extensions.

3.37.2 Future works

No future works are proposed as part of the DSP.

3.37.3 Costing

3.37.3.1 Existing works

Construction	Item	Valuation
1997	Structural	$113,136
1997	Mechanical/electrical, 4L/s duty capacity	$124,264
		$237,400

3.38 SPS48 Shanty

SPS48 receives discharge from SPS47 and pumps to SPS21. The local hotel and petrol station are the only local connections.

3.38.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	126	133	143	154	179
Peak Dry Weather Flow	3 L/s	3 L/s	3 L/s	4 L/s	4 L/s
Peak Wet Weather Flow	7 L/s	7 L/s	8 L/s	8 L/s	9 L/s

All forecast growth is related to development in Ladysmith.

3.38.2 Future works

No future works are proposed as part of the DSP.

3.38.3 Costing

3.38.3.1 Existing works

Construction	Item	Valuation
1997	Structural	$133,556
1997	Mechanical/electrical, 6L/s duty capacity	$126,444
		$260,000

3.39 SPS51 Frederick St

SPS51 receives discharge from other North Wagga sewage pumping stations as well as the local area and discharges directly into Narrung St Sewage Treatment Works.

3.39.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	309	309	309	309	309

Peak Dry Weather Flow	6 L/s	6 L/s	6 L/s	6 L/s	6 L/s
Peak Wet Weather Flow	15 L/s	15 L/s	15 L/s	15 L/s	15 L/s

No growth is forecast for the North Wagga catchments.

3.39.2 Future works

No future works are proposed as part of the DSP.

3.39.3 Costing

3.39.3.1 Existing works

Construction	Item	Valuation
1995	Structural	$161,778
1995	Mechanical/electrical, 12L/s duty capacity	$158,222
		$320,000

3.40 SPS52 Henry St

SPS52 is a small pump station serving the immediate local area and discharging to SPS51.

3.40.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	42	42	42	42	42
Peak Dry Weather Flow	1 L/s	1 L/s	1 L/s	1 L/s	1 L/s
Peak Wet Weather Flow	3 L/s	3 L/s	3 L/s	3 L/s	3 L/s

No growth is forecast for the North Wagga catchments.

3.40.2 Future works

No future works are proposed as part of the DSP.

3.40.3 Costing

3.40.3.1 Existing works

Construction	Item	Valuation
1995	Structural	$120,556
1995	Mechanical/electrical, 5L/s duty capacity	$129,444
		$250,000

3.41 SPS53 William St

SPS53 is a small pump station serving the immediate local area and discharging to SPS51.

3.41.1 Current and future loading

Parameter	2016	2021	2026	2031	2041

Load - Equivalent Tenements	99	99	99	99	99
Peak Dry Weather Flow	3 L/s	3 L/s	3 L/s	3 L/s	3 L/s
Peak Wet Weather Flow	5 L/s	5 L/s	5 L/s	5 L/s	5 L/s

No growth is forecast for the North Wagga catchments.

3.41.2 Future works

No future works are proposed as part of the DSP.

3.41.3 Costing

3.41.3.1 Existing works

Construction	Item	Valuation
1996	Structural	$120,556
1996	Mechanical/electrical, 5kL/s duty capacity	$129,444
		$250,000

3.42 SPS54 Marah St

SPS54 is a small pump station serving the immediate local area and discharging to SPS51. SPS54 also receives pumped flows from SPS55 Mill St.

3.42.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	103	103	103	103	103
Peak Dry Weather Flow	3 L/s	3 L/s	3 L/s	3 L/s	3 L/s
Peak Wet Weather Flow	6 L/s	6 L/s	6 L/s	6 L/s	6 L/s

No growth is forecast for the North Wagga catchments.

3.42.2 Future works

No future works are proposed as part of the DSP.

3.42.3 Costing

3.42.3.1 Existing works

Construction	Item	Valuation
1996	Structural	$120,556
1996	Mechanical/electrical, 5kL/s duty capacity	$129,444
		$250,000

3.43 SPS55 Mill St

SPS55 is a small pump station serving the immediate local area and discharging to SPS54.

3.43.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	34	34	34	34	34
Peak Dry Weather Flow	1.2 L/s	1.2 L/s	1.2 L/s	1.2 L/s	1.2 L/s
Peak Wet Weather Flow	2.2 L/s	2.2 L/s	2.2 L/s	2.2 L/s	2.2 L/s

No growth is forecast for the North Wagga catchments.

3.43.2 Future works

No future works are proposed as part of the DSP.

3.43.3 Costing

3.43.3.1 Existing works

Construction	Item	Valuation
1996	Structural	$120,556
1996	Mechanical/electrical, 5kL/s duty capacity	$129,444
		$250,000

3.44 SPS56 Moorong St

SPS56 is a small pump station serving the Moorong St Industrial Area. The pump station is a developer provided asset.

3.44.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	7	7	7	7	7
Peak Dry Weather Flow	0.4 L/s	0.4 L/s	0.4 L/s	0.4 L/s	0.4 L/s
Peak Wet Weather Flow	0.6 L/s	0.6 L/s	0.6 L/s	0.6 L/s	0.6 L/s

No growth is forecast for this catchment, however it should be noted there is potential for development to occur. If growth occurs it may be necessary for developers to directly fund upgrades.

3.44.2 Future works

No future works are proposed as part of the DSP.

3.44.3 Costing

3.44.3.1 Existing works

Construction	Item	Valuation
1996	Structural	$117,611
1996	Mechanical/electrical, 4.5L/s duty capacity	$127,389
		$245,000

B4. Mains

4.1 Overloaded gravity mains

Gravity mains that are currently overloaded, or will become overloaded due to growth before 2036 require the provision of additional capacity. This additional capacity may be provided by upsizing the pipe using pipe cracking technology, constructing a duplicate or replacement pipe or constructing an interception main to divert load to another part of the sewerage system. In order to avoid double counting the cost of the asset, the following method has been adopted.

1. The value of the existing asset is calculated, and used as the base value of the asset.
2. The size of asset required to transport the 2041 load is determined and valued. The date when the existing asset reaches capacity is deemed the 'construction date' of the upgrade. For assets currently overloaded this is set at 2016.
3. The base value of the asset is deducted at the year the asset is upsized, reflecting its disposal.
4. The upsized asset value is applied at the deemed 'construction date'.

4.1.1 Costing

The following is a summary of the value of upgrades applied to the network:

Year applied	Value of upsizing applied
2016	$515,514.90
2021	$30,917.20
2026	$4,602.80
2041	$386,777.10
Grand Total	$937,812.00

Note that these costs will only affect DSP rates if growth is routed via the upsized assets.

B5. Sewage treatment works

5.1 Narrung Street STW

5.1.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	26,211	27,668	29,201	30,731	34,321
EP/ET ratio	2.47	2.48	2.48	2.47	2.47
Load - Equivalent Persons	64,693	68,532	72,347	75,837	84,696
Average Dry Weather Flow (ML/d)	13.6	14.4	15.2	15.9	17.8

5.1.2 Future works

The recently upgraded Narrung St sewage treatment works has a nominal capacity of 80,000EP. This capacity is projected to be exceeded between 2031 and 2036. Given that the plant is only 5% over capacity on 2041, no allowance has been made for a capacity upgrade.

5.1.3 Costing

5.1.3.1 Existing Works

Construction	Item	Valuation
1980	Orbal treatment process	$14,933,333
2010	Preliminary treatment – Sequencing Batch Reactor	$1,771,015
2010	Sequence Batch Reactor Process	$26,454,932
2010	Disinfection	$753,990
2010	Sludge handling system	$2,799,209
2010	Siteworks	$1,490,668
1994	Bolton Park Recycled Water PS	$309,200
2011	Duke of Kent Recycled Water PS	$1,391,553
		$49,903,900

The former sewage treatment plant was recognised in the capital cost calculations by:

1. Calculating the present value (1996 base) of the original plant on a MEERA basis as of its construction date.
2. Deducting the present value as of 2010 to dispose of the assets.
3. Calculating the present value (1996 base) of the current plant on a MEERA basis as of its construction date.

5.2 Kooringal STW

5.2.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	8,024	8,208	8,304	8,431	8,730
EP/ET ratio	2.47	2.48	2.48	2.47	2.47
Load - Equivalent Persons	19,805	20,331	20,573	20,806	21,544
Average Dry Weather Flow (ML/d)	4.2	4.3	4.3	4.4	4.5

5.2.2 Future works

The recently upgraded Kooringal sewage treatment works has a nominal capacity of 20,000EP or 4.5ML/d. This capacity is projected to be exceeded on an EP basis between 2016 and 2021, and on a volume basis by 2041. Projections indicate that capacity is exceeded by only 8%, which is less than an economic plant upgrade. As a consequence no future upgrade cost has been applied.

5.2.3 Costing

5.2.3.1 Existing Works

Construction	Item	Valuation
1974	Elements of sludge handling network retained from old plant	$1,937,016
2010	Preliminary treatment	$1,437,300
2010	Sequence Batch Reactor Process	$15,367,530
2010	Disinfection	$834,191
2010	Sludge handling system	$2,094,559
2010	Siteworks	$1,125,782
1990	Recycled water pumps	$316,500
		$23,112,878

The former sewage treatment plant was recognised in the capital cost calculations by:

4. Calculating the present value (1996 base) of the original plant on a MEERA basis as of its construction date.
5. Deducting the present value as of 2010 to dispose of the assets.
6. Calculating the present value (1996 base) of the current plant on a MEERA basis as of its construction date.

5.3 Bomen Industrial Sewage Treatment Facility

The Bomen Industrial Sewage Treatment Facility was constructed in 2004 as a specialist pre-treatment plant. The BISTF reduces industrial strength sewage down to domestic strength sewage, prior to final treatment at Narrung Street Sewage Treatment Works.

Currently the wet industries in the catchment are implementing effluent improvement programmes, significantly reducing the loading of the plant. At domestic strengths, the Narrung Street STW is capable of treating the waste without the assistance of BISTF.

5.3.1 Costing

The cost of the Bomen Industrial Sewage Treatment Facility has been excluded from the DSP on the following basis:

1. The function of the BISTF is to pre-treat higher strength wastes prior to discharging to the main sewage treatment plant. 'Dry' industrial customers do not require this facility and therefore should not contribute to its cost.
2. There is sufficient capacity at Narrung Street STW to treat wastewater produced by 'dry' industries over the majority of the planning horizon. Essentially the capacity is not 'taken up'.

5.4 Forest Hill STW

Forest Hill STW is a full effluent reuse plant servicing the civilian and military portions of Forest Hill, and the village of Ladysmith. The plant has two process trains and substantial effluent storage. Effluent is re-used at the "Flushing Meadows" tree lot and for growing seasonal crops.

5.4.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	1,509	1,717	1,952	2,197	2,820
EP/ET ratio	2.47	2.48	2.48	2.47	2.47
Load - Equivalent Persons	3,724	4,253	4,836	5,422	6,959
Average Dry Weather Flow (ML/d)	0.8	0.9	1.0	1.1	1.5

5.4.2 Future works

The combined plant has a capacity of 6000EP. This capacity is expected to be exceeded significantly between 2031 and 2041. Given the lateness of the upgrade, discounting effects means that the impact of that upgrade will be insignificant to charges levied under the life of this DSP.

5.4.3 Costing

5.4.3.1 Existing Works

Construction	Item	Valuation
1976	Pasveer P2000 Carousel	$1,633,333
1976	Pasveer process disinfection ponds (MEERA is UV/Cl disinfection)	$75,000
1976	Pasveer sludge lagoons	$146,667
1970	Aerated lagoons mechanised screening	$716,667
1970	Aerated lagoons structure	$784,000
1993	Aerated lagoons aeration system	$1,082,667
1970	Aerated lagoons process disinfection ponds (MEERA is UV/Cl disinfection)	$150,000
1993	540ML effluent storage dam	$6,926,040
1976	Siteworks	$560,000
		$12,074,374

5.5 Collingullie

The Collingullie Sewage Treatment consist of a facultative pond followed by a series of oxidation/evaporation ponds.

5.5.1 Current and future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	83	86	86	86	86
EP/ET ratio	2.47	2.48	2.48	2.47	2.47

Load - Equivalent Persons	205	213	213	212	212
Average Dry Weather Flow (ML/d)	0.04	0.04	0.04	0.04	0.04

5.5.2 Costing

This costing is based on a 200EP capacity plant, reflective of its loading.

Construction	Item	Valuation
2006	Non-mechanised preliminary treatment	$68,400
2006	Effluent lagoons	$121,000
		$189,400

B6. New sewage treatment systems

6.1 Mangoplah

The Mangoplah sewerage system is proposed to be constructed in 2014 using a conventional gravity system discharging to a facultative lagoon with evaporation ponds.

6.1.1 Future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	46	48	51	54	60
EP/ET ratio	2.47	2.48	2.48	2.47	2.47
Load - Equivalent Persons	114	119	126	133	148
Average Dry Weather Flow (ML/d)	0.02	0.02	0.03	0.03	0.03

6.1.2 Costing

This costing is based on a 150EP capacity plant, reflective of its loading.

Construction	Item	Valuation
2014	Effluent lagoons	$118,250
		$118,250

6.2 Oura

The Oura sewerage system is proposed to be constructed in 2015. Environmental constraint mean that the most likely system would consist of pressure sewerage discharging into a membrane bioreactor plant.

6.2.1 Future loading

Parameter	2016	2021	2026	2031	2041
Load - Equivalent Tenements	69	73	80	85	98
EP/ET ratio	2.47	2.48	2.48	2.47	2.47
Load - Equivalent Persons	170	182	197	210	242
Average Dry Weather Flow (ML/d)	0.04	0.04	0.04	0.04	0.05

6.2.2 Costing

Construction	Item	Valuation
2015	Membrane bioreactor plant plus discharge line	$2,200,000
		$2,200,000

B7. References

Australian Bureau of Statistics (2006) *6427.0 - Producer Price Indexes, Australia, December 2012*, available at http://www.abs.gov.au.

Department of Land and Water Conservation (2003) *NSW Reference Rates Manual for Valuation of Water Supply, Sewerage and Stormwater Assets*, NSW Crown.

NSW Office of Water (2012) *NSW Reference Rates Tables*, July 2012.

Rehbein AOS (2010) *Wagga Wagga Airport Master Plan 2010*.

Water Services Association of Australia (2002) *Sewerage Code of Australia*, version 2.3, Melbourne.

Attachment 1: Design flows

Sewers are generally designed using a planning unit known as an 'equivalent tenement' (ET). This is the load anticipated from an average residential house[3]. During the design phase, actual flows are not known and thus conservative assumptions are used instead. Equivalent tenements are converted to flows using empirical relationships.

There are three key load parameters for sewage transport systems:

- **Average Dry Weather Flow (ADWF)** is the flow rate expected to pass through an average day. ADWF excludes the diurnal variation of load and is generally used to size large infrastructure where one day or more's load is expected to be stored. This report uses an average dry weather flow of 210 litres per equivalent person per day.
- **Peak Dry Weather Flow (PDWF)** is the peak flow rate expected through the network. This is used to size infrastructure where the peak of the diurnal flow needs to be managed. Most PDWF equations consider the attenuation effects of peak loading being distributed across the network.
- **Peak Wet Weather Flow (PWWF)** is the peak flow rate under infrequent 'wet weather' conditions. This planning parameter is used to size infrastructure which must be capable of processing all flows in the system.

Estimation of sewerage flows

This report uses a modified approach of the Water Supply Authorities Association's *Sewerage Code of Australia* method for estimating sewerage flows[4].

The *Code* describes sewerage flows as follows:

Design flow = PDWF + IIF + GWI
where
PDWF is the peak dry weather flow
IIF is the infiltration inflow factor ("storm allowance")
GWI is the groundwater infiltration factor.

Peak dry weather flow is based on the average dry weather flow per equivalent person, the number of equivalent persons and the gross area serviced. This report has simplified that approach by assuming that:

- 1 equivalent tenement = 2.6 equivalent persons
- The service area is assumed to have a density of 10 equivalent tenements (ie 26 equivalent persons) per hectare. Typical densities in Wagga Wagga are 9 equivalent tenements per gross hectare.

Groundwater infiltration is insignificant in the Wagga Wagga area.

[3] This represents about 140 kilolitres per annum.
[4] Version 2.3 referred to- the key outline is in Appendix B.

Adjustment of Storm Allowance/Infiltration Inflow Factor

Insufficient data is available to utilise the *Sewerage Code* method for estimating infiltration and inflow.

Instead this report uses a modification of the storm allowance formula provided in the Department of Public Works *Manual of Practice: Sewer Design* (1984). The formulas provided are a semi-empirical relationship between equivalent tenements and anticipated flow, based on coastal data.

The standard formula is generally accepted to be over-conservative for the following reasons:

- The relationships were developed before water efficiency programmes were enacted, and were based on a sewerage network constructed of older materials which are more prone to infiltration than newer plastic sewers.
- Correlations for wet weather are based on coastal conditions, which are more extreme than experienced in inland centres.

Table 1 shows the significant difference in 'wet weather' between Sydney and Wagga Wagga.

Table 1: Comparison of Design Rainfall Intensity, Sydney and Wagga Wagga (Institution of Engineers, Australia (1984))

		Intensity (mm/h)		
Average Recurrence Interval (years)	Duration (h)	Sydney	Wagga Wagga	Wagga ÷ Sydney
2	1	41.9	20.95	50%
50	1	87	43.31	50%
2	12	8.27	3.94	48%
50	12	16.8	7	42%
2	72	2.55	1	39%
50	72	5.19	1.73	33%

This information suggests the following:

- As rainfall duration increases, Wagga Wagga rainfall intensity lags further behind Sydney rainfall intensity.
- As average recurrence interval increases (more extreme events), Wagga Wagga rainfall intensity lags further behind Sydney rainfall intensity.

Therefore it can be conservatively concluded that all other things being equal, peak wet weather flows for Wagga Wagga should be at most 50% of Sydney's wet weather loading.

The standard formula for estimating the Storm Allowance is as follows:

$$SA = 0.058CT$$

where

CT = cumulative equivalent tenements

The term 0.058CT is the wet weather component of the peak flow (ie infiltration occurs at a rate of 58 millilitres per second per tenement connected). It is assumed that this 'peak' rate is governed by illegal connections and rapid infiltration processes, with trench drainage and other delayed infiltration processes occurring at a slower rate later on.

The modification to the equation then consists of reducing the 0.058CT term to 50% of the value, ie 0.029CT.

Note that adoption of this reduced factor is reliant on the gravity mains network being adequately maintained to control infiltration, and the continuation of programmes to detect illegal connections by smoke testing and inspection of new plumbing work.

Attachment 2: Conceptual sewage pumping station specification

In most cases no design is available for future sewage pumping stations. The following is a conceptual specification on the key design parameters for a new sewage pumping station. Note that more detailed design is likely to alter some of the specification to meet local conditions. These variations are likely to increase costs for the same level of performance, thus any cost estimates using this method will tend to be slightly optimistic.

A good sewage pumping station will have the following characteristics:

- Capable of pumping typical flow conditions in an energy efficient manner
- Capable of managing the full range of flows up to peak wet weather flow either through pumping or detention
- Extremely unlikely to overflow under dry weather flow conditions, including failures (EPA licences prohibit dry weather overflows)
- Capable of managing failures under wet weather conditions with a low likelihood of overflow.

Pumps and control systems

The following pumps are to be provided:

- One duty pump sized to pump 1.2 times peak dry weather flow.
- Where there is insufficient storage for wet weather detention, provide a further duty pump sized to meet peak wet weather flow when operating in combination with the primary duty pump.
- One standby pump identical to the largest pump installed in the station.
- One return pump to transfer water from storages to the primary well or an adjacent gravity main. Sized to allow the storage to be drained within 24 hours (not required where emergency storage can drain to the operating well by gravity).

The following monitoring/control systems are to be used:

- Depth sensors fitted to the operating well and storages
- Variable speed drive control of duty and standby pumps
- PLC control of variable speed drives using the operating well depth sensor, including an inhibit program (where rising mains are shared), rising main scour program and a return pump operation program.
- Radio telemetry unit compatible with Council's radio telemetry system, collecting data from depth sensors, variable speed drives and backup floats. Potentially the PLC controller may be integrated with this unit.
- Star/delta starting of the return pump.
- Backup star/delta starter and float control for duty and standby pumps.

An emergency generator connection point is to be provided with capacity to start and drive the duty pumps only.

Storage

Storage type	Purpose	Desired capacity
Operating well	Allow routine maintenance of pumps without spills to dedicated storage	Sufficient for normal operations, matched to standard sizes.
Wet weather detention	Store wet weather flows in excess of duty pumping capacity	8 hours at Wagga peak wet weather flow *less duty pump capacity, less operating well storage.*
Emergency detention	Store flows during pump station failure. If a transportable generator is readily available this provides time for the generator to be transported to the site and connected to the pumping station.	***Where it is possible to connect a back-up generator:*** The greater of 8 hours at average dry weather flow and 2 hours at peak wet weather flow[5], less: • The storage provided by upstream gravity mains up to spill level less 200mm. • Wet weather detention storage • Operating well storage ***Where it is not possible to connect a back-up generator:*** The greater of 18 hours at average dry weather flow and 4 hours at peak wet weather flow[6], less: • The storage provided by upstream gravity mains up to spill level less 200mm. • Wet weather detention storage • Operating well storage

Rising main

The rising main diameter is selected so that the velocity through the main is a maximum of 1.5 metres per second, when duty pumps are operating at full speed. In practice the rising main diameter is selected to suit a specified pump arrangement, but this is impossible without preparing a concept design for each station.

[5] Moderate impact areas. High impact areas require a storage sized at the greater of 12 hours at average dry weather flow and 6 hours at peak wet weather flow.
[6] Moderate impact areas. High impact areas require a storage sized at the greater of 24 hours at average dry weather flow and 6 hours at peak wet weather flow.

Appendix C: Methods for calculating costs

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C1. Introduction

The NSW Independent Pricing and Regulatory Tribunal (IPART) released a series of determinations in the mid-1990s supporting the use of a "net present value" approach to the calculation of developer charges. This approach supported the calculation based on existing and future asset valuations, reduced by the portion of the capital costs which are funded through annual charges. These determinations applied to Sydney Water, Gosford and Wyong Councils, and Hunter Water.

The then Department of Land and Water Conservation used this work to develop guidelines for local government water utilities to calculate developer charges. While adopting the same philosophy, a number of changes were made to reflect the varying capability of local water utilities to undertake the work required.

1.1 Purpose of Report

This report describes the method used to calculate capital costs per ET, and shows how the method conforms to the guidelines issued by the NSW Office of Water. The report seeks to demonstrate that the method deployed is consistent with the intent of the IPART determinations and NOW guidelines.

1.2 Disclaimer

This document has been prepared by MC Environmental Consulting. The document has been prepared for a particular purpose, using information made available by the client in accordance with the client's instructions. Users of this document should note the assumptions and approximations used. Any use of the document outside of the stated purpose is at the user's risk.

C2. Description of method

2.1 Philosophy

The method used seeks to meet the intent of the IPART determinations during the 1990s and the DLWC guidelines of 2002.
In particular, the method supports the following philosophical approach:

- As development benefits from the provision of downstream infrastructure, the beneficiaries should contribute the full cost (but not more) of the development.
- Charges need to reflect the holding costs of providing asset capacity earlier than required to meet future growth.
- A good system of developer charges provides the appropriate pricing signals to developers on the cost of development. A good system should encourage orderly and economic development which will not only lead to lowest possible cost of development[1], but also should assist in keeping future operating and asset renewal costs low through that orderly and economic development.

2.2 Method

The calculation method is based on the "spreadsheet" approach described in section 2.6.2 of the DLWC guidelines. The method uses a series of spreadsheets to collate major and trunk assets into zones or catchments, and calculates for each of the zones the capital cost per ET for assets within the zone or catchment.

The adopted method takes advantage of the combined asset management system/static network software "Pipepak" developed by Huefner Management Systems, Kent Town, South Australia.

This software is capable of valuing mains assets, and routes equivalent tenement loads downstream from the point of connection to the point of discharge. This enables a simple asset loading assessment to be conducted without going to the expense and complexity of a dynamic network model.

Wagga Wagga City Council commissioned Huefner Management Systems to prepare an additional module to the software to permit the calculation of capital costs per ET using the discounting rules required by IPART determinations and the DLWC guidelines.

[1] The 'lowest cost of development' includes the cost to the community if the full cost of development is not borne by developers. If developer charges in a particular area are too low, the difference needs to be made up through higher annual charges to customers.

2.3 Valuation

Existing assets have been valued for the year ending 30 June 2012. This valuation is made in accordance with fair value principles, which includes the valuation of assets according to the modern engineering equivalent asset.

2.4 Process

The process is best described using a worked example, provided in **Section C4**.

The method involves two network "builds" using a logical 'tree' of the water supply or sewerage system. The first build accumulates equivalent tenement and present value equivalent tenement values from the dead-ends of the network to the inlet (for water supply) or outlet (for sewerage). During this build the infrastructure costs per present value equivalent tenement are also calculated. The second build operates in reverse, accumulating calculated infrastructure costs per ET from the inlet/outlet to the upstream dead-ends.

2.5 Benefits of the model approach

There were a number of benefits in utilising this approach to calculate the capital costs per ET:

1. Council's existing asset management system already contained much of the data required for the Developer Servicing Plan, including the capacity on pipe assets. This minimised the time required to prepare the servicing strategies that support the DSP.
2. There was no need to define service areas before commencing calculations. This resolved potential issues with defining service areas, such as managing asset sharing between service areas and inadvertently merging two areas with quite different capital costs. This maximises the capability of the DSP to provide appropriate pricing signals to developers.
3. The model provides Council with knowledge of capital costs per ET on a zone/catchment basis across its entire network, which enables Council to better manage unforseen development such as redevelopment or infill development.

C3. Compliance with requirements of *Guidelines*

The following table outlines how the key requirements of the DLWC *Guidelines* have been handled:

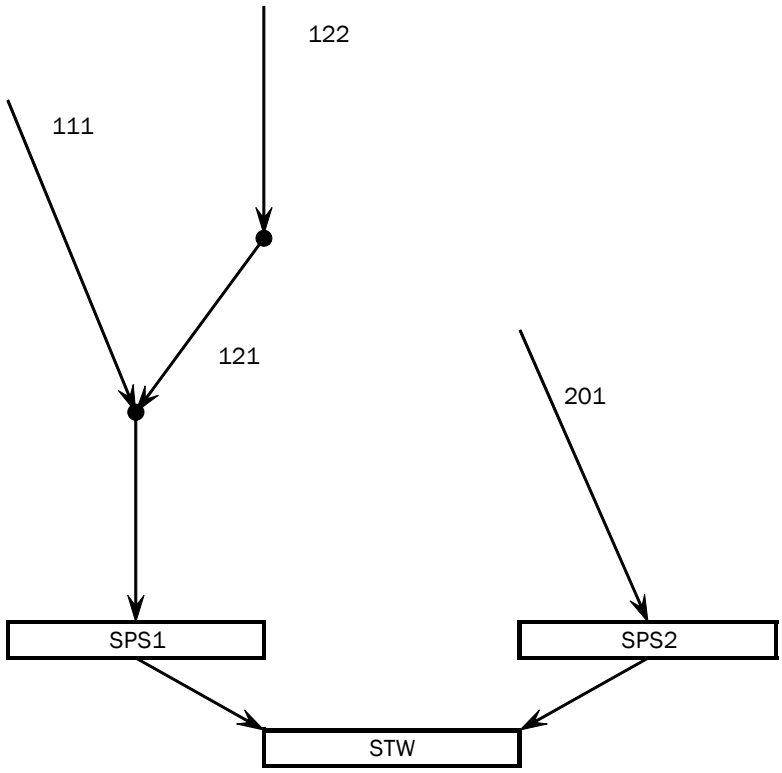
Table 1: Compliance with DLWC Guideline requirements

Issue	Handling in model
Pre-1970 *minor* assets Reticulation assets Developer provided assets	These assets were excluded from calculations.
Pre-1970 *major* assets 1970-1996 assets	Future development utilising these assets has been discounted by 3% per annum from a base of January 1996.
Post-1995 assets	Future development utilising these assets has been discounted by 7% per annum from a base of 1996.
Sharing of assets	As the model calculates the capital cost per ET on an asset-by-asset basis sharing is effectively handled within the model.
Temporarily used assets	The model has been constructed to meet 2041 loads. Where temporary assets have been deployed, it is assumed that the permanent arrangement has been implemented by 2041.
Assets not fully taken up as of 2041	Future assets have only been sized to meet forecast load to 2041 within the model. In practice certain major assets and assets planned to be constructed in later years will consider loads beyond 2041.
Staged construction, upgrades of existing assets	Upgrades of existing assets have been separately costed to correctly reflect discounting rules.
Renewals	Existing renewals have been considered by adjusting the commissioning date of the asset to the date of renewal. Future renewals are not considered as required by the Guidelines.
Out-of-sequence development	Guideline conditions apply. However it should be noted that in cases where assets provision is synchronised with the development, calculated charges will be reasonable as the discounting for the present value of the load and the present value capital cost of the works 'cancels out'.
DSP service areas	DSP service areas have been defined by: For existing suburbs with development exceeding 500 lots, the suburb. Where development areas with each catchment had a developed capacity of greater than 500 equivalent tenements ('lots'), these areas have been excised from the service areas defined in stage 1 and assigned to a separate service area.
Calculation of capital charge in service area	The capital charge for the service area is calculated as the weighted mean capital cost per equivalent tenement for forecast growth in the zone, based on the present value of that growth, discounted at a rate of 7% pa.
Agglomeration of service areas	Service areas were agglomerated where their capital charges were within 30%, as per the guidelines.

C4. Worked example

The following is a worked example to demonstrate how the model is calculating capital costs per ET. The example is based on calculations for capital charges to be levied in 2007.

Consider the following theoretical system:



In this system there is one sewage treatment works, two sewage pumping stations and rising mains (considered together) and five gravity trunk mains. The existing system was originally constructed in 1965 and currently consists of the sewage treatment works, SPS1 and trunk mains 101, 111 and 121. Development will trigger construction of trunk main 122 in 2008, SPS2 (including the rising main) in 2009 and main 201 in 2010. SPS1 and the STW have been classed as major assets, which means that they are included in the capital cost calculations. Main 101 was constructed prior to 1970 but is not classed as a major asset, so therefore has been excluded from the capital cost calculations.

4.1 Loads

The current and future system loads in this theoretical network are shown in the **Table 2** below:

Table 2: Worked example: input system loads

Asset	Construction	Current Conditions		2036 Conditions	
		Direct Connections[2]	Total load	Direct Connections	Total load
STW	1965	0	550	0	750
SPS1	1968	0	350	0	650
101	1968	200	350	200	650
111	1975	150	150	150	150
121	1998	200	200	200	300
122	2008	0	0	100	100
SPS2	2009	0	0	0	100
201	2010	0	0	100	100

4.2 Present value of loads

Future loads in the system need to be converted to two present value results:

- "Present" value as of January 1996, discounted at 3% per annum. This value is used to calculate capital costs per ET for assets constructed prior to 1996.
- Present value as of January 1996, discounted at 7% per annum. This value is used to calculate capital costs per ET for assets constructed after 1995.

Assuming that the direct connections to each asset occur on the year of construction, this yields the present value of connections in **Table 3**.

Table 3: Worked example: present value of system loads

Asset	Construction	2036 Direct Connections	PV(ET) at 3% (1996 base)	PV(ET) at 7% (1996 base)
STW	1965	0	0	0
SPS1	1968	0	0	0
101	1968	200	200	200
111	1975	150	150	150
121	1998	200	189	175
122	2008	100	70	44
SPS2	2009	0	0	0
201	2010	100	66	39

[2] Direct connections are customers that are directly connected to the asset. It does not include customers located upstream of the asset.

4.3 Infrastructure cost per ET

The capital cost per ET for a given piece of infrastructure is given by:

$$\text{Capital Cost per ET} = \frac{\text{PV(Capital Cost)}}{\text{PV(ET served)}}$$

Consider SPS1.

The ET served by SPS1 is the total upstream ET, discounted to the present value rule applicable to that piece of infrastructure. So for example the PV(ET served) for SPS1 is:

$$\begin{aligned}\text{PV(ET served SPS1)} = {} & \text{PV(Connections to SPS1)} + \\ & \text{PV(Connections to 101)} + \\ & \text{PV(Connections to 111)} + \\ & \text{PV(Connections to 121)} + \\ & \text{PV(Connections to 122)}\end{aligned}$$

As SPS1 was commissioned in 1968 and is classed as a major asset, the applicable discount rate is 3% per annum from January 1996. This means that the result of the equation is:

$$\text{PV(ET served SPS1)} = 0 + 200 + 150 + 189 + 70 = 609$$

Say the valuation of SPS1 was $300,000. As an existing asset the present value of the asset is equal to the valuation. This leads to the capital cost per ET being:

$$\text{Capital Cost per ET} = \frac{\$300{,}000}{609} = \$492.47$$

Adopting the same approach for the rest of the infrastructure leads to the capital costs per ET for individual pieces of infrastructure, as shown in Table 4.

Table 4: Worked example: capital cost per ET for network elements

Asset	Construction	Valuation	Discount Rate	PV(Capital Cost)	PV(ET served)	Infrastructure cost per ET
STW	1965	$2,000,000	3%	$2,000,000	675	$2,961.15
SPS1	1968	$300,000	3%	$300,000	609	$492.47
101	1968	$0	3%	$0	539	$0.00
111	1975	$20,000	3%	$20,000	150	$133.33
121	1998	$20,000	7%	$20,000	219	$79.73
122	2008	$30,000	7%	$28,170	94	$300.00
SPS2	2009	$200,000	7%	$175,481	82	$2140.00
201	2010	$16,000	7%	$13,120	82	$160.00

4.4 Capital cost per ET for new connections

Now consider the growth that is forecast to connect at main 122. Development in this area benefits from mains 122, 121, 101, SPS1 and the sewage treatment works. The capital cost per ET then becomes the sum of the infrastructure cost per ET for these assets.

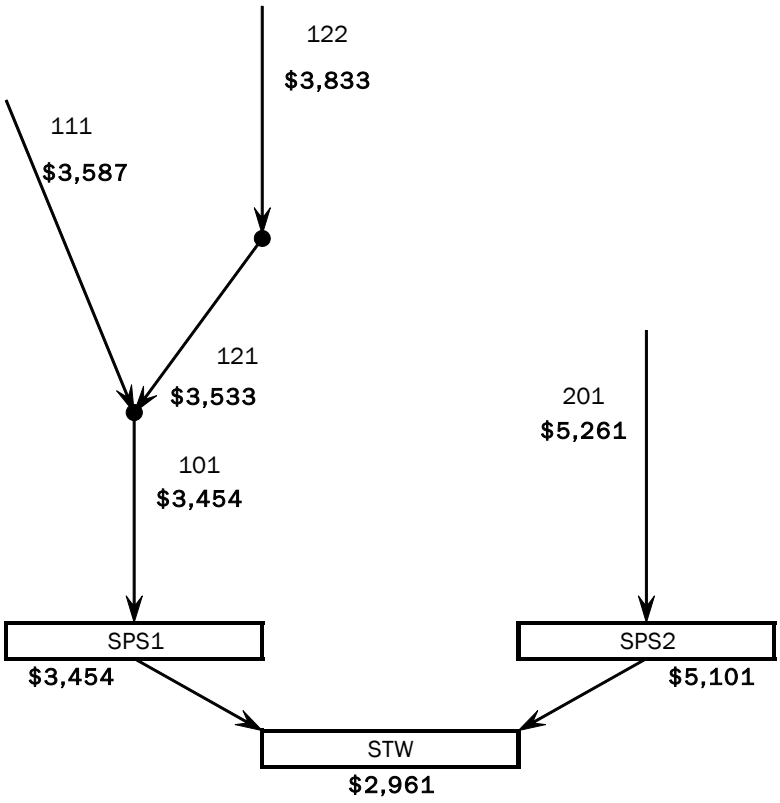
$$\begin{aligned}\text{Capital cost per ET}_{\text{Main 122}} &= IC_{122} + IC_{121} + IC_{101} + IC_{SPS1} + IC_{STW} \\ &= \$300 + \$79.73 + \$0 + \$492.47 + \$2{,}961.15 \\ &= \$3{,}833.35\end{aligned}$$

Table 5 summarises capital cost calculations for this theoretical network:

Table 5: Worked example: summary of capital cost per ET for network locations

Location	Cost contributor								Total cost
	STW	SPS1	101	111	121	122	SPS2	201	
STW	$2,961	-	-	-	-	-	-	-	$2,961
SPS1	$2,961	$492	-	-	-	-	-	-	$3,454
101	$2,961	$492	-	-	-	-	-	-	$3,454
111	$2,961	$492	-	$133	-	-	-	-	$3,587
121	$2,961	$492	-	-	$80	-	-	-	$3,533
122	$2,961	$492	-	-	$80	$300	-	-	$3,833
SPS2	$2,961	-	-	-	-	-	$2,140	-	$5,101
201	$2,961	-	-	-	-	-	$2,140	$160	$5,261

This is the capital cost per ET value required in the Developer Servicing Plan. This value is reduced by the Reduction Amount to derive the Developer Charge. The capital costs for connections to each part of the theoretical network are as shown below:



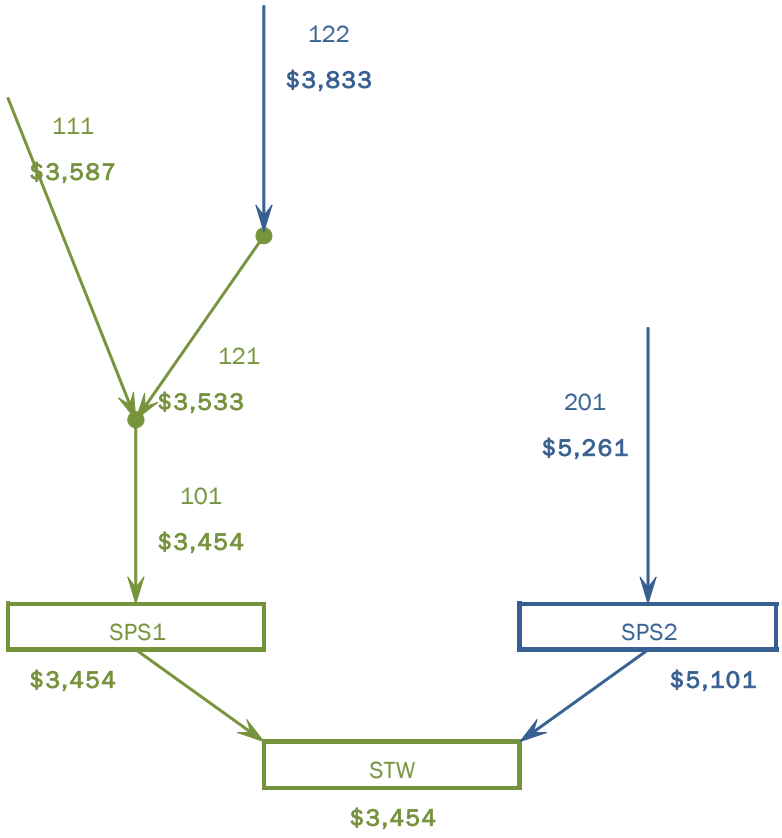
4.5 Agglomeration

Under the DLWC *Guidelines*, service areas with like prices need to be agglomerated. **Table 6** shows the grouping and agglomeration process.

Table 6: Agglomeration of Charges

Location	*Capital cost*	*NPV Growth @ 7%*	Select highest cost location	Highest cost less 30%	Calculate weighted average cost
201	*$5,261*	*82*			
SPS2	*$5,101*	*0*	$5,261	$3,683	$4,498
122	*$3,833*	*94*			
111	*$3,587*	*150*			
121	*$3,533*	*200*			
101	*$3,454*	*200*	$3,587	$2,511	$3,519
SPS1	*$3,454*	*0*			
STW	*$2,961*	*0*			

The result of this agglomeration process is two charges across the network- a lower charge on the older and more central elements, with higher charges on the more remote or expensive to service parts of the network.



C5. References

Department of Land and Water Conservation[3] (2002) *Developer Charges Guidelines: Water Supply, Sewerage and Stormwater*, NSW Crown.

Department of Land and Water Conservation (2003) *NSW Reference Rates Manual for Valuation of Water Supply, Sewerage and Stormwater Assets*, NSW Crown.

Government Pricing Tribunal (1995) *Sydney Water Corporation: Prices of Developer Charges for Water, Sewerage and Drainage Services*, available at http://www.ipart.nsw.gov.au

Independent Pricing and Regulatory Tribunal (2000) *Sydney Water Corporation, Hunter Water Corporation, Gosford City Council, Wyong Shire Council: Developer Charges from 1 October 2000*, available at http://www.ipart.nsw.gov.au

[3] The relevant functions of the former NSW Department of Land and Water Conservation are, at the time of writing, executed by the Office of Water, NSW Department of Primary Industries.

Appendix D: Reduction Amount Calculations

The reduction amounts for this DSP have been calculated using the NPV of Annual Charges Method documented in the DLWC Guidelines. This includes the incorporation of a varied capital charge over time.

The relationship between ETs and Assessments has been determined as follows:

- Residential: Dwelling developments were assigned a value of 1 ET for each dwelling on the property. There is a low proportion of multiple-unit dwelling development in the LGA.
- Non-residential: New assessments have been assigned a value of 2.0 ET per assessment.

The iteration results from the spreadsheet are summarised in the tables below. Spreadsheet outputs are provided following.

Sewerage

Parameter	Iteration 1	Iteration 2
Weighted capital cost	$5,413	$5,413
Input reduction amount	$1,500	$1,621
Input development charge/ET	$4,048	$3,790
Output reduction amount	$1,621	$1,621

ENTER YOUR DATA INTO YELLOW CELLS ONLY

Table D1 - Calculation of Developer Charges using the NPV of Annual Charges Method — **Wagga Wagga City Council - Sewerage Service**

Based on Input Reduction Amounts of $1,500 /ET (1st iteration)

Year																					
	Year No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Year	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Developer Charges																					
Year 1		2013 /14																			
Base Year		2012 /13																			
Average Capital Charges per ET	(2012/13$)	5,413	5,413	5,413	5,213	5,213	5,213	5,213	5,213	4,975	4,975	4,975	4,975	4,975	5,064	5,064	5,064	5,064	5,064	5,390	5,390
Inflation from 2012/13 to 2013/14 (%)		2.50%																			
Capital Charges	(2013/14$)	5,548	5,548	5,548	5,343	5,343	5,343	5,343	5,343	5,100	5,100	5,100	5,100	5,100	5,191	5,191	5,191	5,191	5,191	5,525	5,525
Input Reduction Amounts	**(2013/14$)**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**	**1,500**
Developer Charge per ET	(2013/14$)	4,048	4,048	4,048	3,843	3,843	3,843	3,843	3,843	3,600	3,600	3,600	3,600	3,600	3,691	3,691	3,691	3,691	3,691	4,025	4,025
Developer Charges per assessment - Residential	(2012/13$)	4,048	4,048	4,048	3,843	3,843	3,843	3,843	3,843	3,600	3,600	3,600	3,600	3,600	3,691	3,691	3,691	3,691	3,691	4,025	4,025
Developer Charges per assessment - Non-Residential	(2012/13$)	8,096	8,096	8,096	7,686	7,686	7,686	7,686	7,686	7,200	7,200	7,200	7,200	7,200	7,382	7,382	7,382	7,382	7,382	8,050	8,050
Assessments & ETs																					
	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Residential Assessments at year end	23,276	23,581	23,890	24,203	24,515	24,831	25,151	25,475	25,804	26,129	26,458	26,791	27,129	27,471	27,801	28,135	28,473	28,815	29,161	29,546	29,936
Non Residential Assessments at year end	1,735	1,744	1,753	1,762	1,769	1,776	1,783	1,790	1,797	1,803	1,809	1,815	1,821	1,827	1,834	1,841	1,848	1,855	1,862	1,870	1,878
Backlog Assessments at year end	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assessments at year end	25,011	25,325	25,643	25,965	26,284	26,607	26,934	27,265	27,601	27,932	28,267	28,606	28,950	29,298	29,635	29,976	30,321	30,670	31,023	31,416	31,814
ET per Residential Assessment	1.00																				
ET per Non Residential Assessment	2.00																				
Total ETs from growth model	34,338	34,853	35,492	36,142	36,805	37,175	37,548	37,926	38,307	38,692	39,068	39,448	39,832	40,220	40,611	40,995	41,381	41,772	42,166	42,564	42,992
New ETs per year (excluding backlog)	-	515	639	651	662	370	374	377	381	385	376	380	384	388	391	383	387	391	394	398	428
Cumulative New ETs (excluding backlog)	-	515	1,154	1,805	2,467	2,837	3,211	3,588	3,969	4,354	4,731	5,111	5,495	5,882	6,274	6,657	7,044	7,435	7,829	8,227	8,655
PV (new ETs excluding backlog) 30 years @ 7% pa	-	6,085	6,031	5,842	5,628	5,388	5,444	5,501	5,559	5,618	5,678	5,752	5,827	5,905	5,986	6,068	6,166	6,268	6,374	6,485	6,600
Revenue and Expenditure																					
Rates & Charges Revenue, Trade Waste Charges, Other Sales and Charges, Pensioner Rebate Grant																					
Revenue ($'000)	(2012/13$)	17,172	16,817	17,045	17,299	17,507	17,746	17,977	18,235	18,480	18,716	18,942	19,196	19,442	19,666	19,915	20,155	20,417	20,670	20,937	21,229
OMA Expenditure ($'000)	(2012/13$)	11,059	11,235	11,419	11,606	11,795	11,990	12,161	12,339	12,516	12,698	12,882	13,069	13,259	13,451	13,647	13,847	14,048	14,251	14,462	14,677
Revenue less OMA Expenditure ($'000)		6,113	5,582	5,626	5,693	5,712	5,756	5,816	5,896	5,964	6,018	6,060	6,127	6,183	6,215	6,268	6,308	6,369	6,419	6,475	6,552
Revenue less OMA Expenditure for new ETs ($'000)		90	182	281	382	436	492	550	611	671	729	785	845	904	960	1,018	1,074	1,134	1,192	1,251	1,319
PV (Revenue less OMA Expenditure for new ETs) 30 years @ 7% pa ($'000)		10,145	9,847	9,511	9,027	8,484	8,563	8,619	8,652	8,648	8,649	8,687	8,743	8,749	8,768	8,833	8,874	8,943	8,959	8,997	9,014
Output (calculated) Reduction Amounts		1,667	1,633	1,628	1,604	1,575	1,573	1,567	1,556	1,539	1,523	1,510	1,500	1,482	1,465	1,456	1,439	1,427	1,405	1,387	1,366
Output with first 5 years averaged		1,621	1,621	1,621	1,621	1,621	1,573	1,567	1,556	1,539	1,523	1,510	1,500	1,482	1,465	1,456	1,439	1,427	1,405	1,387	1,366
% Difference Between the Input and Output		8%																			

Difference Greater Than 2%, Go to Next Iteration

General Notes:

1. Approximately three iterations of the financial planning model are normally required until the Ouput Reduction Amount for the first 5 years is within 2% of the Input Reduction Amount.

Specific Notes:

GREEN CELLS HAVE BEEN CARRIED OVER FROM THE PREVIOUS ITERATION

Table D2 - Calculation of Developer Charges using the NPV of Annual Charges Method — **Wagga Wagga City Council - Sewerage Service**

Based on Input Reduction Amounts of $1,621 /ET (2nd iteration)

Year																					
Year No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Year		2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Developer Charges																					
Year 1		2013/14																			
Base Year		2012/13																			
Average Capital Charges per ET	(2012/13$)	5,413	5,413	5,413	5,213	5,213	5,213	5,213	5,213	4,975	4,975	4,975	4,975	4,975	5,064	5,064	5,064	5,064	5,064	5,390	5,390
Inflation from 2012/13 to 2013/14 (%)		0.00%																			
Capital Charge	(2013/14$)	5,410	5,410	5,410	5,210	5,210	5,210	5,210	5,210	4,980	4,980	4,980	4,980	4,980	5,060	5,060	5,060	5,060	5,060	5,390	5,390
Input Reduction Amounts	**(2013/14$)**	**1,621**	**1,621**	**1,621**	**1,621**	**1,621**	**1,573**	**1,567**	**1,556**	**1,539**	**1,523**	**1,510**	**1,500**	**1,482**	**1,465**	**1,456**	**1,439**	**1,427**	**1,405**	**1,387**	**1,366**
Developer Charge per ET	(2013/14$)	3,790	3,790	3,790	3,590	3,590	3,640	3,640	3,650	3,440	3,460	3,470	3,480	3,500	3,600	3,600	3,620	3,630	3,650	4,000	4,020
Developer Charges per assessment - Residential	(2012/13$)	3,790	3,790	3,790	3,590	3,590	3,640	3,640	3,650	3,440	3,460	3,470	3,480	3,500	3,600	3,600	3,620	3,630	3,650	4,000	4,020
Developer Charges per assessment - Non-Residential	(2012/13$)	7,580	7,580	7,580	7,180	7,180	7,280	7,280	7,300	6,880	6,920	6,940	6,960	7,000	7,200	7,200	7,240	7,260	7,300	8,000	8,040
Assessments & ETs																					
		2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29	2029/30	2030/31	2031/32	2032/33
Residential Assessments at year end		23,276	23,581	23,890	24,203	24,515	24,831	25,151	25,475	25,804	26,129	26,458	26,791	27,129	27,471	27,801	28,135	28,473	28,815	29,161	29,546	29,936
Non Residential Assessments at year end		1,735	1,744	1,753	1,762	1,769	1,776	1,783	1,790	1,797	1,803	1,809	1,815	1,821	1,827	1,834	1,841	1,848	1,855	1,862	1,870	1,878
Backlog Assessments at year end		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Assessments at year end		25,011	25,325	25,643	25,965	26,284	26,607	26,934	27,265	27,601	27,932	28,267	28,606	28,950	29,298	29,635	29,976	30,321	30,670	31,023	31,416	31,814
ET per Residential Assessment		1.00																			
ET per Non Residential Assessment		2.00																			
Total ETs from growth model		34,338	34,853	35,492	36,142	36,805	37,175	37,548	37,926	38,307	38,692	39,068	39,448	39,832	40,220	40,611	40,995	41,381	41,772	42,166	42,564	42,992
New ETs per year (excluding backlog)		-	515	639	651	662	370	374	377	381	385	376	380	384	388	391	383	387	391	394	398	428
Cumulative New ETs (excluding backlog)		-	515	1,154	1,805	2,467	2,837	3,211	3,588	3,969	4,354	4,731	5,111	5,495	5,882	6,274	6,657	7,044	7,435	7,829	8,227	8,655
PV (new ETs excluding backlog) 30 years @ 7% pa		-	**6,085**	**6,031**	**5,842**	**5,628**	**5,388**	**5,444**	**5,501**	**5,559**	**5,618**	**5,678**	**5,752**	**5,827**	**5,905**	**5,986**	**6,068**	**6,166**	**6,268**	**6,374**	**6,485**	**6,600**
Revenue and Expenditure																					
Rates & Charges Revenue, Trade Waste Charges, Other Sales and Charges, Pensioner Rebate Grant																					
Revenue ($'000)	(2012/13$)	17,172	16,817	17,045	17,299	17,507	17,746	17,977	18,235	18,480	18,716	18,942	19,196	19,442	19,666	19,915	20,155	20,417	20,670	20,937	21,229
OMA Expenditure ($'000)	(2012/13$)	11,059	11,235	11,419	11,606	11,795	11,990	12,161	12,339	12,516	12,698	12,882	13,069	13,259	13,451	13,647	13,847	14,048	14,251	14,462	14,677
Revenue less OMA Expenditure ($'000)		6,113	5,582	5,626	5,693	5,712	5,756	5,816	5,896	5,964	6,018	6,060	6,127	6,183	6,215	6,268	6,308	6,369	6,419	6,475	6,552
Revenue less OMA Expenditure for new ETs ($'000)		90	182	281	382	436	492	550	611	671	729	785	845	904	960	1,018	1,074	1,134	1,192	1,251	1,319
PV (Revenue less OMA Expenditure for new ETs) 30 years @ 7% pa ($'000)		**10,145**	**9,847**	**9,511**	**9,027**	**8,484**	**8,563**	**8,619**	**8,652**	**8,648**	**8,649**	**8,687**	**8,743**	**8,749**	**8,768**	**8,833**	**8,874**	**8,943**	**8,959**	**8,997**	**9,014**
Output (calculated) Reduction Amounts		**1,667**	**1,633**	**1,628**	**1,604**	**1,575**	**1,573**	**1,567**	**1,556**	**1,539**	**1,523**	**1,510**	**1,500**	**1,482**	**1,465**	**1,456**	**1,439**	**1,427**	**1,405**	**1,387**	**1365.75**
Output with first 5 years averaged		**1,621**	**1,621**	**1,621**	**1,621**	**1,621**	**1,573**	**1,567**	**1,556**	**1,539**	**1,523**	**1,510**	**1,500**	**1,482**	**1,465**	**1,456**	**1,439**	**1,427**	**1,405**	**1,387**	**1365.75**
% Difference Between the Input and Output		**0.0%**																			

Difference Less Than 2%, Calculation Complete

Developer Charges for the first 5 years = $3790 in year 2013/14 dollars

General Notes:

1. Approximately three iterations of the financial planning model are normally required until the Ouput Reduction Amount for the first 5 years is within 2% of the Input Reduction Amount.