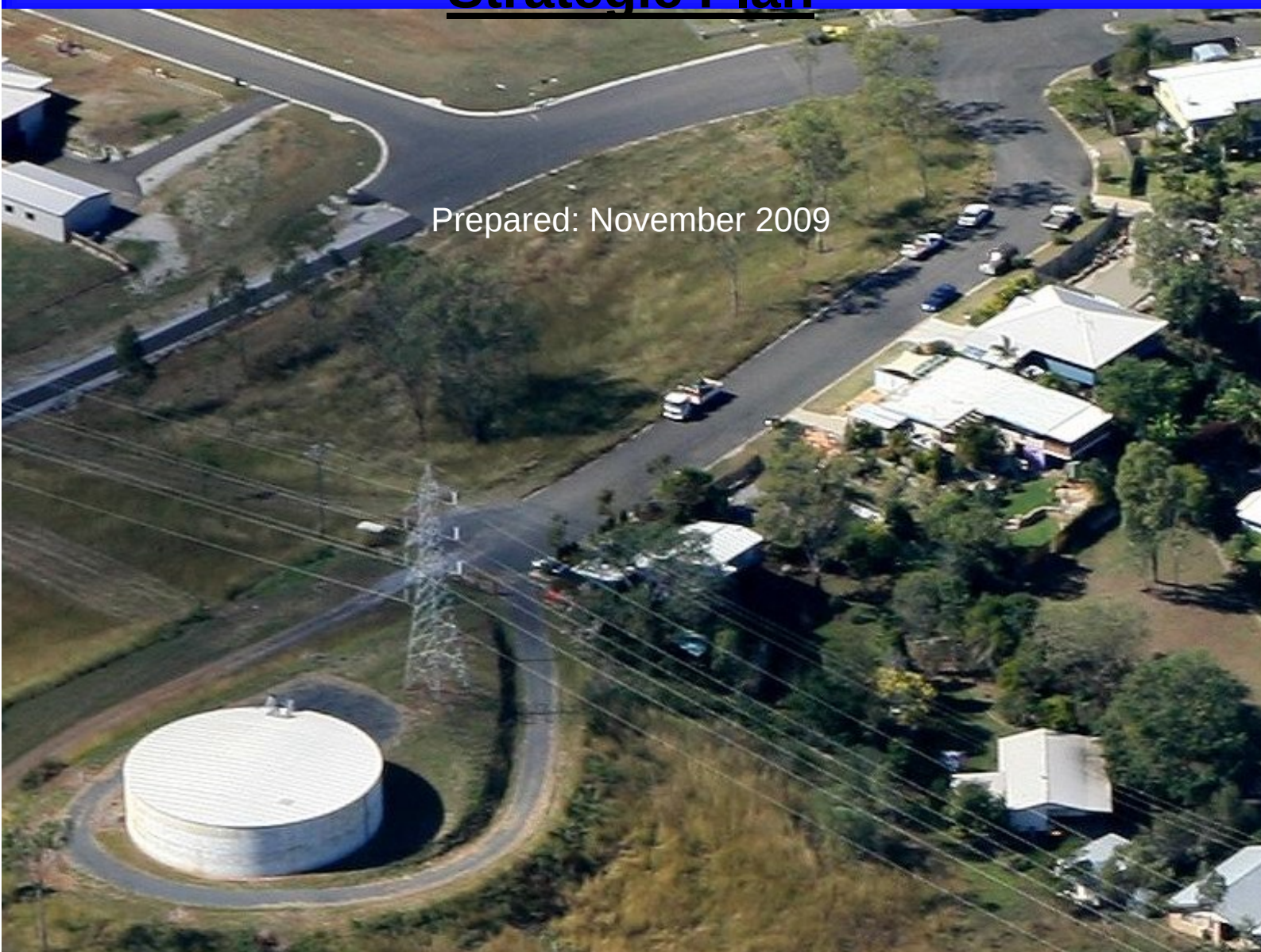
GLADSTONE
REGIONAL COUNCIL

Calliope Water Supply Scheme Strategic Plan

Prepared: November 2009



Amendment Table

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1 Preliminary

The Calliope/Beecher area has seen a significant rise in subdivisional interest in recent years with subdivisional enquiries, applications and approvals covering some 3049 potential allotments. The current level of growth has reduced in the past months from the unprecedented levels experienced only a couple of years ago. The development rate at its peak was around 123 lots p.a. or around 10% growth per annum and whilst it appears to have slowed, development looks like returning to a high rate in the near future. This level of growth is unprecedented and unpredictable for the Calliope area therefore continual review of this document is required.

Strategic Planning is based on the H20MAP Water modelling software package produced by MWHSoft, which has permitted a level of analysis well beyond that achievable in 1994 when much of the original planning was carried out.

2 Scope

The scope includes the Calliope water supply system comprising all infrastructure downstream of South Gladstone Reservoir, including pumping, storage and reticulation systems referred to herein as the Calliope Water Supply Scheme. The scheme area includes Calliope township, the Beecher trickle feed system and all bulk water infrastructure from (but excluding) the South Gladstone Reservoir.

3 Objectives of the Plan

The primary objectives of the Strategic Plan are to:

- Identify the Defined Water Supply Area (DWSA) for the Calliope region.
- Define maximum service levels (MSL) within the DWSA.
- Identify long term capital Infrastructure requirements.
- Identify any future reservoir sites.
- Identify infrastructure trigger points.
- Identify pre-requisite infrastructure.
- Prepare a plan that can assist in the preparation of Planning Scheme Policies and Priority Infrastructure Plans.
- Prepare a 10 Year Capital Works Plan for the Calliope Water Supply Scheme.
- Rectify existing demand & fire flow problems as part of the plan.

4 Strategic Planning Rationale

The Strategic Plan identifies infrastructure requirements into the longer term, indicating the trigger point for each component and any pre-requisite infrastructure required.

The Calliope DWSA has been developed in consultation with Council's Planning Department and includes areas of subdivisional interest, new applications and areas adjacent to the existing system that have a reasonable expectation of being connected to the supply system.

Maximum service levels shown on Maps 1 and 3 have been adopted to ensure that minimum pressures and fire flows can be maintained in all reticulation mains within the DWSA. In addition flood levels, based on the recent Calliope flood study and the latest remanent vegetation maps have also been considered in the development of this plan.

The model assumes that residential development will occur in the majority of Zone 1, light industry development in Zone 1K (10ET per Ha), rural residential development in Zones 3 and 4 (1.7ET per Ha) and Beecher (1.5Ha per ET) and a mixture of residential and rural residential development in Zone 2. Whilst this is not inconsistent with the new Town Planning Scheme it has been necessary to make some assumptions beyond the current scope of the town plan.

The model is based on equivalent tenements (ET) for long term accuracy as discussed in Strategic Planning Assumptions below rather than population predictions. Estimated time lines however are necessary for preparing the 10 year plan which will need reviewing on an annual basis. Equivalent Population (EP) estimates are used only for comparative purposes and are not used in the model itself.

Long term modelling has been adopted to ensure that short term decisions are informed and based on long term strategic goals. This is particularly important for the development of the treated bulk water supply system.

The model assumes that initial development will occur near existing infrastructure and progressively extend to the extremities of the DWSA as major infrastructure is provided. Out of sequence development will no doubt occur as well and may require interim solutions and/or bring forward costs associated with major infrastructure in the Capital Infrastructure Plan. Details of pre-requisite infrastructure have been included in Appendix 2 to assist in assessing the impact of this "leap frog" development.

The Strategic Plan assumes that all infrastructure listed in the Capital Infrastructure Plan will be funded through developer contributions. The segregation of the system into zones and the introduction of longer lead up times, where appropriate, will enable the augmentations to be fully funded while ensuring lower and more uniform headworks contributions over the long term.
The plan also assumes that Council will assume control of the Calliope treated bulk water system from South Gladstone Reservoir. This approach is consistent with Councils desire to simplify the implementation of bulk water upgrades that will be required as the population expands.

Acquisition of the existing 375mm Gladstone-Calliope supply main from the Gladstone Area Water board is included in this Plan and in the Developer Contribution Policies, in order to complete the progressive acquisition of the Calliope bulk water system. The existing Calliope Booster pump station has been excluded since both the pumps and building will be inadequate for future augmentations.

5 Defined Water Supply Area

The primary purpose of the DWSA is to set fixed development limits to enable the system to be modelled. The DWSA itself is based on areas of subdivisional interest, new applications and areas adjacent to the existing system and takes into account geographical limitations including elevation, slope, flooding and remanent vegetation.

Whilst the intention of DWSA is not to prohibit external development, it is likely that small scale development outside the DWSA will be discouraged in the short term as a result in significant delays and costs associated with reassessing the model and supporting documentation.

This is not unreasonable since the total DWSA included in Zones 1-4 and the Beecher area has a capacity of over 21,780 EP and a potential development life in excess of 40 years.

In some cases the external boundaries of the DWSA do not necessarily follow existing property boundaries. For example the extreme southern boundary of the DWSA in Zone 3 is set at RL 65 to avoid the need for prohibitively expensive infrastructure for a very small number of lots. In this instance Zone 3 can be serviced through Zone 1 in the medium term after pre-requisite infrastructure has been provided.

6 Strategic Planning Assumptions

Calliope (Excluding Beecher)
The strategic plan is based on the following basic assumptions:

- 2.8 Equivalent People (EP) per Equivalent Tenement (ET)
- Av Daily Flow (AD) = 520 L/EP/day (529.25 KL/ET/year used in model)
    - MDMM = 780 L/EP/Day
    - Max Day (MD) = 1170 L/EP/day
    - Max Hour (MH) = 97.5 L/Hr/EP
- Residential Development Density = 10 ET per ha
- Max Rural Residential Development Density = 1.7 ET per ha
- Light Industry Development Density = 10ET per ha
- Modelling is based on both Maximum day and Maximum hour (18:00 hrs)
- Service levels of RL 80 (Mt Elizabeth(and RL 50 (Silverdale) unless otherwise stated
- Model uses highest RL on land parcel chosen, if higher than Max Service Level, the MSL limit used.

Beecher System
The following assumptions apply to the Beecher Trickle System.

- Design Flow Rate - 1.3 l/min per ET (the largest trickle feed valve installed)
- 2.8 Equivalent People (EP) per Equivalent Tenement (ET)
- Rural allocation = 0.66 ET/ha or 1.5 ha/ET
- Service levels of RL 80, 60 and 50 have been kept the same as the previous 1994 water supply areas. Note; all zones fed off Mt Elizabeth.
- Subdivision connections to be a maximum of 150NB.
- Modelling is based on both Maximum day and Maximum hour (18:00 hrs)
- Domestic control valving requires minimum 12mhd to function correctly.
- Beecher is currently averaging 35 connections per year.

Some of the areas included in the Strategic Plan (particularly Zones 2 and 3) fall outside the scope of current Town Plan. The type and density of development in these areas is essentially a “best guess” estimate and may require further assessment at a later date.

6.1 Maximum Service Levels (MSL)

Although existing development levels have been taken into account, the service levels ultimately adopted in this plan have been a balance between desirable maximum elevations, the extent of developable land above the maximum service levels and the cost of infrastructure needed to service development at these levels.

The following Service levels have been adopted in the Strategic Plan.

- **Zone 1&2** - **RL 80** (Serviced by Mt Elizabeth Res)
- **Zone 3** - **RL 65** (Serviced by Mt Elizabeth Res)
- **Zone 4** - **RL 50** (Serviced by Silverdale Res)
- **Beecher** - **RL 80** (Mt Elizabeth to Chamberlain Rd)
    - - **RL 60** (Chamberlain Rd to Clyde Creek crossing*)
    - - **RL 50** (North of Clyde Creek crossing)

6.2 Development above Maximum Service Levels

The Strategic Plan ensures that adequate fire flows and system pressures can be guaranteed for all subdivisional development within the maximum service levels defined here-in. There is however a growing trend of subdivisional developments being approved with the reticulation system complying with minimum pressure and fire flow requirements while adjacent land parcels are allowed to exceed the maximum service level.

It is not necessarily detrimental having structures built above the maximum service level provided the owners are aware of their responsibilities in relation to providing and maintaining their own booster equipment and provided local fire services personnel are aware of the situation and have booster pumps capable of reaching the buildings.

The issue of boosting daily supplies is not life threatening however the issue of fire flows may well be. Therefore if Council is to continue this practice the following recommendations are proposed to improve safety and protect structures built above the maximum service level:

- Fire hydrants should be provided on the boundary of every allotment where potential building sites will exceed the maximum service level.
- Fire fighting storage should be provided on allotments where the elevation of potential building sites will significantly degrade the capacity of fire appliance booster pumps to supply adequate fire flows at that level.

6.3 Demand levels and Loadings

6.3.1 Current Connections

Current loadings on Mt Elizabeth and Silverdale systems used in the model are based on the areas defined as Zones 1 and 4.

Zone 1	=	856 ET
Zone 2	=	0 ET
Zone 3	=	0 ET
Zone 4	=	398 ET
Beecher	=	374 ET
Total	**=**	**1628 ET**

6.3.2 Ultimate Loadings

The ultimate capacity of each zone is listed below:

Zone 1	= 3590 ET
Zone 2	= 2000 ET
Zone 3	= 370 ET
Zone 4	= 758 ET
Beecher	= 1062 ET
Total	**= 7780 ET**

6.3.3 Demand Predictions

Although the model is based on equivalent tenements, growth rates are still required for the 10 year plan. The current growth rates have no historical precedent and the previous boom and current slow down has been too short to provide any reliable trends. As a consequence an annual average growth rate of 4% p.a. has been assumed for the Calliope Water Supply Scheme.

6.4 Fire Flow Service Levels

For non-commercial properties (residential buildings with 3 storeys or less), the total available flow, either from one or a combination of Council's hydrants, is 15 l/s for fire fighting purposes plus the maximum day demand. For commercial areas the total available flow is 30 L/s plus the maximum day demand (usage varies for different types of land uses). The system has been designed to provide 12m residual pressure at the hydrant in use and 6m elsewhere in the system.

The service levels provided for fire fighting purposes are in accordance with Chapter 6 of the Planning Guidelines for Water Supply and Sewerage, 2005, produced by the Department of Natural Resources and Mines.

6.5 Existing Fire Flow Issues

The Calliope water supply system has historically suffered from pressure and fire flow problems particularly in the higher areas around Silverdale, Hazelbrook and at the extremities of the reticulation system in areas like Vallis Street and Ironmonger Street.

All problem areas have been identified during modelling and will be progressively eliminated during the implementation of the Capital Infrastructure Plan.

7 Capital Infrastructure Plan

The Calliope Water Supply Scheme has been modelled on the progressive development of the DWSA from its current loading of 1630 ET to a maximum loading of around 7780 ET (21,780 EP).

The Capital Infrastructure Plan divides the DWSA into zones to assist in identifying the level of infrastructure required in each area. It also provides a mechanism for developing separate headworks zones outside the DWSA. Separate zones are also used to define and separate the high and low level pressure systems.

The Capital Infrastructure Plan only includes infrastructure required to service the DWSA as a whole and does not list localised infrastructure such as internal subdivisional mains, connecting mains that service individual developments or interconnecting loop mains between subdivisions.

Full details of each component and supplementary explanations are included below. The Capital Infrastructure Plan is summarized in Appendix 1. Maps 4, 5 and 6 show the location of each component listed in the Capital Infrastructure Plan.

7.1 Zone 1

Zone 1 covers much of the existing township serviced by Mt Elizabeth reservoir and has a total capacity of some 3590 ET (10,050 EP). It also includes undeveloped land around Mt Elizabeth, Hazelbrook and Silverdale areas, large tracts of vacant land between Don Cameron Drive and Morcom Streets and vacant land between Taragoola Road and Racecourse Road to the south of the Council Depot.

The recently completed 375NB parallel Dawson Highway main from the Crossroads to Don Cameron Drive has meant that the trunk water system in Calliope has enough capacity to service the majority of Zone 1's future demands. Development in

Zone 2 and 3, in conjunction with other trunk infrastructure, can begin to occur due to the completion of this main.

Development in this zone is now only dependent on a number of smaller mains including looping mains which are required to provide and resolve issues with local fire flows and water pressure.

The following section details the major infrastructure required to fully develop Zone 1 to its maximum capacity of 3590 ET. Additional prerequisite infrastructure for each zone is listed in Appendix 2.

7.1.1 1B - 200NB Herbertson Rd Main

The Herbertson Road main will complete the link between Morcom and Ironmonger Streets and is required to resolve existing fire flow problems in the southern end of this zone. The 200NB link allows further rural residential and light industrial development in Zone 1G and 1K, respectively, provided the mains are connected to the new 200NB main.

7.1.2 1C - 150NB Pujola Street Loop

Pujolas Street is the separation point between Zone 1 and Zone 4. To achieve zone separation a new 150NB main is required on the eastern side of Pujolas Street (see Map 9) connecting Sutherland and Bloomfield Streets. These works create a “looping effect” eliminating dead end mains and providing redundancy. Valves between the two Pujolas Street mains are required to separate the two pressure zones.

7.1.3 1F - 300NB Don Cameron Drive Upgrade to Walker Drive

The existing 100NB Don Cameron Drive main is required to be upgraded to 300NB as far as the Walker Drive junction when there is a total of 1160ET in Zone 1. This is required in order to maintain fire flows in Zone 1E and in the Morris Ave area.

7.1.4 1G - 200NB Farmer Street Link

The 200NB link from the 375NB main to Brown Street via Farmer Street is required to resolve existing and future fire flow problems in this area.

7.2 Zone 2

Zone 2 is located to the east of Zone 1 and contains some 2000 potential urban allotments (5600EP). Although the land in this zone is ideal for urban development it does contain pockets of endangered remanent vegetation and some land above the adopted service level.

It is possible to service Zone 2 independently of Zone 1 with the construction of mains 2B and 2C as outlined below, however it is far more likely to be developed in smaller stages off Don Cameron Drive to take advantage of the lower initial service and access costs.

7.2.1 2A - 300NB Don Cameron Drive Upgrade from Walker Dr

With the construction of the 300NB distribution main up Don Cameron Drive to Walker Drive (1F), a total of **50 ET** can be serviced in Zone 2 with the provision of this main. A further **350 ET** can be developed in Zone 2 with the extension of a 300NB main up Don Cameron Drive to Zone 2 (2A).

7.2.2 2B - 450NB Reticulation Main A to Zone 2

For Zone 2 to develop beyond 400 ET to a capacity of **1000 ET** (2800 EP's), a separate 450NB distribution main is necessary from the 375NB main at the Calliope Crossroads running east along the Bruce Highway reserve to Zone 2. The 450NB main must form a looping main by extending through the middle of Zone 2 and connecting to the 300NB distribution main from Don Cameron Drive.

7.2.3 2C - 450NB Zone 2 Reticulation Main B

To fully develop Zone 2 to **2000 ET** (5600 EP's), the 450NB main (2B) must be extended past the 375NB connection to the proposed 600NB parallel distribution main (W6) from Mt Elizabeth to Calliope Crossroads.

7.3 Zone 3

Zone 3 is located at the southern extreme of the Calliope Township area. The southern boundary of Zone 3 follows the **65m** contour line as fire flows cannot be provided where development exceeds RL 65 without providing a pump station, rising main, reservoir and reticulated main, which due to the small amount of additional lots gained would be uneconomical.

Zone 3 can service a total of **150 ET** without further infrastructure triggered. However development past 150 ET is dependent on the extension of the 375NB main past Don Cameron Drive (3A).

7.3.1 3A - 375NB Dawson Highway Main (Extension C)

To fully develop Zone 3 to **370 ET**, the 375NB parallel feed main must be extended south of Don Cameron Drive along the eastern side of the Dawson Highway for a total length of approximately 850m. Cross connections to this main are required at Lightning Street, Muirhead Street and into the 200NB main just before the railway easement.

7.4 Zone 4

Zone 4 is a low pressure zone fed from the Silverdale Reservoir system via an existing 200NB trunk main which has an existing capacity of **340 ET**. Assuming the area west of Stowe Road is fully developed as rural residential allotments the total capacity of Zone 4 would be around 760 ET, with the current spare capacity of the 200NB main being around 70 ET. The construction of a 300mm parallel main from Silverdale Reservoir to Stowe Road is required to provide the additional capacity. This main can however be constructed in three stages so as to spread the costs over a number of developments as outlined in items 4A, 4B and 4C.

7.4.1 4A - 300NB Parallel Main (Stage 1)

The first 600m stage of the 300NB main from Silverdale Reservoir will enable a further 130 ET to be developed with the total capacity increasing to **470 ET**.

7.4.2 4B - 300NB Parallel Main (Stage 2)

A second 600m stage of the 300NB main (total of 1200m) will enable a further 145 ET to be developed increasing the total capacity to **615 ET**.

7.4.3 4C - 300NB Parallel Main (Stage 3)

The last 600m of the 300NB parallel main (total of 1800m) will enable the balance of Zone 4 to be developed to a total capacity to **758 ET.**

7.4.4 4D - Archer Street Link

The Archer Street link is located in the electricity easement at the wash down pad off Stowe Rd. The link involves connecting adjacent 100NB and 200NB mains on the

Silverdale system. These changes will improve the looping capacity of this pressure system as there is currently only one feed from the Silverdale Reservoir. This modification will also resolve existing fire flow problems in Menzies Street.
Additionally, this work involves the removal of the connection to the old calliope bore system which is no longer required. This link should be installed when **Main 4A** occurs.

7.5 Beecher

The Beecher area consists entirely of rural residential allotments. The model assumes a density of 1.5 Ha/ET. The area is essentially a long narrow valley with steep hills on both sides exceeding the maximum service levels for this area. It also contains a significant amount of land affected by both flooding and remanent vegetation restrictions.

Given that the current trickle water supply scheme has performed satisfactorily since its introduction in 1994 the model assumes that the current trickle system will be retained into the future.

A parallel 200NB main from the Mt Elizabeth takeoff point to Wyndham Road has been constructed and will service the full development of Beecher (1062 ET). No other infrastructure is required for the trunk water system however some reticulation mains require upgrading.

Upgrading the main in **Schulze Road** to 100mm will be required with any further development in this area. Also a 150NB main will be required to feed sub-divisions off **Grayson Road**. This includes the connection back to the proposed 200mm Dawson Highway main.

7.6 Bulk Water System

For the purposes of the Strategic Plan the bulk water system comprises the common infrastructure between South Gladstone reservoir and the various zones. The existing bulk water system consists of the 375mm rising main from South Gladstone to Calliope Booster, Calliope Booster, Mt Elizabeth and Silverdale Reservoirs, the 300NB rising main from Calliope Booster to Mt Elizabeth Reservoir, the 375NB off take trunk main from Mt Elizabeth reservoir and the 200NB rising main to Silverdale Reservoir.

Bulk water components are common to multiple zones and are generally the most expensive. Where possible bulk water augmentations have been staged to maximize contribution periods and minimize the impact on developers and existing ratepayers.

7.6.1 Upgrade Calliope Bulk Water System at 1900 ET (5320 EP)

The capacity of the existing 6ML reservoir on Mt Elizabeth will be exceeded when the combined downstream load reaches **1900 ET** (5320 EP). At this point additional storage will be required to enable further development.

Augmenting the existing storage on Mt Elizabeth is considered the most economic option at this point since it involves the least amount of capital infrastructure however the storage capacity is limited. The provision of an additional 6ML reservoir on Mt Elizabeth is possible however and will increase the total capacity of the system to **3625 ET** (10150 EP). At this point the current pumping system needs to be upgraded to 110l/s however there are real advantages in upgrading it to 120 l/s (the maximum capacity for the current 375NB suction line).

To achieve an increased capacity from 1900 ET to 3625 ET the following infrastructure will be required:

- W1 - New 6ML Reservoir on Mt Elizabeth (total storage increased to 12ML)
- W3 - New pump station with new pumps operating at 120 l/s duty
- W4 - New booster pump station at South Gladstone Reservoir to prevent cavitation problems created by the upgraded Calliope Booster station. (Pump Duty point 120 l/s).

Upgrading the current Calliope Booster would involve gutting the facility to replace the pumps, pipework and control equipment. Given the lack of any space in the building for future expansion and the difficulty in doing this with a facility operating at near maximum capacity, it may be more prudent to construct a new facility and to either decommission the old pump station or retain it for chlorination purposes only.

7.6.2 W5 - 600 NB Parallel Distribution Main – Mt Elizabeth to X-Roads

When the total load in Zones 1,2,3,4 reaches **2100 ET** a new 600NB distribution main will be required between Mt Elizabeth and the point where the 375NB main on Dawson Highway commences. This main, in parallel with the existing 375NB main, will be sufficient to service the full development of Zones 1, 2, 3 and 4. To avoid congestion the pipeline route would be via Arthur Hume Way and along the Dawson Highway as shown on the maps.

In addition the model indicates that subdivisions connected to the existing 375NB main and having road crossings to the west of the Dawson Hwy should be reconnected to the 600NB distribution main for maximum efficiency.

7.6.3 Upgrade Calliope Bulk Water System at 3625 ET (10 150EP)

At 3625 ET (10150 EP) the capacity of the combined 12ML storage on Mt Elizabeth will be exceeded. To allow further development to occur additional storage will be required. A suitable reservoir site is available adjacent to Mt Elizabeth on Lot 5 SP190794, however the main problem at this point is capacity of the GAWB rising main.

The model indicates that the capacity of the 375NB suction main will be exceeded at around 120 l/s however it also suggests that the upgrade can be deferred until around 4225 ET (11830 EP) with the provision of more storage on the adjacent hill and treating all 3 reservoirs as a single storage. Construction of a 12 ML storage at this point provides maximum capacity for the existing GAWB supply main, defers the upgrade of the 375NB main and eliminates the need to construct a 4th tank to service the DWSA.

To achieve an increased capacity from 3625 ET to **4225 ET** the following infrastructure will be required:

- W6 - A new 12ML reservoir on Lot 5 SP190794
- W7 - A new 375NB rising main to the new reservoir
- W8 - A new 450NB reticulated main from the new reservoir.

7.6.4 Upgrade Calliope Bulk Water System at 4225 ET (11830 EP)

At 4225 ET (11830 EP) the pumping capacity of the bulk water system will be unable to keep up with maximum demand conditions over a 3 day period and the upgrade of the 375 NB suction main will be necessary.

If the 375NB main is not upgraded the performance characteristics of the upgraded Calliope Booster Pump Station after it is upgraded to 170 l/s would cause unacceptable operating pressures (in excess of 1200 KPA) and excessive running costs. To eliminate these problems a new 450NB parallel trunk main is required from South Gladstone reservoir to Friswell Road. The model indicates that the main can be constructed in 2 stages to reduce the outlay of capital funds. The South Gladstone Booster Pump Station is still required but can remain at 120 l/s.

The provision of the parallel main will enable the pumping capacity to be ramped up to 170 l/s taking the total capacity at this point to **5500 ET** (15400 EP). Infrastructure required to achieve this capacity include the construction of:

- W9 - 10 km of 450NB main [South Gladstone Booster to Friswell Rd interconnected at both ends to the 375NB pipeline.
- W10 - Upgrading pumping capacity to 170 L/s

7.6.5 Upgrade Calliope Bulk Water System at 5800 ET (16240 EP)

At 5800 ET (16240 EP) the 2nd stage of the 450NB main needs to be completed to allow the total pumping capacity to be upgraded to 220 l/s which will provide sufficient capacity for the full development of **7780 lots** (21,780 EP).

To achieve this capacity the following infrastructure will be required:

- W11 - Completing the 450NB parallel suction main (3.2km)
- W12 - Upgrade Calliope PS pumping capacity - 220 l/s
- W13 - Purchase of 375NB South Gladstone to Calliope water main

The South Gladstone Booster becomes redundant with the completion of the 450NB parallel suction main to Calliope Booster since the required NPSHA is 4m but with the 375NB and 450NB mains running in parallel, the suction head without a booster station is approx 7m. It should be noted however that the South Gladstone Booster station is necessary until the final stage of the 450NB is completed.

Purchasing the 375NB South Gladstone to Calliope water main is not required to provide additional capacity however it resolves ownership issues and ensures that the water price for Gladstone is the same at Calliope.

7.7 Future Reservoir Sites

Mt Elizabeth has room for 2 only 6ML reservoirs therefore a new reservoir site will be required when storage requirements exceeds 12 ML. Although a number of potential reservoir sites exist in the Calliope area the site on Lot 5 SP190794 adjacent to Mt Elizabeth is considered the most economical and advantageous.

This site is the subject of some preliminary subdivisional discussion and could be required as part of the subdivisional approval process or simply acquired outright by negotiation if required sooner. Ease of access and proximity to the bulk water system and Calliope Booster are the primary advantages of the site which is large enough to accommodate additional reservoirs of 12 ML capacity or larger.

7.8 Future Standpipe Site

Currently the Standpipe is located at the Calliope Crossroads Choice Service Station. It has been identified that the standpipe may have to be relocated in the future. Several sites were investigated with the available area for vehicle manoeuvring, safety, easy access to the site and impact on the water network considered in the assessment.

The road reserve on the corner of Dawson Highway and Taragoola Road was identified as the most appropriate site for the future standpipe. Map 8 outlines the identified area.

The infrastructure required if the standpipe is installed is:

- Extend 375NB from Don Cameron Dr 850m towards Railway (3A)
- Replace 150NB under Railway on Dawson Highway to 200NB

7.9 Looping Mains

Internal looping mains are not included in the Capital Infrastructure Plan and are considered a Developer responsibility. Map 8 provides limited details on looping mains however as the final size and location of these mains will be dependent on subdivision layout, only limited modelling has be carried out. As a consequence each subdivision will require hydraulic assessment prior to subdivisional approval being granted.

In some cases inter-connecting mains will also be required between subdivisions with separate tenure. If the provision of these mains is necessary for the benefit of the whole community, Council will fund the upsizing of interconnecting mains.

7.10 Pre-requisite Works

Pre-requisite works are listed in Appendix 2.

The pre-requisite works table is intended as a detailed guide of zone related infrastructure requirements particularly in relation to staged and “leap frog” development.

It does not include bulk water infrastructure which is common to all development works but may include non-eligible headworks offsetting infrastructure such as internal water mains, valving upgrades and interim external works required to connect “leap frog” developments to the existing reticulation system.

8 Developer Contributions

The Strategic Infrastructure Plan has been developed to in order to assist with the development and amendment of the Planning Scheme Policies and the Priority Infrastructure Plan for Calliope Water.

The current Developer Charges (Headworks) for Calliope Water is outlined in Planning Scheme Policy No.2 – Planning Scheme Policy Water Supply and Planning Scheme Policy No.6 – Planning Scheme Policy Beecher Water for the Beecher Area. The charge for Calliope Water is $8,254/ET and for Beecher it is $14,976/ET (plus adjustments) as at the 6th October 2009.

9 System Pressure Issues

Modifying the existing catchments served by Silverdale and Mt Elizabeth reservoirs will result in a maximum pressure of around 740Kpa in Zone 1 (where the lowest areas of this catchment are at RL 30) and average pressures of between 600 and 650KPa. The average pressure range for Zone 4, served by Mt Elizabeth will be between 550Kpa and 600Kpa however the maximum pressure will not exceed 700 KPa.

The higher pressures in some areas of Zone 1 are only marginally outside Council's adopted maximum levels. If required, high pressures could be controlled with 2 pressure reducing valves. One would need to be located on Herbertson Road near Morcom Street and the other on the 375NB main near Don Cameron Drive. The discharge pressures of the PRV's would need to be set to 45 m head to ensure that fire flows are not affected.

10 Infill Development

The purpose of the strategic plan is to provide detailed information on the progressive development of the Calliope Water Supply Scheme and to alert Council and potential Developers to the extent and likely timing of major infrastructure provision and upgrades based on their subdivisional loadings.

The plan itself does not assess local subdivisional infrastructure such as internal water mains, valving upgrades, interim external works and inter connecting mains, which will still need to be assessed in relation to its local environment.

Most sequential developments within the DWSA will only require a simple assessment of internal mains and possible connecting or looping mains to other areas. More detailed assessments will be necessary with “leap frog” development within the DWSA which may require some external works, bring forward costs or headworks offsetting infrastructure (infrastructure included in the Capital Infrastructure Schedule) to connect to the existing system and meet supply and fire flow requirements.

In all cases however the level of assessment will be localized and fairly minor and any costs associated with this work would normally be included in the standard assessment fees.

11 Development Outside The DWSA

The impacts of any development outside the DWSA are completely unknown and depending on the location and size of such developments may require extensive re-modelling to determine its impact on other Zones and the bulk water system. Any development outside the DWSA will require a review of the Calliope Strategic Plan including its impacts on the Capital Funding Plan, Capital Infrastructure Plan and Headworks Policies. As a consequence all proposed developments outside the DWSA would have to be assessed on a case by case basis.

Whilst the Strategic Plan is not intended to exclude development outside the DWSA its primary purpose is to define a finite area to enable future augmentations to be modelled and to provide a process for assessing the extent and likely timing of major infrastructure provision and upgrades within the DWSA. Therefore given the resources and costs associated with preparing this plan, all costs associated with assessing development applications outside the DWSA should be passed on to the applicants.

Applicants need to be made aware of the potential lead times and costs associated with development requests outside the DWSA.

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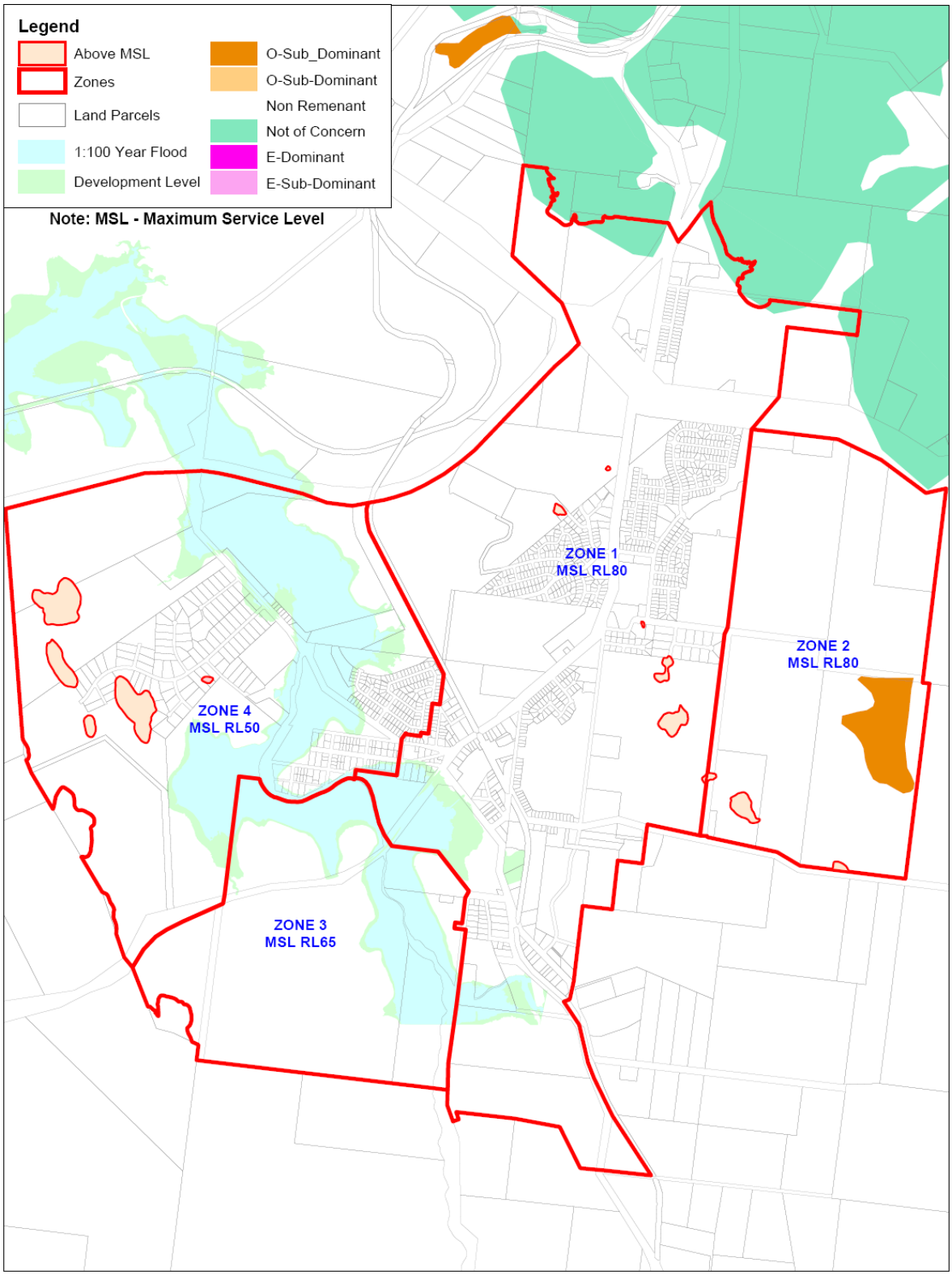
MAPS

MAP 1 - Calliope Defined Water Supply Area



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Map 1
Calliope Defined Water Supply Area

MAP SCALE
Scale 1:20,000
500 0 m

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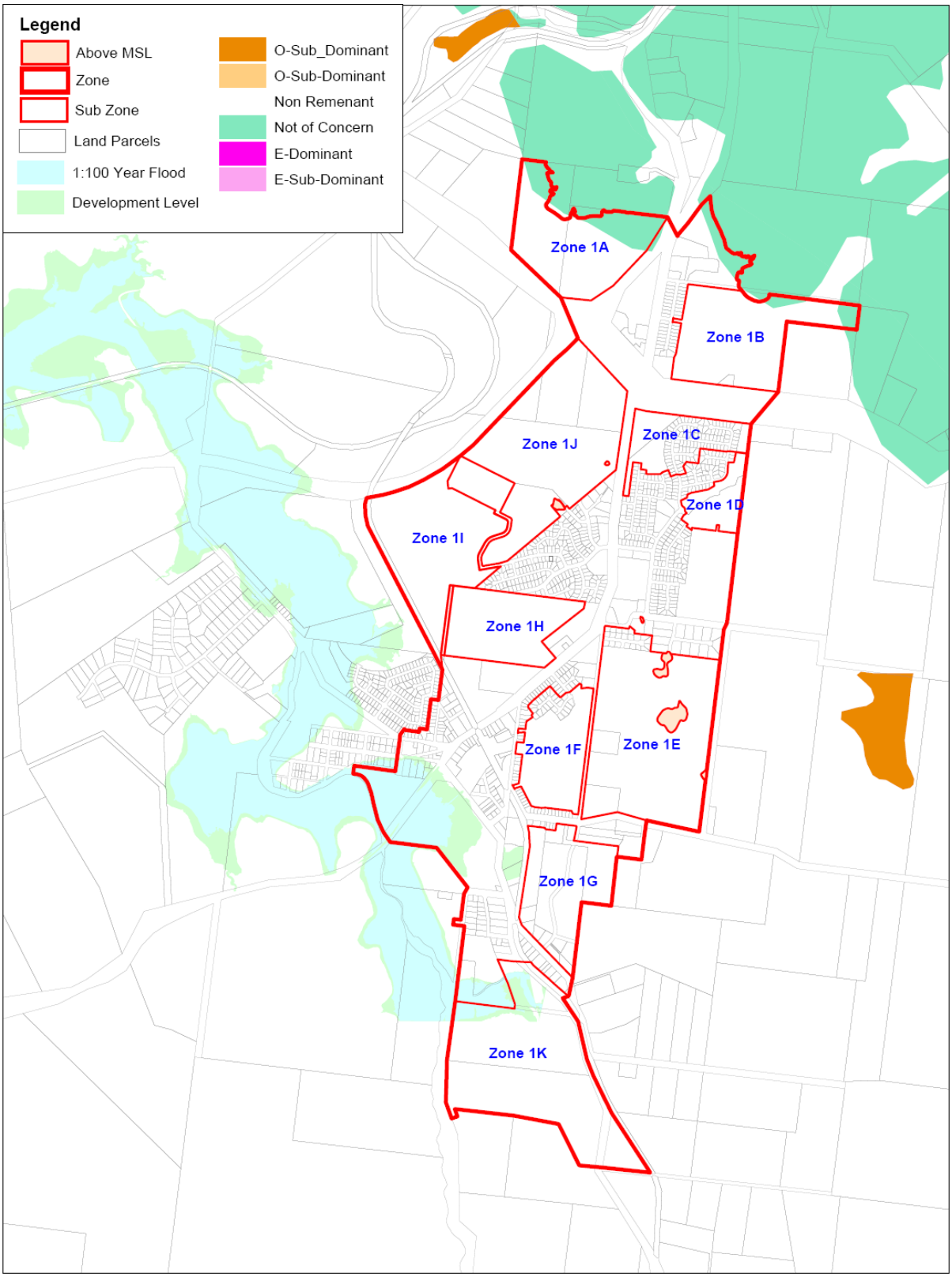
MAP 2 - Calliope Zone 1



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Map 2
Calliope Defined Water Supply Area - Zone 1

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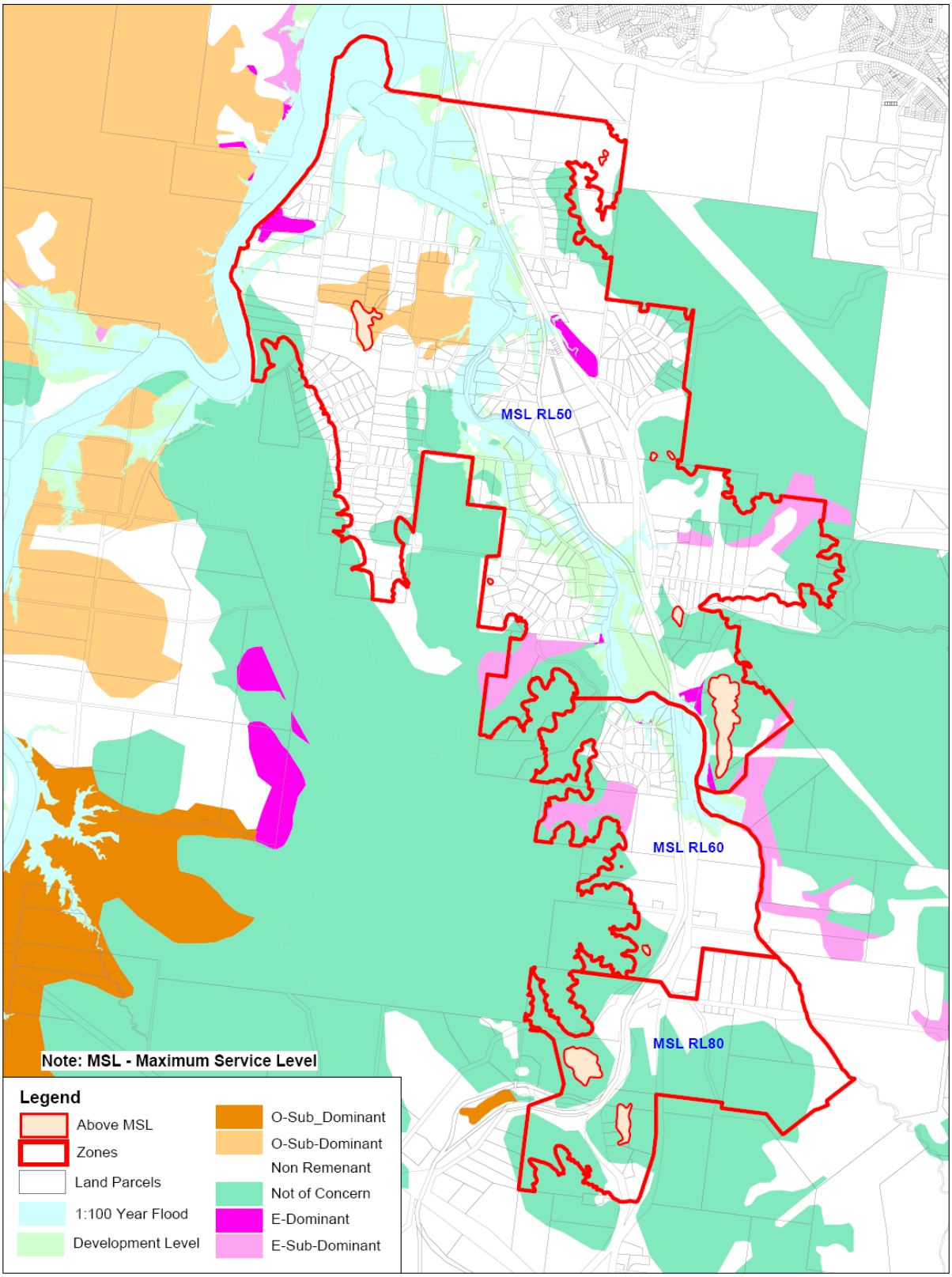
MAP 3 - Beecher Water Supply Area



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Map 3
Beecher Defined Water Supply Area

MAP SCALE
Scale 1:30,000
1000 0 m
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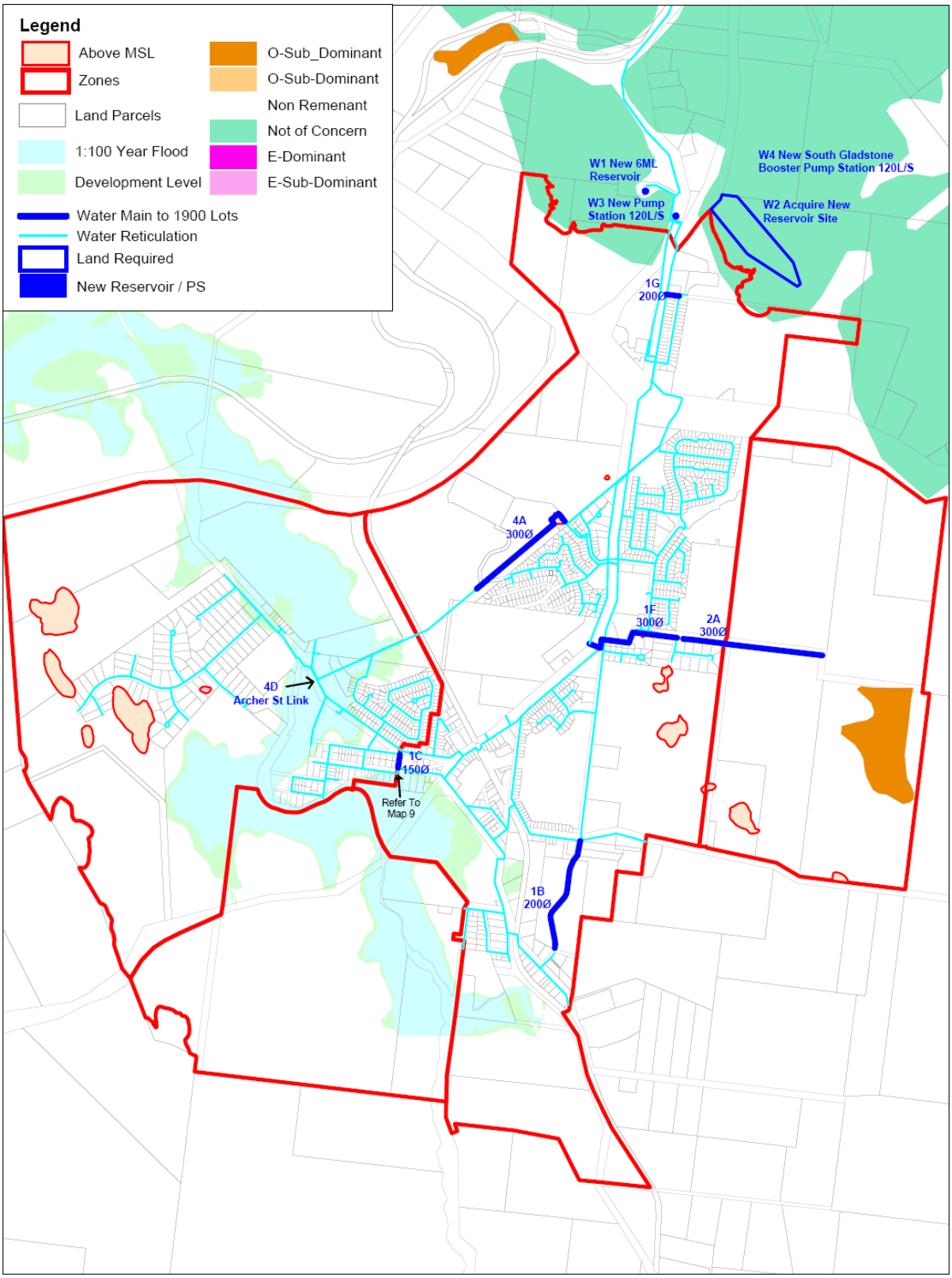
MAP 4 - Infrastructure Required at 1900 Lots



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Map 4
Capital Infrastructure Required at 1900 ET

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Scale 1:20,000
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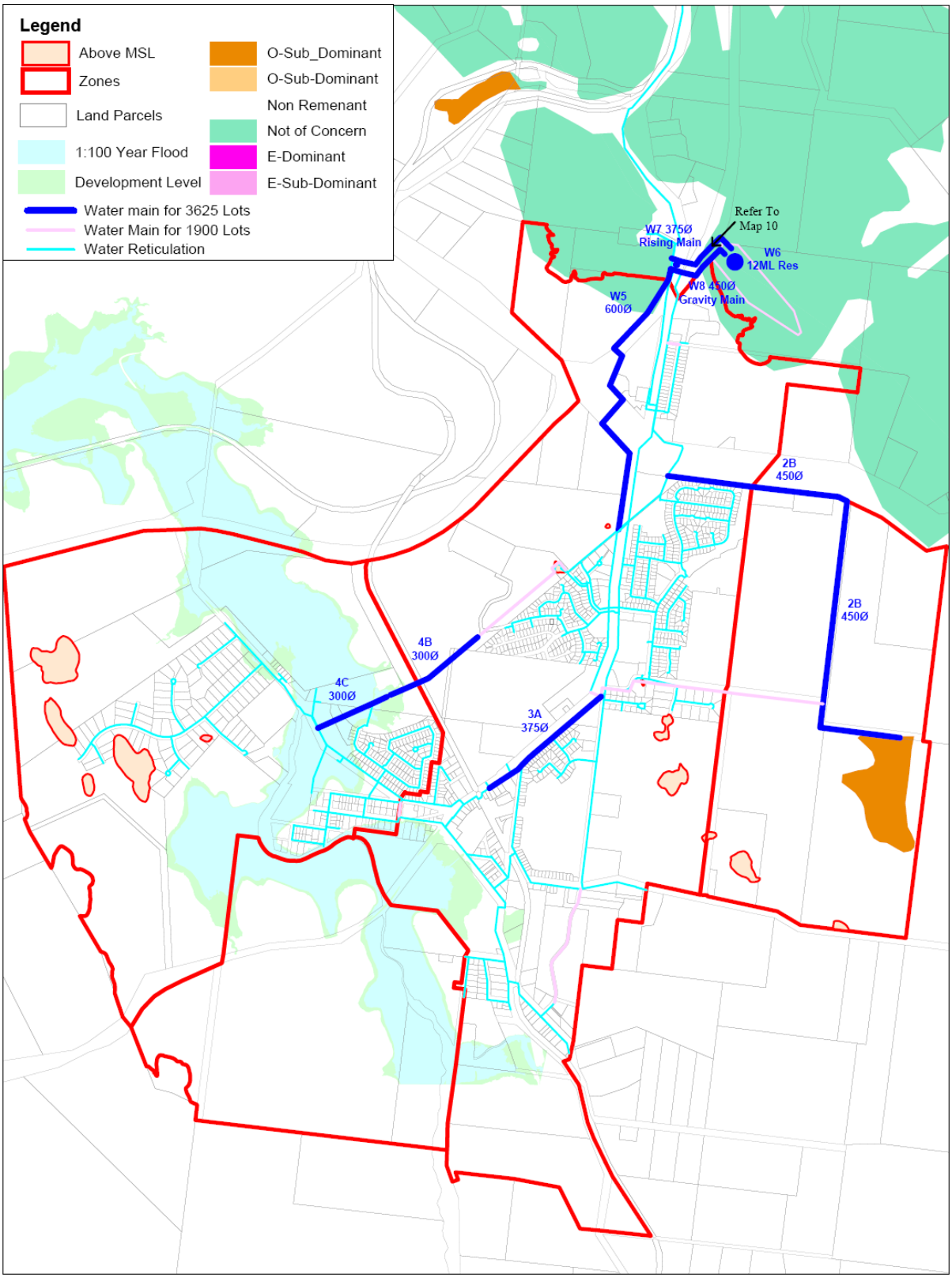
MAP 5 - Infrastructure Required at 3625 Lots



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Map 5
Capital Infrastructure Required at 3625 ET

MAP SCALE
Scale 1:20,000
500 0 m

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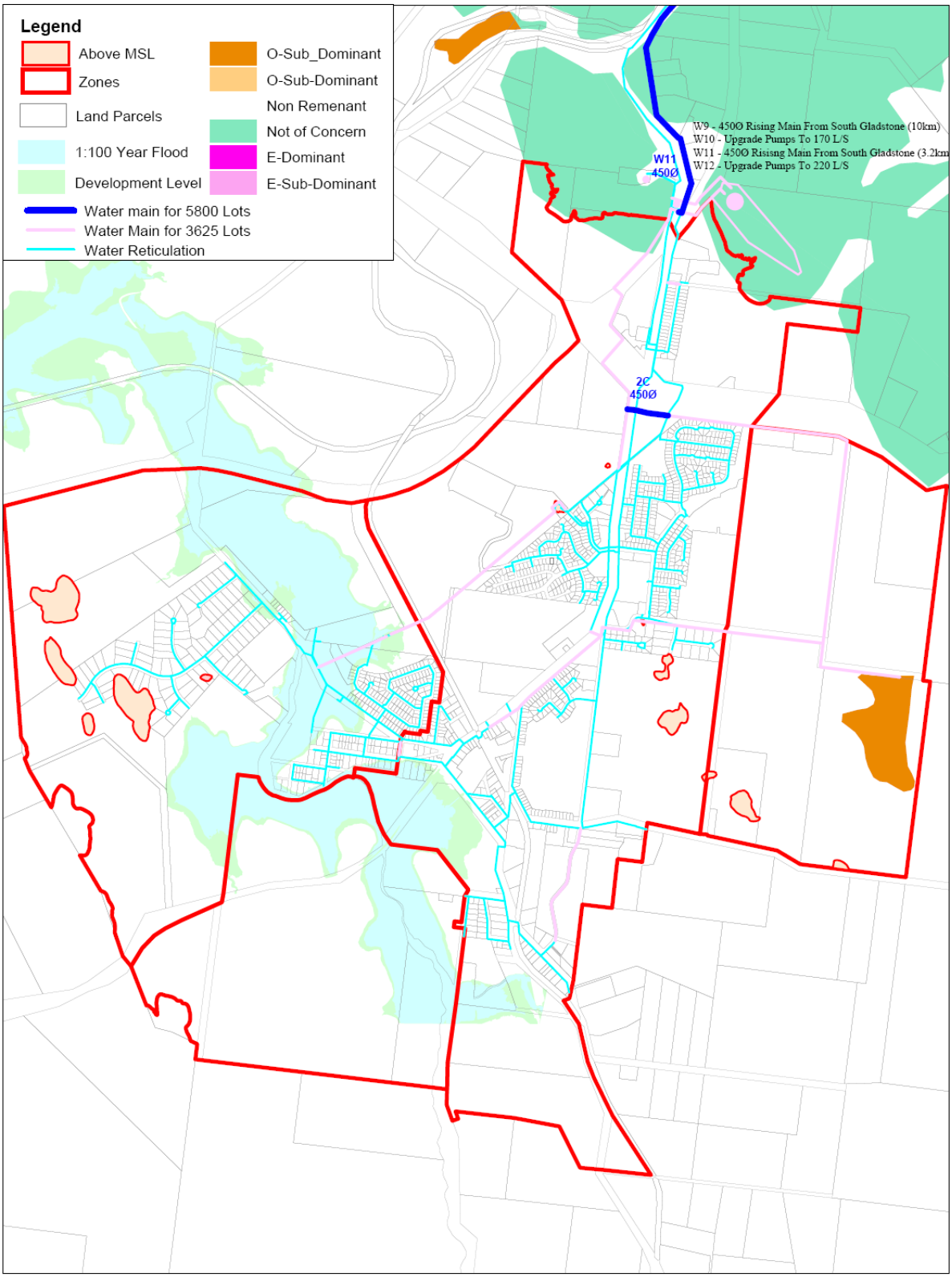
MAP 6 - Infrastructure Required at 5800 Lots



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Map 6
Capital Infrastructure Required at 5800 ET

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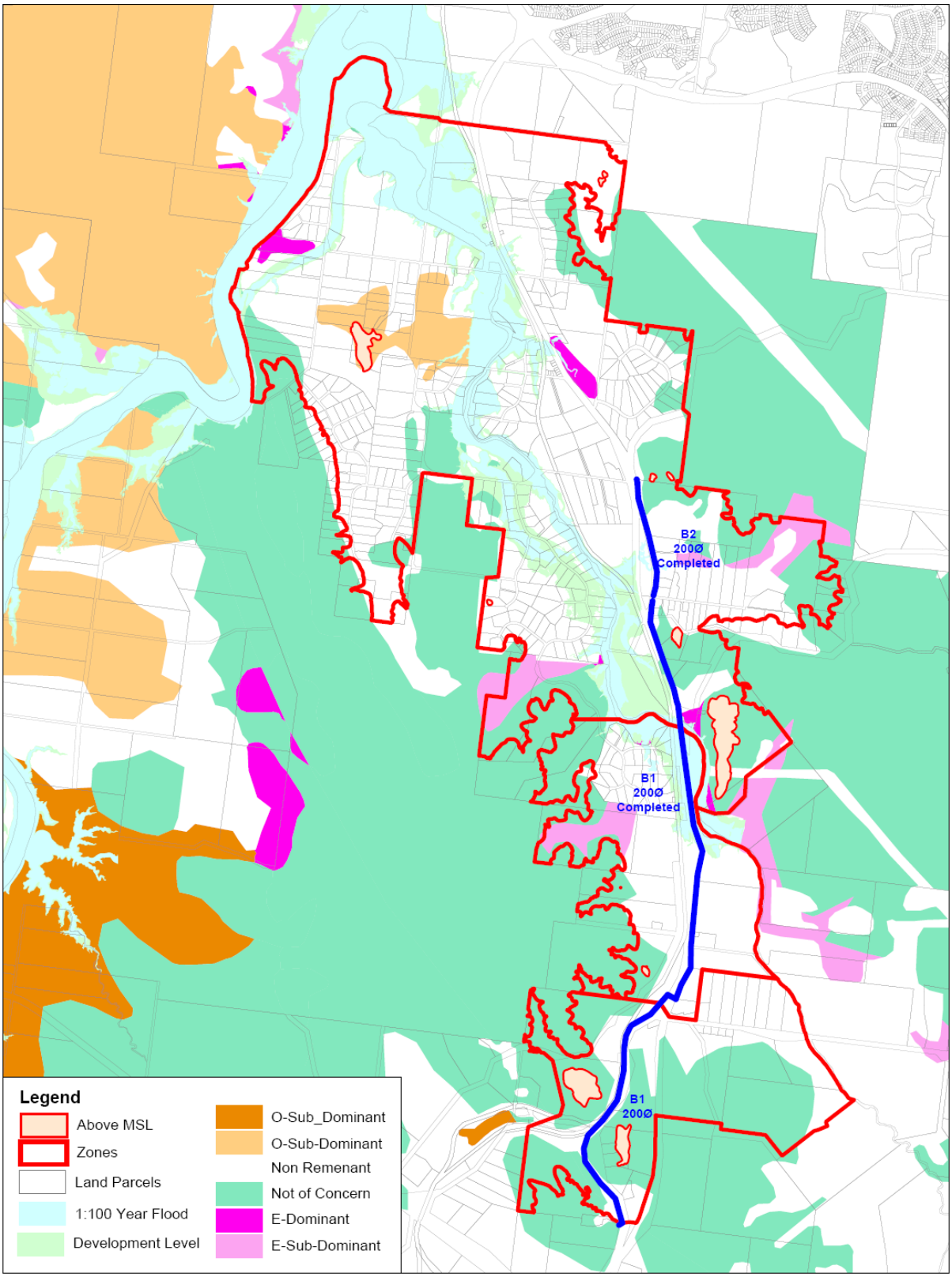
MAP 7 - Infrastructure Required for Beecher



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Map 7
Capital Infrastructure Required For Beecher

MAP SCALE
Scale 1:30,000
1000 0 m
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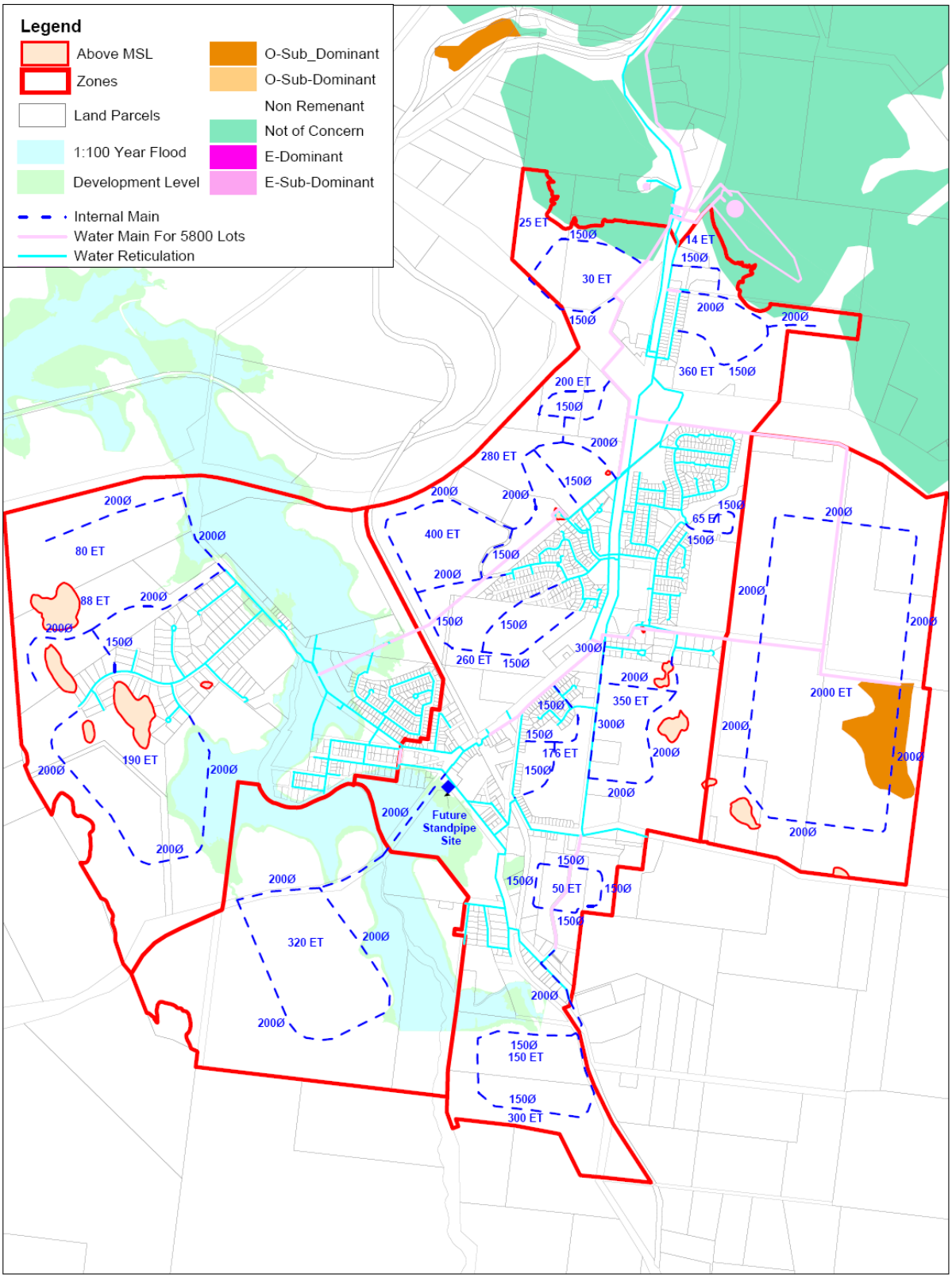
MAP 8 - Internal Linked & Looped Mains



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Map 8
Internal Linked & Looped Mains

MAP SCALE
Scale 1:20,000
500 0 m
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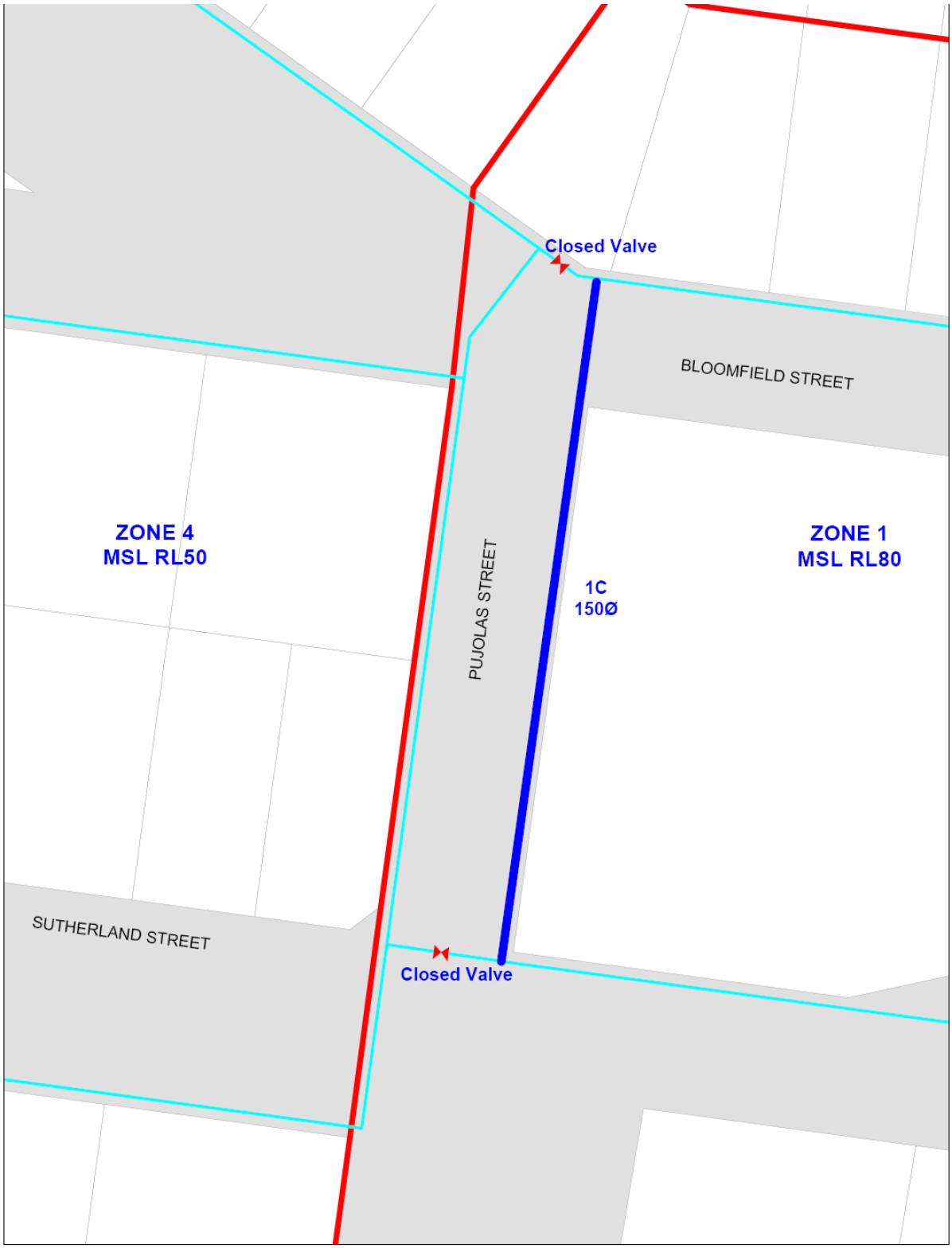
MAP 9 - Pujolas Street Link



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Map 9
Pujolas Street Link 1C

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25 0 m

Scale Scale 1:750

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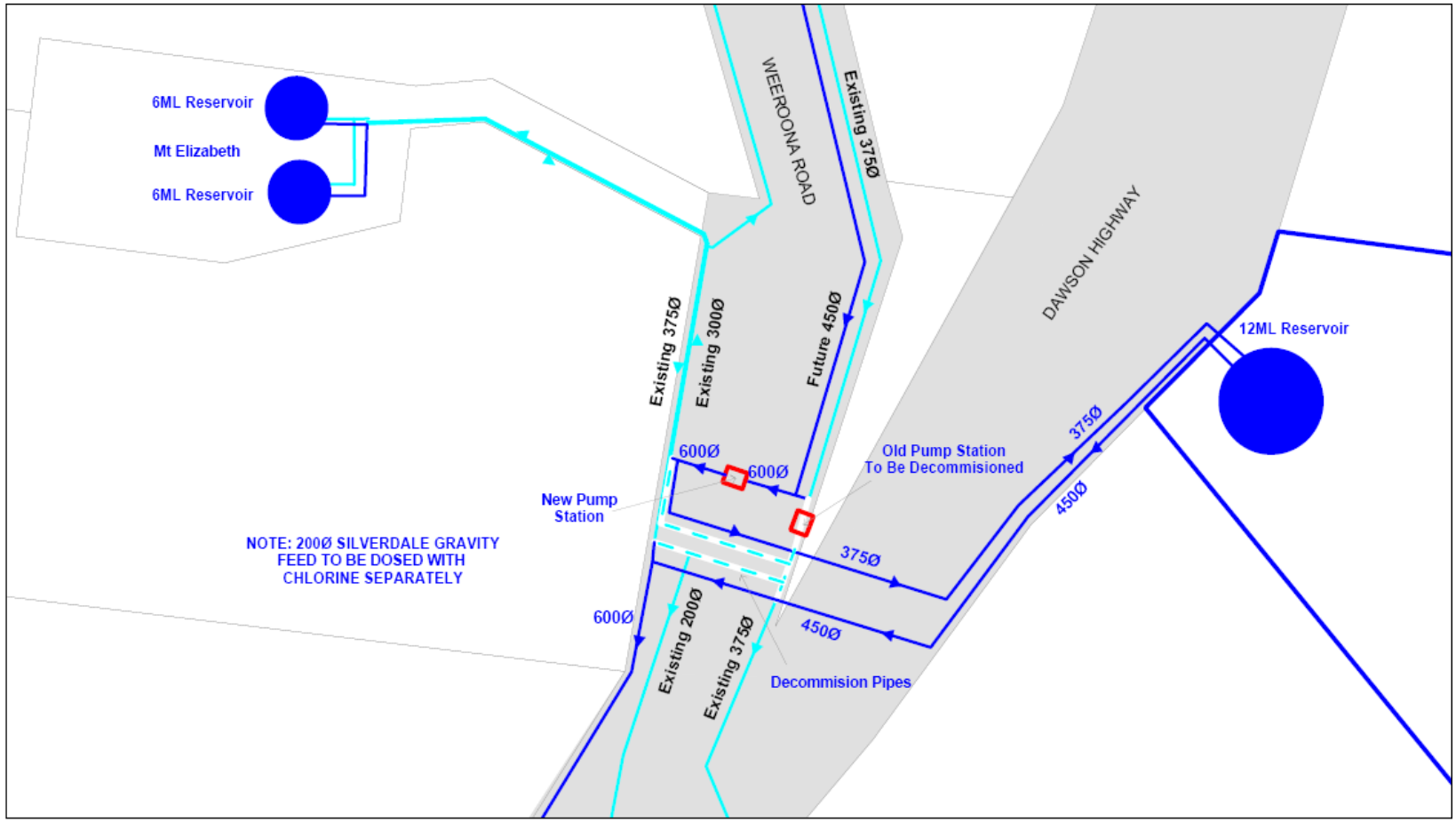
MAP 10 - Calliope Booster Pump Station



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Map Scale Scale 1:2,500

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GDA

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Map 10 - Calliope Booster Pump Station Arrangement Details

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Appendix 1

CAPITAL INFRASTRUCTURE PLAN

	Description	Zone	Dia	Qty	Cost	Initial Lots	Asset Trigger Point	Lots to Trigger Dev	Year	Comment
	Required For Zone 1 (Max 3059 Lots)									
1B	**200NB Herbertson Rd Main**									Improves fireflows to standard in Iron Monger St
	▪ Extend 200NB main 690m from Morcom to Ironmonger	1	200	690	**$220,000**	640	860	**220**	2008	and Industrial Estate.
1C	**150NB Pujola Street Loop**									Restores "looping" characteristics of created
	▪ Extend 150mm main by 100m	1	150	100	**$30,000**	640	860	**220**	2008	dead end mains by re-zoning.
1F	**300NB Don Cameron Drive Upgrade to Walker Dr**									Existing Don Cameron main will not sustain any
	▪ Upgrade to 300NB from Dawson Hwy to Walker Dr	1	300	500	**$250,000**	640	1160	**520**	2012	development in Zone 2.
1G	**200NB Farmer Street Link**									
	▪ Provide 200NB link to Brown Street via Farmer Street	1	200	80	**$30,000**	640	1160	**520**	2012	Resolves Fireflow issues in Brown Street
	Required For Zone 2 (Max 2000 Lots)									
2A	**300NB Don Cameron drive Upgrade from Walker Dr**									Existing Don Cameron main will not sustain any
	▪ Extend 300NB from Walker Dr	2	300	1000	**$490,000**	0	50	**50**	2014	development in Zone 2.
2B	**450NB Zone 2 Reticulation Main A**									Required for full development of Zone 2 to meet
	▪ Extend 450NB main from 375NB main at X-Roads	2	450	2300	**$1,760,000**	0	400	**400**	2030	operational standards.
2C	**450NB Zone 2 Reticulation Main B**									Required for full development of Zone 2 to meet
	▪ Connect 450NB main to 600NB Main	2	450	320	**$250,000**	0	1000	**1000**	2038	operational standards.
	Required For Zone 3 (Max 370 Lots)									
3A	**375NB Dawson Hwy Main Extension C**									Allows continued development by maintaining
	▪ Extend 375NB Don Cameron Dr to R'way	1	375	850	**$600,000**	0	150	**150**	2020	Fireflows and Pressures up to RL 80.
	Required for Zone 4 (Max 758 Lots)									
	300NB Parallel Main - Silverdale Res to Stowe Rd									
4A	▪ Duplicate 300mm main Stage 1	4	300	600	**$290,000**	268	338	**70**	2012	Reqd after Load on Silverdale exceeds 338 Lots
4B	▪ Duplicate 300mm main Stage 2	4	300	600	**$290,000**	268	468	**200**	2022	Reqd after Load on Silverdale exceeds 468 Lots
4C	▪ Duplicate 300mm main Stage 3	4	300	600	**$290,000**	268	616	**270**	2030	Reqd after Load on Silverdale exceeds 616 Lots
4D	**Archer Street Link**									
	▪ Valving and connection alterations	4			**$30,000**	268	338	**70**	2012	

CAPITAL INFRASTRUCTURE PLAN

	Description	Zone	Dia	Qty	Cost	Initial Lots	Asset Trigger Point	Lots to Trigger Dev	Year	Comment
	Required for Bulk Water System (Max 7250 Lots)									
	Upgrade Calliope Bulk Water System (1900 Lots)									
W1	▪ 6 ML No 2 Reservoir - Mt Elizabeth	BW	6		**$2,280,000**	1200	1900	**700**	2016	Storage needs increasing from 6 ML to 12 ML
W2	▪ Acquire Reservoir Site 2 on L5 SP190794	BW			**$500,000**	1200	1900	**700**	2016	
W3	▪ New Calliope Booster PS (120 l/s duty)	BW			**$940,000**	1200	1900	**700**	2016	Load exceeds capacity of existing pumps
W4	▪ New South Gladstone Booster PS (120 l/s duty)	BW			**$810,000**	1200	1900	**700**	2016	Required with Mt Elizabeth Booster upgrade
	600NB Parallel Trunk Main - Mt Elizabeth to X-Roads									Allows full development of Zones 1,2 and 3 .
W5	▪ 600NB trunk main Mt Elizabeth to 375 conn (2100 Lots)	BW	600	1900	**$2,040,600**	1200	2100	**900**	2018	
	Upgrade Calliope Bulk Water System (3625 Lots)									
W6	▪ 12 ML No 1 Reservoir Res Site 2 (L5 SP190794)	BW	12		**$3,480,000**	1200	3625	**2425**	2031	Storage needs increasing from 12 ML to 18 ML
W7	▪ 375 NB RM to new Res Site {350 m}	BW	375	350	**$250,000**	1200	3625	**2425**	2031	Needed to connect new reservoir to bulk water main
W8	▪ 450 NB Retic main from Reservoir {600m}	BW	450	600	**$460,000**	1200	3625	**2425**	2031	Needed to connect new reservoir to bulk water main
	Upgrade Calliope Bulk Water System (4225 Lots)									
W9	▪ 450 NB RM Sth Gladstone to Calliope Stg 1 (10 km)	BW	450	10000	**$7,640,000**	1200	4225	**3025**	2034	375NB main cannot provide additional pumping capacity
W10	▪ Upgrade Calliope PS pumping capacity - 170 l/s	BW			**$340,000**	1200	4225	**3025**	2034	New PS req,d to service 6ML reservoir on L5 SP190794
	Upgrade Calliope Bulk Water System (5800 Lots)									
W11	▪ 450 NB RM Sth Gladstone to Calliope Stg 2 (3.2 km)	BW	450	3200	**$2,450,000**	1200	5800	**4600**	2042	375NB main cannot provide additional pumping capacity
W12	▪ Upgrade Calliope PS pumping capacity - 220 l/s	BW			**$680,000**	1200	5800	**4600**	2042	Requirements of additional capacity
W13	▪ Purchase of 375NB Sth Gladstone to Calliope Main	BW			**$4,030,000**	1200	5800	**4600**	2042	
	General									
G1	Oversizing of Minor mains 150NB to 200NB				**$100,000**					
G2	Oversizing of Minor mains 150NB to 200NB				**$100,000**					
G3	Oversizing of Minor mains 150NB to 200NB				**$100,000**					
G4	Oversizing of Minor mains 150NB to 200NB				**$100,000**					

Appendix 2

PRE-REQUISITE INFRASTRUCTURE

Area	Loading (Lots)	Prerequisite Details
Zone 1B	0-100	• 200NB main from 375 Main via Farmer St to subdivision(1G)
	100 - Full	• 200NB main from 375 Main via Farmer St to subdivision (1G) • 150NB link via Ibbotson Rd
Zone 1E	0 - 150	• 200NB looping main from Herbertson Rd to Walker Dr
	150 - Full	• 200NB internal loop from Herbertson Rd to Walker Dr • 300NB parallel main along Herbertson Rd off 1E (only required for Rangeview development) • 200NB internal loop from and back to 300NB main
Zone 1F	0 - 100	-
	100 - Full	• Looping main to Muirhead St
Zone 1G	0 - Full	• 200NB Herbertson Rd Main (Morcom to Ironmonger St) (1B)
Zone 1H	0 - Full	• 150NB looping mains required to join bordering subs(refer Map 8)
Zone 1I	0 - Full	• 200NB looping main required to join bordering subs (refer Map 8)
Zone 1J	0 - 80	• Parallel 150NB main off the current 200NB in Liffey Way
	80 - 150	• Parallel 150NB main off the current 200NB in Liffey Way • 200NB looping main required off 375NB Main (1A)
	150 - Full	• Parallel 150NB main off the current 200NB in Liffey Way • 200NB looping main required off 375NB Main (1A) • 150NB looping main from Tarrawonga Drv
Zone 1K	0-Full	• 200NB Herbertson Rd Main (1B) • Upgrade existing 150NB on Herbertson Rd (south of Main 1B) and 100NB on Ironmonger St (part of) to 200NB
Standpipe	-	• Extend 375NB from Don Cameron Dr 850m towards R'way (3A) • Replace 150NB under Railway on Dawson Highway to 200NB

PRE-REQUISITE INFRASTRUCTURE (Continued)

Zone 2	0-400	• 300NB Don Cameron Dr upgrade Dawson to Walker Dr (1F) • 300NB Don Cameron drive Upgrade Walker Dr - Sub (2A)
	400 - 1000	• 300NB Don Cameron Dr upgrade Dawson to Walker Dr (1F) • 300NB Don Cameron drive Upgrade Walker Dr - Sub (2A) • Extend 450NB main from 375NB main at X-Roads (2B)
	1000 - 2000 (full)	• 300NB Don Cameron Dr upgrade Dawson to Walker Dr (1F) • 300NB Don Cameron drive Upgrade Walker Dr - Sub (2A) • Extend 450NB main from 375NB main at X-Roads Connect (2B) • Connect 450NB main to 600NB Main (2C)
Zone 3	0-150	• Continuation of 200NB main to subdivision
	150 - 370 (full)	• Continuation of 200NB main to subdivision • Extend 375NB from Don Cameron Dr 850m towards R'way (3A)
Zone 4	Current - 340	-
	340 - 470	• Archer Street Link (4D) • Duplicate 300mm main Stage 1 (4A)
	470 - 620	• Archer Street Link (4D) • Duplicate 300mm main Stage 1 (4A) • Duplicate 300mm main Stage 2 (4B)
	620 - 760 (full)	• Archer Street Link (4D) • Duplicate 300mm main Stage 1 (4A) • Duplicate 300mm main Stage 2 (4B) • Duplicate 300mm main Stage 3 (4C)
Beecher	Current - 1062	-

Note: The pre-requisites table lists the infrastructure required for the development of each zone however only those items listed in the Capital Infrastructure Plan will be funded by Council.

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