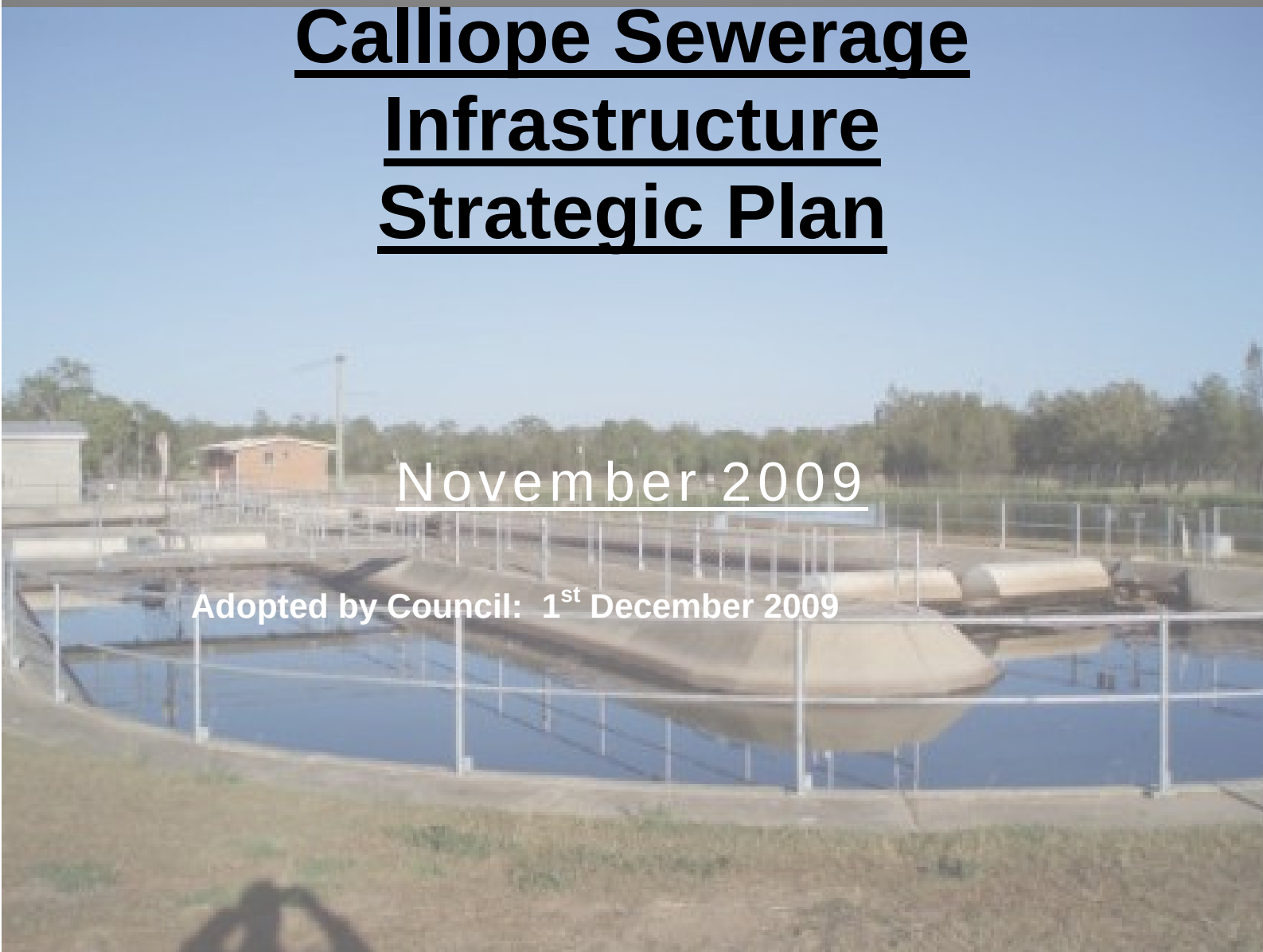
GLADSTONE
REGIONAL COUNCIL

Calliope Sewerage Infrastructure Strategic Plan



November 2009

Adopted by Council: 1st December 2009

Amendment table

AMENDMENT DESCRIPTION	DATE
Adopted	16th June 2009
Version 2 – Inclusion of Industrial Land	1st December 2009

Executive Summary

The Calliope Sewerage Strategic Plan has been prepared to enable Council and the Development Industry to understand the required Sewerage infrastructure for development to occur in the town of Calliope.

The plan is based on assumed growth rates, and sequential development occurring within the Declared Sewerage Service Area. Any 'out of sequence' or leapfrog development may require temporary, alternate infrastructure to be installed at the developer's cost.

The plan covers the Trunk infrastructure needs of Calliope for the next 40 + years, depending upon the actual growth rates.

The identified infrastructure includes a connection to the Tannum Sands STP (or Calliope River STP) when the capacity of the Calliope STP reaches 6,000EP (currently 3,000 EP).

The Trunk Infrastructure required has been identified, including the number of equivalent tenements available until the trunk infrastructure is triggered, as well as an estimated year when the infrastructure is required.

Due to the predicted development progress of the area, it is expected the funding of these works will require Council to utilise external loans.

Table of Contents

List of Figures

List of Maps

List of Tables

1 Introduction

1.1 Background to the Strategic Plan

The township of Calliope historically has experienced a very erratic development growth pattern. This pattern has generally coincided with the major industrial development projects occurring in the region.

The last assessment of the required strategic sewerage infrastructure undertaken was completed in 1994, as part of Total Management Plan.

Recently, there has been a substantial increase in the number of Development requests for the Calliope area.

In order to ensure that the infrastructure constructed in the Service Area is appropriately sized and timed, and the funding for this infrastructure is fairly and equitably raised, the previous Plan has been reviewed.

1.2 Description of this Strategic Plan

This strategic plan is the documented summary of Council's process of proactively defining and making decisions on its infrastructure requirements and allocating its resources to pursue the strategy resulting from increased development.

This strategic plan is an adaptive long-term statement outlining equitable and timely solutions to the urban and industrial needs of the town of Calliope. Together, the elements of the strategy will provide a basis for allocating and managing the towns infrastructure for the next 40 years and beyond.
As the plan is a long term document, and it is recognised that development, particularly in this region, is very fluid, this Strategic Plan is intended to be a flexible document that will be monitored and reviewed to ensure it remains relevant in the years ahead.

The scope of this Strategic Plan includes the Calliope sewer system, which consists of all infrastructure in the town of Calliope. This infrastructure includes collection sewer mains, rising mains, pump stations and the Sewage Treatment Plant (STP).

1.2.1 Objectives of the Plan

The primary objectives of this Strategic Plan are to:

- Identify the area of the town of Calliope which is to be declared the Declared Sewer Service Area (DSSA).
- Identify long term capital infrastructure requirements for:
  - Trunk sewers
  - Pumping stations

  - Rising mains
  - Treatment plants
  - Effluent Reuse
- Identify pre-requisite infrastructure.
- Identify infrastructure trigger points.
- Prepare a Capital Works Plan for the Calliope Declared Sewerage Service Area.
- Prepare a Capital Funding Plan.
- Provide background information for development of Priority Infrastructure Plans (PIP's).
- Provide basis for the development of appropriate Developer Charges to adequately fund the Capital Works Program.

1.3 Purpose of Strategic Plan

A strategy is required to address the following key issues:

- Urban growth and development in the town of Calliope.
- Compliance with the relevant Environmental Licences
- Reduce the creation of duplicated infrastructure
- Encourage development in a sequential manner

This strategic plan, in combination with other relevant plans, assists in setting the path for the future development of the township.

This Strategic plan does not undertake detailed analysis or design of the trunk infrastructure, but identifies the infrastructure required:

a) To meet the Standards of Service within Council's policy;
b) To be shared by a number of users;
c) To provide a system function that is generally trunk, which may not necessarily be related to its size or capacity.
d) By the overall planned demands including those partially generated by a development permit.

All identified infrastructure is to be clarified / refined by the more detailed analysis and design as part of masterplanning or individual reconfiguration applications.

1.4 Strategic Plan Area

This Strategic Plan covers the immediate area of the town of Calliope, located approximately 20km South of Gladstone CBD. The development of the Strategic Plan has resulted in the identification of the Declared Sewerage Service Area for Calliope.
The Strategic Plan area is indicated on MAP 1 – Calliope Strategy Area.

1.5 Declared Sewerage Service Area

The Declared Sewerage Service Area (DSSA) is the area of land identified via extensive modelling, which can be provided with a sewerage service, subject to sequential development and the construction of appropriate infrastructure.

The DSSA includes a large portion of land which is not zoned as 'Urban', and is not currently serviced by any sewerage infrastructure. The requirement to connect to the sewerage system is not required until the property is zoned as 'Urban'.

The primary purpose of the DSSA is to set identifiable areas (residential, commercial and industrial) which can ultimately be appropriately serviced by the proposed sewerage infrastructure. This includes that all properties within the area can be connected to the sewer at a level below ground which is capable of servicing the premises.

This declared area, then enables the full system to be modelled and appropriately sized.

The DSSA itself is based on areas of subdivisional interest, new applications and areas adjacent to the existing system. It takes into account geographical limitations including elevation, slope, flooding, remnant vegetation and the Defined Water Supply Area (Refer Calliope Water Supply Scheme, Strategic Plan, 2009). The buffer area surrounding the Pump Stations is not included within the DSSA.

Whilst the intention of the DSSA is not to prohibit external 'Urban' development, it is likely that small scale development outside the DSSA will not be practical in the short term due to significant delays and costs associated with reassessing the model and supporting documentation. This is not considered unreasonable, since the DSSA has an ultimate capacity in excess of 20,000 EP and a potential development life in excess of 40 years.

The Declared Sewerage Service Area is identified in MAP 2 – Calliope Defined Sewerage Service Area

1.6 Preparation of Strategic Plan

The Calliope DSSA 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 sewerage system.

The model assumes that residential development will occur in all catchments. Whilst this is not consistent with the existing Calliope Shire Council Town Planning Scheme, it has been necessary to make some assumptions beyond the current scope of the town plan. 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 is based on equivalent connections (Equivalent Tenements) for long term accuracy (as discussed in Strategic Planning Assumptions below) rather than population predictions. Estimated time lines however are necessary for preparing the 15 year plan which will need reviewing on an annual basis.

Long term modelling has been adopted to ensure that current and short term decisions are consistent with the long term strategic goals. This is particularly important for the development of the pumping and treatment components of the system.

The model assumes that initial development will occur near existing infrastructure and progressively extend to the extremities of the DSSA 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.

This Strategic Plan assumes that all infrastructure listed in the Capital Infrastructure Plan will be funded through developer contributions

Naturally, if the rate of development changes dramatically from that which is identified in the Demand Predictions, the level of borrowing and capital expenses will alter.

Infrastructure “trigger points” are used in the Capital Funding Plan to assess the capacity of the fund to finance capital components over the life of the plan.

1.7 Strategic Plan Assumptions

The strategic plan is based on the following assumptions:

- 2.6 Equivalent People (EP) per Equivalent Tenement (ET)
- Average Daily Flow (AD) = 225L/EP/day
- Residential Development Density = 10 ET per ha
- Industrial Density = 10 ET per ha (2 ET per Lot)
- Peak Wet Weather Flow (PWWF) to Average Dry Weather Flow (ADWF) = 5
- Pump Station Emergency Storage = 4 hours ADWF
- Pumps sized to match PWWF, in a duty standby arrangement
- No Rural Residential or Rural will be serviced by sewer
- The actual grades (from Asset Register) for existing reticulated sewer mains have been used in the analysis process
- Minimum grades for all new reticulated sewer mains including realignments, have been adopted in the analysis process
- Velocity in Rising mains between 1m/s and 1.5m/s
- Retention time in the well and rising main is less than 8hrs

- Pipe loss per meter is less than 10m per 1000m (or 0.01m per m)
- Capacities of Gravity main based on Figures C.1 to C.6
- Current usage is effective as of June 2009.
- All vacant lots and new development lots are equal to 1 ET.
- Sequential Development will occur
- Development occurring as per the estimate Development Data provided in Table 2.2.
- Developers are responsible for the full installation and costs of all sewer mains up to and including 225NB.
- Mains over 225NB which have been identified in this Plan, will be provided by Council. .
- A Trunk main is classified as greater than 225NB, or
  Any main which is downstream of another trunk, or
  Any main which is downstream of a rising main
- A Branch main is classified as greater than 150NB and less than or equal to 225NB, downstream of a Branch main, downstream of a rising main.

2 Demand Levels and Loadings

The Calliope DSSA is divided into 11 individual and interlinked catchments (MAP 3 – Catchments), which rely on a combination of gravity, rising mains and pumping stations.
The current loadings were determined based on the existing connections on the system, however the ultimate loading was determined using current loading plus new lots based on land area.
The entire plan is based on the following figures.

TABLE 2.1 Sewer Loading

Catchment	Current Load		Ultimate Load		Increase
	ET	EP	ET	EP	EP
1	302	786	1,141	2,967	2,181
2	386	1,004	539	1,403	399
3	30	78	215	559	481
4	273	710	273	710	0
5	75	195	111	289	94
6	11	29	408	1,061	1,032
7	454	1,181	972	2,528	1,347
8	35	91	35	91	0
9	0	0	3,935	10,231	10,231
10	0	0	324	843	843
11	0	0	450	1,170	1,170
Total	1,566	4,074	8,403	21,852	16,608

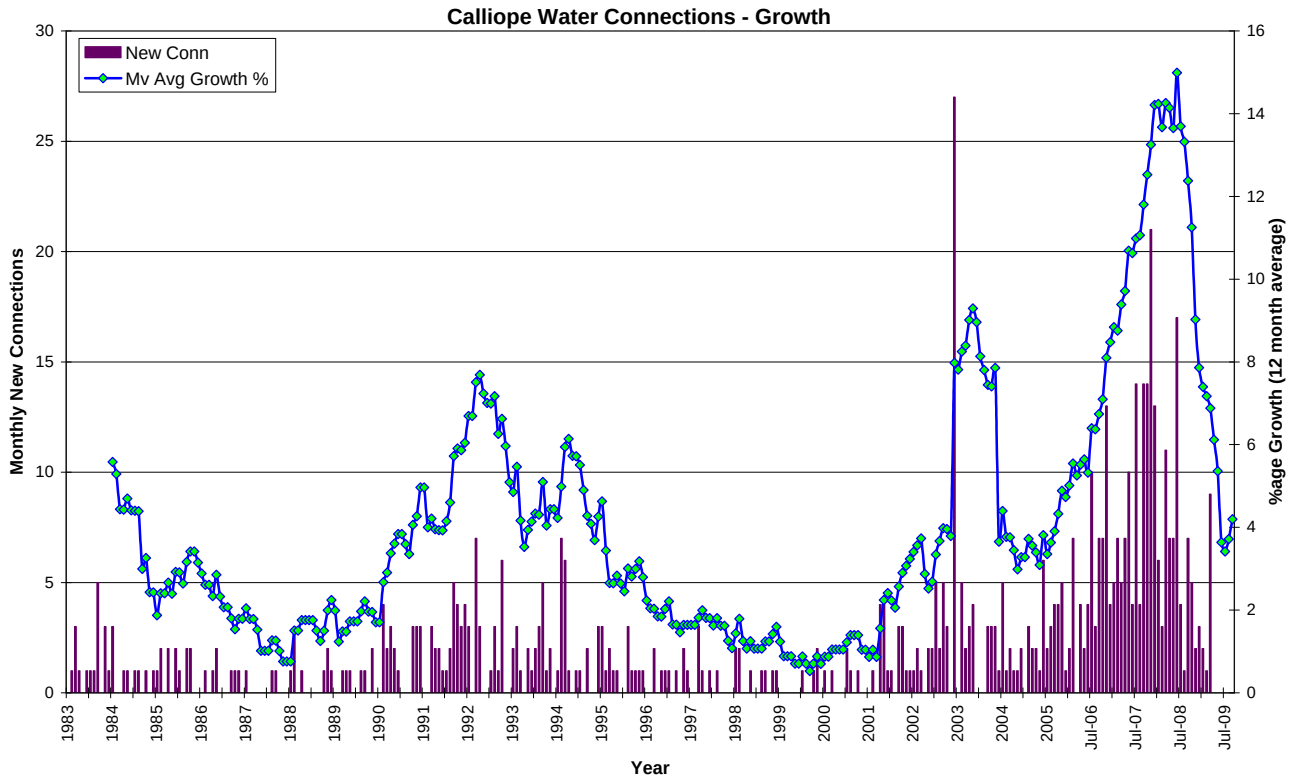
2.1 Demand Predictions

The demand for the Calliope DSSA was determined from the level of loading at the end of the 2008/2009 Financial Year.
Table 2.2 lists the predicted ET's for each catchment in each year, and identifies the growth rate for the year.

A growth rate of 4% has been utilised. This growth rate is consistent with the average growth over a 25 yr period. It can be seen in FIGURE 2.1 Historic Calliope "Growth Rates" that the level of growth varies considerably, making accurate predictions in growth very difficult.

FIGURE 2.1 Historic Calliope "Growth Rates", provides the historic growth data for the Calliope area since the early 80's. The growth represents the number of water connections installed and is the actual growth of the preceding 12 months.

FIGURE 2.1 Historic Calliope "Growth Rates"



The development phase of catchments 9 and 10 has been assumed, using the ideal of sequential development as the basis.

TABLE 2.2 Demand Growth

Financial Year	Catchment												
0	1	2	3	4	5	6	7	8	9	10	11	Total	Growth
2009	262	358	30	273	75	11	208	35	0	0	0	1,252	0.00%
2010	282	358	30	273	75	11	239	35	0	0	30	1,333	6.47%
2015	360	384	210	273	75	56	296	35	60	0	70	1,819	4.60%
2020	488	417	210	273	95	131	372	35	115	0	150	2,286	5.78%
2025	568	472	210	273	115	191	472	35	240	30	190	2,796	4.48%
2030	678	503	210	273	115	317	587	35	390	80	260	3,448	5.03%
2035	876	503	210	273	115	405	709	35	687	175	300	4,288	4.25%
2040	1031	503	210	273	115	405	829	35	1216	300	370	5,287	5.05%
2045	1135	503	210	273	115	405	883	35	2155	325	400	6,439	4.78%
2050	1135	503	210	273	115	405	883	35	3500	325	430	7,814	4.55%

It is acknowledged that this development programme will not be accurate when viewed in hindsight, however, the best endeavours were used to make the assumptions utilised correct at the time of preparation.

3 Assessment Methodology

The assessment methodology consists of how the data was obtained, analysed, sorted and accepted in terms of reticulation mains, pump stations and rising mains.

3.1 Catchments and Loadings

The catchment areas were determined based on:

1. Topographical boundaries,
2. Defined Water Supply Area (DWSA) boundary,
3. Flood levels, and
4. Remanent vegetation.

A catchment area was defined as an area of land where the geographical features direct all flows to one point, which is usually the pump station. There are 11 catchment areas identified in total.

All connections were converted to Equivalent Tenements (ET). Non residential developments were converted to ET by the use of equivalent demand units (EDU).

The Ultimate capacity of the catchment areas were then determined, and is the basis for the calculation of current and ultimate capacity of the entire Calliope Sewer System.

3.2 Sewage Treatment Plant

The existing Calliope STP receives all effluent from the township of Calliope, and has a current capacity of 2,000 EP. (769 ET). This plant is to be augmented to 6,000 EP (2,300 ET) in 2010. It is expected that this capacity will be reached sometime during the 2019 financial year.

Following detailed investigation, it was considered that further augmentation of the Calliope STP is not suitable, and as such the plant should be relocated when the capacity reaches 6,000EP.

3.2.1 Relocated Plant

The Calliope area was investigated for possible future STP sites.

MAP 4 – Investigation of STP Sites shows the sites identified as suitable for a relocated plant. These sites are over 7km in direct line from the existing plant and both require a crossing of the Calliope River.

3.2.2 Transfer Effluent

Options of diverting all effluent flow to a new site, and diverting flows over 6,000EP to a new site were considered. The option of maintaining the Calliope STP in its current arrangement ie 6,000EP, and transferring additional effluent to another site was considered the optimum arrangement.

For this solution, three possibilities exists:

- transfer to a new STP,
- transfer to Gladstone (Calliope River) STP, and
- transfer to Tannum Sands STP.

The preferred new site is located on Calliope River Road, some 2km north of the Calliope River Road and Bruce Highway Intersection.

3.2.3 Recycling

As part of the current STP augmentation, the EPA have required that all treated effluent is utilised via recycling. The Water and Nutrient Balance report has indicated that up to 6,000EP can be reused via irrigation to the Golf Club and local sport fields.
Once the total load on the Calliope STP exceeds 6,000EP, a substantial irrigation plot would need to be sourced, or an alternate option sourced.

3.2.4 Additional Works and Costs

In addition to the current augmentation, additional works are required at regular intervals to maintain adequate capacity.

Ignoring the initial construction cost, any staging costs and augmentation costs of STP's, the total cost of construction of transfer infrastructure to a new STP site is $41.7M, the Gladstone (Calliope River) STP is $29.2M, whilst the cost of transfer infrastructure to the TS STP is $23.7M.

The preferred option, on a financial basis, is to transfer effluent to the Tannum Sands STP. However, due to the Gladstone and Tannum Sands STP options being relatively close in total cost, a detailed review of the two options is required to be undertaken prior to the preliminary design stages of the Transfer Scheme.

3.3 Pump Stations and Rising Mains

3.3.1 Current Capacity

The current capacity of the pump stations were determined in order to identify any current deficiencies

The summary of the current status of existing Pumping Station is shown in TABLE B.5 Current Capacity of Pump Stations and Rising Mains.

3.3.2 Ultimate Capacity

Pump stations that are considered undersized for the ultimate development of Calliope Township were then analysed to determine the required size of pumps, storages and rising mains. Various options for pumping between various pumping stations were also investigated.

All sites were assessed for optimum staging situations. These staging scenarios are included in the Capital Infrastructure Plan, and shown in TABLE B.6 Staged and Ultimate Capacity of Pump Stations and Rising Mains.

3.4 Reticulation Mains

The current capacity of the reticulation mains was checked for existing capacity.

The ultimate required size of the existing mains was determined by using the maximum ET load applied to each of the existing mains. Due to diversions, the ultimate load of the main may be lower than during an intervening period.

All new trunk system mains were then considered. Some of the larger catchments were broken down into sub-catchments, based on internal ridgelines, water courses, property boundaries and proposed plans.

The new and realigned mains were assessed based on being installed at minimum grade and the ultimate load the mains need to carry. Figures C.1 to C.6 were used to size the mains.
TABLE B.8 Minimum ET's Required For Scouring shows the minimum load required to scour the main, keeping in mind that these only have to be reached once a day.

4 Capital Infrastructure Plan

The Strategic Plan has been analysed based on the current allocated loading of 1,566ET, with a maximum ultimate loading of approximately 8,400ET (21,900EP) from the 11 distinct catchments.

The Capital Infrastructure Plan only includes an assessment of 'trunk' infrastructure required to service the DSSA as a whole. It does not include localized infrastructure such as internal subdivision mains, connecting mains that service individual developments or temporary infrastructure required as a result of non-sequential development or small staging.

Some items in the Capital Infrastructure Plan have many trigger points which depend on the order and speed in which the land is developed. These items will have to be assessed on a 'case by case' basis in order to determine the most appropriate action.

Further details of each item are included below. The items are discussed in terms of Sewage Treatment, Pump Stations and Rising Mains, and Reticulation Mains.
Maps 5, 6, 7, 8, 9 and 10 show the location of each item listed.

4.1 Pre-Requisite Infrastructure

Pre-Requisite infrastructure work has not been listed, as the entire plan has assumed Sequential Development of land, and therefore infrastructure needs will follow the staging plans indicated.

In the event of leapfrog development, an analysis of the infrastructure required to appropriately service the development will be undertaken and provided to the developer. This list of 'Pre-Requisite' works will form part of any Council approval.

The Pre-Requisite works list, will also indicate any works which will be eligible for "Oversizing Payments" from Council.

4.2 Staging and Temporary Infrastructure

The volatility in the rate of development (historic variation of 1 – 15 %) in Calliope causes much uncertainty about the order in which the land is developed. This makes it difficult to forecast when the new items in the infrastructure plan are needed. It is evident that some of these items will have to be staged and/or temporary infrastructure will have to be put in place until there is sufficient load to build the ultimate infrastructure.

It should be noted that any staging or temporary infrastructure not specifically listed in this plan, will not be funded by Council as it is the developers responsibility to install and fund.

The plan has considered various staging options, and adopted those which are the most viable (fiscally, operationally and environmentally).
However it has to be emphasised that the infrastructure required for each new development with have to be assessed at the time on a "case-by-case" basis.

4.3 Connecting Mains (Individual Developments)

Connecting mains which are smaller than 300NB and specifically and solely service individual developments are not included in the Capital infrastructure plan and are considered a developer responsibility. However, they need to be considered in the Strategic Plan to ensure all possible development sites in the DSSA have access to the sewer system.

4.4 Sewage Treatment Plants & Effluent Reuse

Through a thorough investigation of STP sites, and locations, it has been identified that the existing Calliope STP site is suitable for development up to 6,000EP. It is preferable to limit the site to this capacity, and transfer effluent over this level to a new site.
Due to the physical constraints of the catchments, the transfer of effluent to a new site would be conducted on a catchment by catchment basis

The investigations indicated that the transfer of effluent to the existing Tannum Sands STP is the most cost effective method.

The transfer of effluent to a new plant will commence with the diversion of Catchment 9, and occur as a result of the pump station in Catchment 2 reaching its capacity. This is expected to occur in 2020. After this time, Catchments 3, 5, 6, and 10 will also be diverted to Tannum Sands STP, via the catchment 9 pumping station. This maintains a maximum load on the Calliope STP of less than 6,000EP.

The Capital Infrastructure required for the Treatment area is identified in TABLE B.1 Capital Infrastructure Plan – STP's

4.4.1 Calliope STP

Augmentation

The current Calliope STP has a design capacity of 2,000 EP. It has been identified that with augmentation of some components, the facility can be increased in capacity to 6,000EP.

In the augmented form, the site is expected to service the community until approximately the 2021 financial year.

Storage

To achieve the full capacity of 6,000EP, the treated effluent storage capacity needs to be augmented.
To adequately deal with the wet weather storage requirement for 6,000EP, new lagoons of an additional 30ML capacity are required. On the current assumed development scenario, it is expected that these will be required in 2010.

Biosolids

The current Biosolids handling process utilised, is to treat and dry the material in lagoons (1 duty, 1 standby) and remove dried material. This process works well for this size plant, however it is intensive in its area requirements.

To achieve the full capacity of 6,000EP, the Biosolid treatment capacity needs to be augmented.

It has been identified that the best solution for Biosolids treatment is to incorporate Mechanical Dewatering (belt press, centrifuge, etc). This equipment will be required before the STP load reaches 1,350ET. This is expected to occur in 2011, as such the equipment is required to be installed during 2010.

4.4.2 Tannum Sands STP

The current Tannum Sands STP was commissioned in 2008, and has a current staged capacity of 7,500EP. The Plant has been designed to enable an increase in capacity to 15,000 and 30,000EP by duplication of site components.
The plant is a BNR plant with the capability to supply treated water for irrigation of fields, and industrial needs. It has been designed so as to have a zero environmental discharge.

Capacity

The current load on the plant is approximately 4,160EP. With the Calliope diversion applied, this plant is expected to reach Stage 1 capacity in 2020. This will require the commencement of Stage 2 of the Tannum Sands STP.

Clarifiers

It is expected that the Stage 1 capacity of the STP (limited by the existing clarifiers), will be reached in 2020. The designed Stage 2 for the STP is the construction of 2 x additional clarifiers.

The addition of these two clarifiers will provide a treatment capacity of 15,000EP, which is the limit of the Bioreactor.

Bioreactor

It is expected that the Stage 2 capacity of the STP (limited by the existing Bioreactor), will be reached in 2032. The designed Stage 3 for the STP is the construction of 1 x bioreactor, and 4 x clarifiers, with the use of simultaneous filter press usage in addition to those in Stage 2.
The addition of these items will provide a treatment capacity of 30,000EP, (the design limit of the entire site) as it is currently configured.

New Plant

It is expected that the Ultimate capacity of the STP, will be reached in 2047. The land buffer surrounding the STP site enables the construction of a new STP, and this is required in order for the continued growth of Boyne Island / Tannum Sands (BITS) and Calliope.
The new plant is expected to be between 45,000 and 60,000 EP in capacity.

4.4.3 Effluent Reuse Schemes

In order to minimise the level of environmental discharge from the Calliope and Tannum Sands plants, infrastructure needs to be installed at both sites.

To maximise the irrigation potential of the Calliope System, treated effluent quality is required to meet Class A+ standard. Due to the industrial reuse of Effluent from the Boyne Island and Tannum Sands plants, the required quality of effluent from the Tannum Sands Plant is not expected to be any greater than Class B.

Irrigation of Calliope Golf Club

Currently, the Calliope Golf Club utilise all effluent treated at the Calliope STP in the irrigation of part of the Golf Club site This effluent is mixed with bore water prior to being irrigated. To maximise the irrigation potential of the site, approximately 15 Ha of land requires irrigation infrastructure to be installed.

In order to adequately irrigate (sprays) any site, which is open to the public, the quality of effluent utilised is to be Class A +. To achieve this, further treatment modules are required to be installed at the STP.

Industrial Reuse

All effluent produced by the Tannum Sands STP is currently utilised at QAL facilities and irrigated at the BITS Club fields, relocated sport fields and the BITS Club Redevelopment.

In the future it is expected that this effluent will be utilised by QAL within its internal processes. In order to achieve this, the current disposal line is expected to require upgrading. This is nominally expected to occur in 2025.

4.5 Pump Stations and Rising Mains

The following sections lists the works required at various planned stages to meet the service requirements of the Calliope Township.

All works required have been listed in TABLE B.2 Capital Infrastructure Plan – Pumped Systems, and provide details on the work required, the timing (ET and Approximate year) and the estimated cost of the works.

To minimise odour, noise and general amenity complaints regarding pumping stations, a 100m buffer has been identified around all new PS sites

Catchment 1 - Upgrade

There is an existing pump station which is located in catchment 1.
The upgrading of this Pump Station comprises 4 Stages.

Stage 1 Upgrade operational and Emergency Storage Capacity of site, to $4m^3$ operating, $60m^3$ emergency. The site is currently theoretical over capacity, and subsequently should be upgraded as a priority.

Stage 2 Upgrade pumps to include 2 x 43l/s pumps in combination with existing 20l/s 'jockey' pumps. The new pumps will have a nominal power rating of 21kW each. This is required at a trigger of 590 ET.

The rising main from Pump Station 1 will need to be upgraded when the load on the PS 1 reaches 590ET (occur as part of Stage 2 of Pump Station Works). The main needs to be increased to 200NB. It is approximately 460m in length.

The Storage components of the Pump Station also need to be increased as part of this stage. The total capacities required are:

Operating $8m^3$
Emergency $120m^3$

Stage 3 Remove Jockey pumps. This works is required at 750ET, and is required as the jockey pumps are too small to be effective.

Stage 4 Upgrade capacity once load reaches 1,135 ET. These upgrades include increasing the emergency storage to $160m^3$ and upgrading the pump set to 2 x 54l/s pumps. These new pumps are nominally 30kW each.

This pump Station will then have an ultimate capacity of 1,585ET

Catchment 2 - Upgrade

There is an existing pump station which is located in catchment 2.
The upgrading of this Pump Station comprises 2 Stages.

Stage 1 Upgrade Emergency Storage Capacity of site, to the ultimate required capacity (61m^3). The site is under capacity for the existing load. This pump station will then have an ultimate capacity of 622 ET.

Stage 2 Due to the capacity of the Calliope STP, effluent from this site is required to be diverted to the alternate site, via PS9. This requires the rising main to be diverted, and results in the pumps being able to be downsized to a nominal power rating of 7kW each.
The new rising main is to be 150NB and approximately 590m long.

Catchment 3 - Upgrade

There is an existing pump station which is located in catchment 3.
The upgrading of this Pump Station comprises 2 Stages. It should be noted that if the proposed construction Camp located on Stowe Road does not proceed, the works on this station are not required.

Stage 1 Due to the proposed Construction Camp discharging into this system. The site needs to be augmented to 215ET. This requires the pumps to be increased to 7kW each (8l/s). The combined storage of the new well is to be 12m^3, providing a total storage of more than 22m^3. This is to utilise the existing well to achieve the emergency storage required.
The existing rising main is to be upsized to 125NB poly.
This pump station will then have an ultimate capacity of 215 ET.

Stage 2 Due to the limitations of the Calliope STP, it is more practical to divert flows from this site to PS 9, via PS 6.
To achieve this, the pumps sets need to be replaced (2 x 8l/s @ 54m, nominally 34KW motors).
The rising mains also need to be extended from the existing discharge location to PS 6. This upgraded main is required in 125NB poly.

Catchment 4 - Upgrade

There is an existing pump station which is located in catchment 4.
The site is under capacity for the existing load, with the storage components being undersize.
Upgrade Emergency Storage Capacity of site, to the ultimate required capacity (27m^3).
Upgrade Operating Storage Capacity of site, to the ultimate required capacity (1.5m^3).

This pump station will then have an ultimate capacity of 275 ET.

Catchment 5 - Upgrade

There is an existing pump station which is located in catchment 5.
The upgrading of this Pump Station comprises 2 Stages.

Stage 1 This is required due to proposed works by Main Roads in upgrading the Bruce and Dawson Highway Intersection.
Appropriate sizing of the rising main, results in the existing pump being suitable for this stage.
The rising main needs to be rerouted from the existing main near CQP to PS2. This new main is to be 110OD poly for a length of 1,250m.
If the Main Roads works do not result in the main needing to be rerouted along the Bruce Highway, the effluent will need to be rerouted into PS2 from a point nearer to the centre of Calliope. Again this would be performed in 110OD poly, for a distance of approx. 260m.

Stage 2 Due to the development of Catchment 10, the rising main can be redirected into this new catchment. This results in a shorter rising main length and smaller diameter pipe. The pipe is to be 90mm poly, for a length of 250m.
This results in the pumps being able to be downsized in capacity to typically 4KW, and reduces and detention issues.

The station will still have a capacity of 115 ET.

Catchment 6 - Decommission and New

The existing Pump Station 6 will be decommissioned when the new pump station 6 is constructed (as part of new development). The Pump Station is to be relocated to service all of Catchment 6.
The existing connections on this pump station will be serviced by the new PS 6.
The existing pump station has a capacity of 70ET, with a current loading of 11 ET.

Stage 1 The existing pump station is to be decommissioned. The new Pump Station 6 will replace the existing PS 6. It is required as part of any development in catchment 6.
The new pump station is required to have the following parameters:

- 14l/s pumping units, nominally 12KW
- Operational Storage of 2.1m^3
- Emergency Storage of 40m^3

The rising main from PS 6 (NEW) to main RET 7.3 will need to be 100NB. It is approximately 170m in length. This main will be built at the same time as PS 6 (NEW).
The existing rising main will be decommissioned when PS 6 (NEW) and RM 6 (NEW) are built.

This will provide the pump station with a capacity of 405ET.

Stage 2 Due to the limited capacity of the Calliope STP, Catchment 6 effluent is required to be redirected to the alternate plant via PS 9.
Due to increased head considerations the pump units are required to be upgraded to a nominal power rating of 48KW.
The redirected rising main is required to be 150NB, and approximately 2,280m long.
The rising main is to be discharged into PS 9 directly, not via PS 2.

Stage 3 Due to the limited capacity of the Calliope STP, Catchment 6 and Catchment 3 effluent is required to be redirected to the alternate plant via PS 9.
The mains and pumps are upgraded to the required level as part of the previous stage.
The storage capacity of the pump station needs to be increased to:
Operating Storage $3m^3$
Emergency Storage $60m^3$.

This will maintain the ultimate capacity of the Pump Station to 620ET.

Catchment 9 - New

This is a new pump station which is located in catchment 9.
The ultimate capacity of this site is achieved in 4 Stages.

Stage 1 Pump effluent to the Calliope STP via Don Cameron Drive. This requires the site to have the following parameters:
- 2 x 10.2l/s pumping units, nominal power of 25KW
- Operational Storage of $1.5m^3$
- Emergency Storage of $30m^3$
- Rising Main 100mm PVC-M, 1,000m long.

This will provide the pump station with a capacity of 300ET.

Stage 2 This will nominally occur when the ultimate capacity of PS 2 or any downstream component of Catchments 2 and 9 is reached, and includes diverting the flow from PS 2 into PS 9. This will be the first occurrence of pumping effluent to the alternate STP.
This stage requires the following parameters:
- 2 x 68l/s pumping units, nominal power of 122KW.
- Operational Storage of $10m^3$
- Emergency Storage of 190m3.
- Rising Main 225NB and 21km long.

This will provide the pump station with a capacity of 1,980ET.

Stage 3 This stage is required as a result of achieving the maximum capacity of the rising main. This stage requires the following parameters:
- 3 x 125l/s pumping units, nominal power of 167KW.
- Operational Storage of $18m^3$ total.
- Total Emergency Storage of $360m^3$.

Rising Main 300NB and 21km long.

This will provide the pump station with a capacity of 3,690ET.

Stage 4 This is the ultimate stage for the Pump Station, and requires the use of combined rising mains (Stage 2 and 3 mains). This stage requires the following parameters:

3 x 223l/s pumping units, nominal power of 240KW.
Operational Storage of 32m^3. This is provided by using both wells in stage 2 and 3 in combination.
Total Emergency Storage of 640m3.
Rising Mains of stage 2 and 3 are to be utilised in parallel.

This will provide the pump station with a capacity of 6,585ET.

Catchment 10 - New

This station has been planned to have Catchment 5 diverted to it once sufficient gravity mains are installed. The pump station will pump to PS 9. The required parameters for this site are:

15l/s pumping units, nominal power of 10KW.
Operational Storage of 2.2m^3.
Emergency Storage of 43m3.
Rising Main is to be 100NB and approximately 790m in length.

This will provide the pump station with a capacity of 440ET.

Catchment 11 - New

This station has been planned to service the future industrial area to the South of Councils Depot. The pump station will pump to PS 1. The required parameters for this site are:

16l/s pumping units, nominal power of 16KW.
Operational Storage of 2.3m^3.
Emergency Storage of 44.
Rising Main is to be 100NB PVC and approximately 400m in length.

This will provide the pump station with a capacity of 450ET.

4.6 Reticulation Mains

The following lists the works required at various planned stages to meet the service requirements of the Calliope Township.

All works required have been listed in TABLE B.3 Capital Infrastructure Plan – Gravity Systems, and provide details on the work required, the timing (ET and Approximate year) and the estimated cost of the works.

All manholes on trunk mains are required to be internally lined, to prevent the effect of gas attack.

It should be noted that the locations of mains identified in the Maps are indicative only, and the final location is subject to detailed design and subdivision layout.

All Catchments

STP Main

The upgrade of the main into the Sewage Treatment Plant (STP) is essential for future development in all catchment areas. The main is currently 375NB with a small section of 300NB. The current loading is 950ET. When the loading on the main reaches **1,270 ET,** the main has to be upgraded to 450 NB. It is anticipated that this will occur in 2013.

Catchment 1

Ret 1.1 Realignment of 225NB to 300NB main from PS1 to Muirhead St

This main will be realigned to the southern boundary of Chapman Park compared to its current alignment on the northern boundary. The existing main will continue to be used to collect all of catchment 1A and 1B until the trigger point of **400 ET** is reached. At this level, the existing main will become overloaded and Main RET 1.1 has to be built.

Ret 1.2 Decommission section of 225NB Main

This main, which is the existing main that is made redundant by the above works, will be decommissioned once main RET 1.1 is built. There are no connections on this main and therefore does not need to be operational.

Ret 1.3 New 225NB main from Muirhead Street to Herbertson Rd

The Muirhead St to Herbertson Rd main connects into the existing 225NB main that services the Calliope Vista subdivision, and extends up to Herbertson Rd.

Ret 1.4 Realignment of 150NB to 225NB main from Morcom St to Taragoola Rd New

The Morcom St main is to be realigned so that it flows along Morcom St, crosses the railway line and down Muirhead St which will join into the existing 225NB main on Taragoola Rd. This main will have to be built when the trigger point of **190ET** is reached (from Catchments 1D and 1E). Once the new main is built the existing 150NB main (southern part of Calliope Vista Estate) will still service the current lots. However all of Catchment 1D and 1E and the properties on the south side of Morcom St will be serviced by the new main.

Ret 1.5 225NB main servicing Catchment 1D and 1E

The main servicing catchment 1D and 1E is located parallel to the eastern end of Morcom St. This main will allow for development in Catchment 1D and 1E. The main will link into the existing 150mm main that services houses on Morcom St until the main is at capacity (190ET). This main will then connect to main RET 1.4.

This main is required prior to any development ion Catchment 1D and 1E.

Ret 1.6 Upgrade main from 225NB to 375NB

This main is currently 225NB and will be upgraded to 375NB when the loading on the critical node of the main reaches **440 ET**. The current loading on this node is 101ET.

Ret 1.7 Upgrade main from 150NB to 300NB
This main is currently 150NB and will be upgraded to 300NB when the loading on the critical node of the main reaches **210 ET**. The current loading on this node is 50ET.

Ret 1.8 Inlet to Pump Station
This main is required in order to service the entire Catchment 1.

Ret 1.9 Upgrade main from 150NB to 225NB
This main is required in order to service the Catchment 1H, and specifically is a requirement of the future industrial development of Catchment 11.
This upsizing is required when the loading at node 12394 reaches 220ET.

Ret 1.10 Upgrade main from 150NB to 225NB
This main is required in order to service the Catchment 1H, and specifically is a requirement of the future industrial development of Catchment 11.
This upsizing is required when the loading at node 12376 reaches 170ET.

Catchment 6

Ret 6.1 New 225NB main entering new PS 6
This main enters the new pump station 6 (PS 6 –NEW) which is needed to service catchment 6.

Catchment 7

Ret 7.1 New 375NB trunk main in Catchment 7
The 375NB trunk main will be used to service all of catchment 6 and 7C -E. This main is required at the commencement of Catchment 6, and as part of Catchments 7C-E.

Ret 7.2 New 300NB trunk main in Catchment 7
The 300NB trunk main will be used to service all of catchment 6 and 7D -E. This main is required at the commencement of Catchment 6, and as part of Catchments 7D-E.

Ret 7.3 New 225NB trunk main in Catchment 7
The 225NB trunk main will be used to service all of catchment 6 and 7E. This main is required at the commencement of Catchment 6, and as part of Catchment 7E.

Ret 7.4 Regraded 225NB trunk main in Catchment 7
The 225NB trunk main is primarily used to transfer pumped effluent from station to the STP. In the area of the Dawson Highway, the existing main is relatively flat and limited the capacity of the entire line to a level which is not

sufficient for the stage development plan. A regrading of the line will provide suitable capacity for the staging to occur.
The regrading is required as part of the construction of Stage 1 of PS 9.

Catchment 8

Ret 8.1 Upgrade main from 300NB to 375NB
This main is located near the railway line and the Calliope Primary School. This section is currently 300NB and needs to be upgraded to 375NB when the loading on the main reaches **940 ET**. The current loading is 312ET.

Ret 8.2 Upgrade main from 225NB to 300NB
This main is located near the railway line and the Calliope Primary School. The section is currently 225NB and needs to be upgraded to 300NB when the loading on the main reaches **750 ET**. The current loading is 277ET.

Catchment 9

It is acknowledge that due to the undeveloped nature of this catchment, the location of the internal collection mains (150 and 225NB) may be significantly different from the locations identified in this Plan. If the mains connect to the trunk mains in a different location to those identified, the sizing of the trunk main will need to be reconsidered.

The first stage of development in this catchment requires Ret 7.4 to be completed.

Staging for the collection this Catchment has been based on the use of dual 225NB parallel mains in addition to the trunk main. The trunk main will effectively run through the centre of the catchment (closely following the exiting drainage path). The dual parallel mains will run at some distance from the trunk main, and be located each side of the trunk main. This option has been identified as the most economic and suitable staging option.

Ret 9.1 525NB main Entering Pump Station
The 525NB main is the centre trunk main leading to the new pump station. It will effectively be the main between the inlet manhole and the pump station. It will service all of catchment 9.

Ret 9.2 525NB main servicing Catchment 9 except 9A.
The 525NB trunk main joins up with the 450NB main. This main services most of Catchment 9.

Ret 9.3 450NB main servicing Catchment 9 except 9A, & B

Ret 9.4 450NB main Servicing Catchment 9 except 9A, B, C, & D

Ret 9.5 450NB main Servicing Catchment 9 except 9A, B, C, D & E

Ret 9.6 450NB main Servicing Catchment 9H, I, J, K, L, & M

Ret 9.7 375NB main Servicing Catchment 9H, J, K, L, & M

Ret 9.8 375NB main Servicing Catchment 9J, K, L, & M

Ret 9.9 375NB main Servicing Catchment 9K, L & M

Ret 9.10 375NB main Servicing Catchment 9K & M

Ret 9.11 300NB main Servicing Catchment 9A

Catchment 11

As this catchment services the future light industrial development area of Calliope, the minimum gravity sewer main diameter is 225NB.

5 Capital Funding Plan

This plan requires total capital expenditure of $74.633M over the period of development. This is comprised $40.769M in Treatment Costs, $29.136M in Pumping Station costs, and $4.728M in Gravity Mains.

The Capital Funding Plan is shown in TABLE B.4 Capital Funding Plan. The Capital Funding Plan is used to indicate developer contributions and the progressive impact of each capital item on the Sewer fund itself by progressively summing the infrastructure costs and the income generated each year. The plan is developed to identify the ability of the Calliope Sewer Fund to meet the financial needs of the area, and indicate any requirements for external funding.

The plan is based on the assumption of development growth, and therefore rating base, occurring as indicated in TABLE 2.2 Demand Growth. For the purpose of the plan, all catchments have been assessed as one single assessable area.

Whilst the Capital Funding Plan is designed on a marginal cost basis, and ignores the spare capacity of the existing network, as well as financial concepts of present value of future growth. It is designed to indicate the capacity to fully fund new capital infrastructure through Infrastructure charges.

5.1 Oversizing Contributions

For the purposes of the funding arrangements, total expected cost of works are utilised.

Oversizing contributions on works provided by developers will only be considered for gravity mains which are over 225NB.

Mains which are not eligible for oversizing contributions (Council Contribution) to the total cost are:

- 225NB and smaller
- Larger mains which are solely required to ensure individual developments met the required level of service.

The list of Pump station and associated works is to be used as the ‘standard’ to which a development is required to construct. Any pumpstation constructed smaller than, or in a substantially different location to the listed infrastructure, will not be eligible for any Council contribution.

6 Development Progress

The purpose of the strategic plan is to provide detailed information on the progressive development of the Calliope Sewerage Service 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 has been assessed by assuming sequential development, radiating out from the major collection point (normally the Pump Station) of each catchment.

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

6.1 Sequential Development

Most sequential developments within the DSSA will only require a simple assessment of internal mains and possible connection to other areas, to confirm compliance with the Strategic Plan.

More detailed assessments will be necessary with non-sequential or “leap frog” development within the DSSA which may require some ‘temporary’ external works, bring forward costs or headworks offsetting infrastructure (infrastructure included in the Capital Infrastructure Schedule) to connect to the existing system and meet service 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.

6.2 Development outside the DSSA

The impacts of any development outside the DSSA are completely unknown and depending on the location and size of such developments may require extensive re-assessment to determine its impact on other Catchments and the Sewage Treatment Plant.

Any development outside the DSSA 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 DSSA would have to be assessed on a case by case basis.

This Strategic Plan uses the DSSA for the primary purpose of setting identifiable areas which can ultimately be serviced by the proposed sewerage infrastructure identified in the plan, however the Strategic Plan is not intended

to exclude development outside the DSSA. This provides a process for assessing the extent and likely timing of major infrastructure provision and upgrades within the DSSA. Therefore, given the resources and costs associated with preparing this plan, all costs associated with assessing development applications outside the DSSA 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 DSSA.

Appendices

A Maps

- MAP 1 – Calliope Strategy Area
- MAP 2 – Calliope Defined Sewerage Service Area
- MAP 3 – Catchments
- MAP 4 – Investigation of STP Sites
- MAP 5 – Trunk Infrastructure Catchment 1
- MAP 6 – Trunk Infrastructure Catchments 2, 5 and 10
- MAP 7 – Trunk Infrastructure Catchment 3, 4, 6, 7 & 8
- MAP 8 – Trunk Infrastructure Catchment 9
- MAP 9 – Trunk Infrastructure Catchment 11
- MAP 10 – Trunk Infrastructure Rising Mains

B Tables

- TABLE B.1 Capital Infrastructure Plan – STP's
- TABLE B.2 Capital Infrastructure Plan – Pumped Systems
- TABLE B.3 Capital Infrastructure Plan – Gravity Systems
- TABLE B.4 Capital Funding Plan
- TABLE B.5 Current Capacity of Pump Stations and Rising Mains
- TABLE B.6 Staged and Ultimate Capacity of Pump Stations and Rising Mains
- TABLE B.7 Permitted ET Range in Reticulated Mains
- TABLE B.8 Minimum ET's Required For Scouring

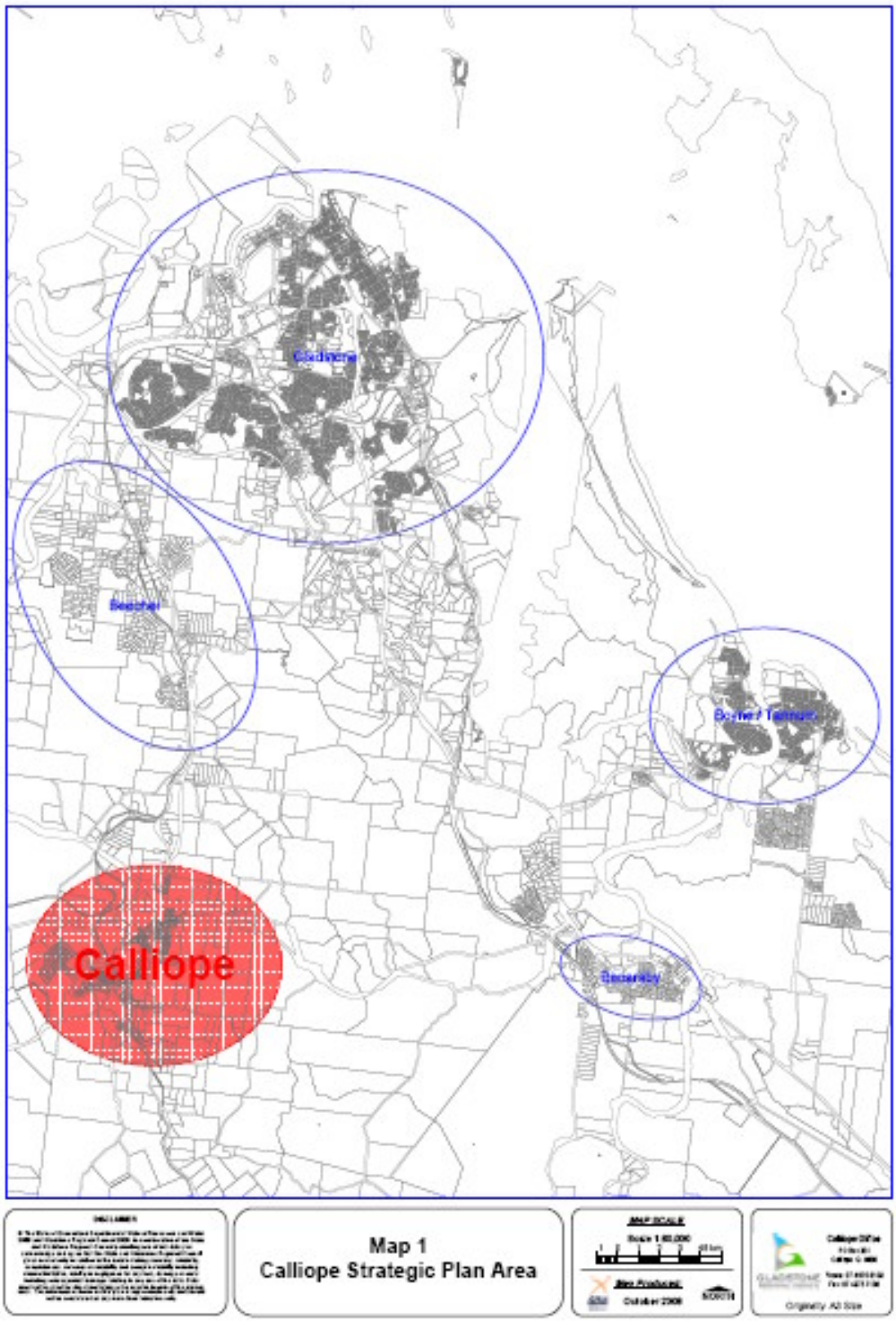
C Figures

- FIGURE C.1 225 NB Pipe Capacity
- FIGURE C.2 300 NB Pipe Capacity
- FIGURE C.3 375 NB Pipe Capacity
- FIGURE C.4 450 NB Pipe Capacity
- FIGURE C.5 525 NB Pipe Capacity
- FIGURE C.6 600 NB Pipe Capacity

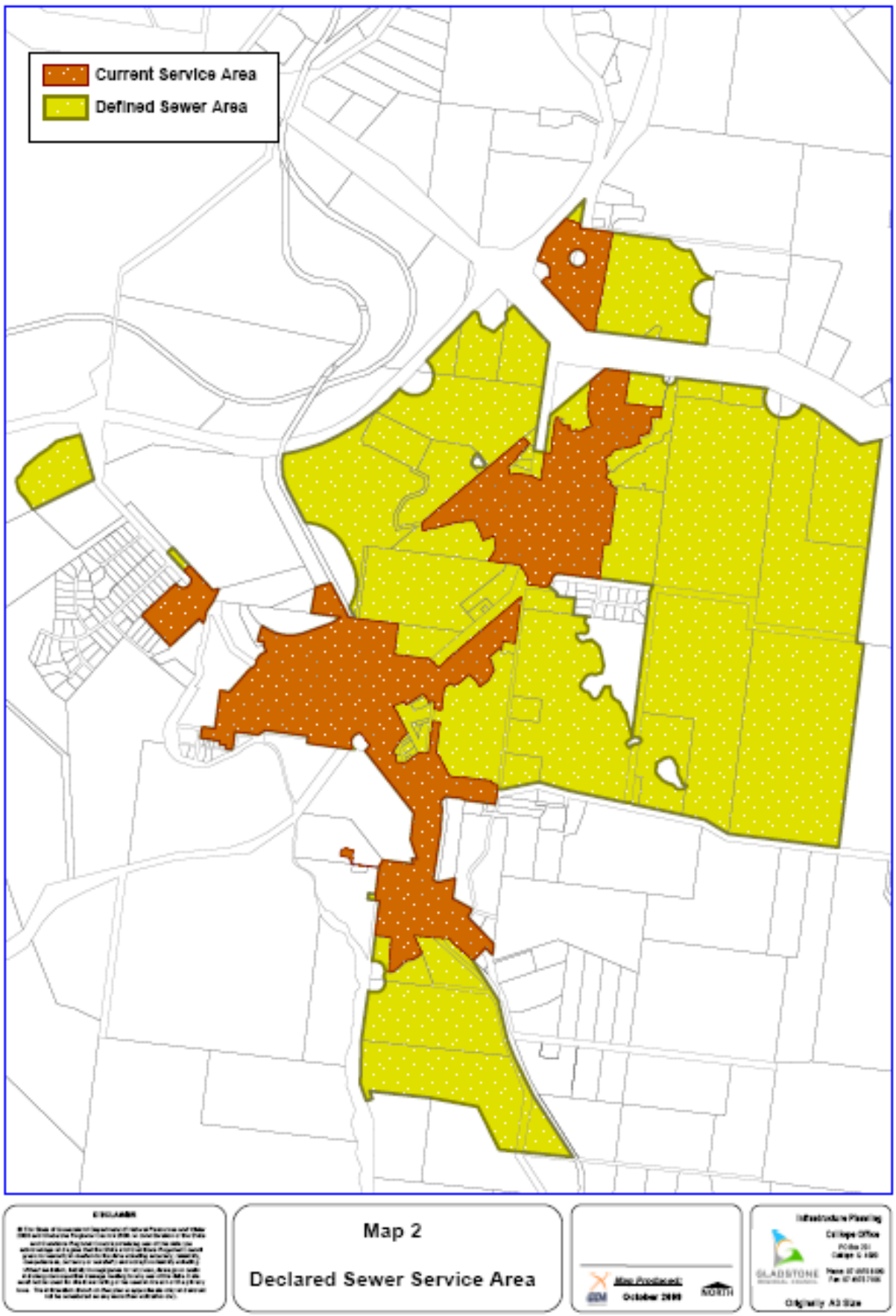
D Key Terms and Concepts

A Maps

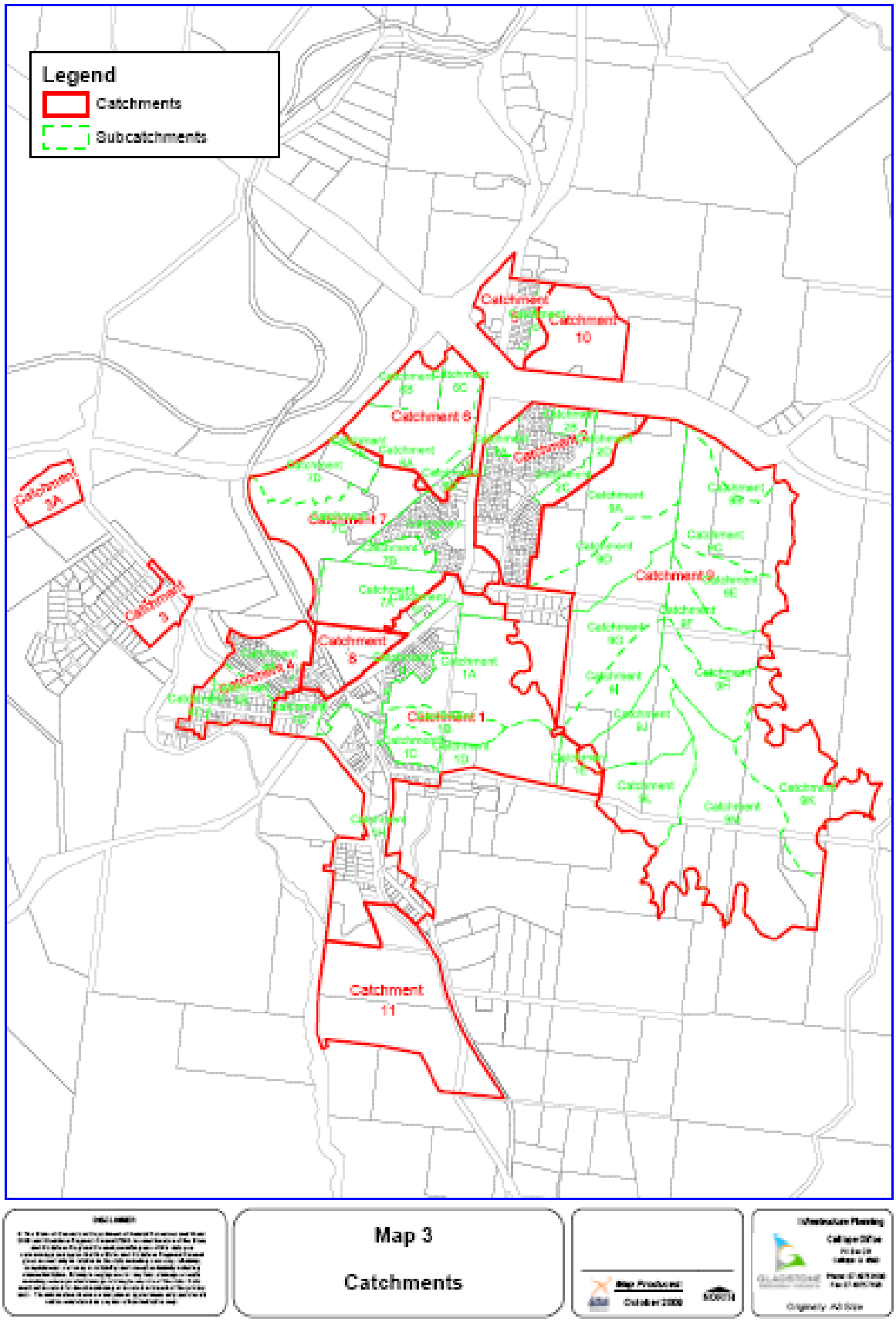
MAP 1 – Calliope Strategy Area



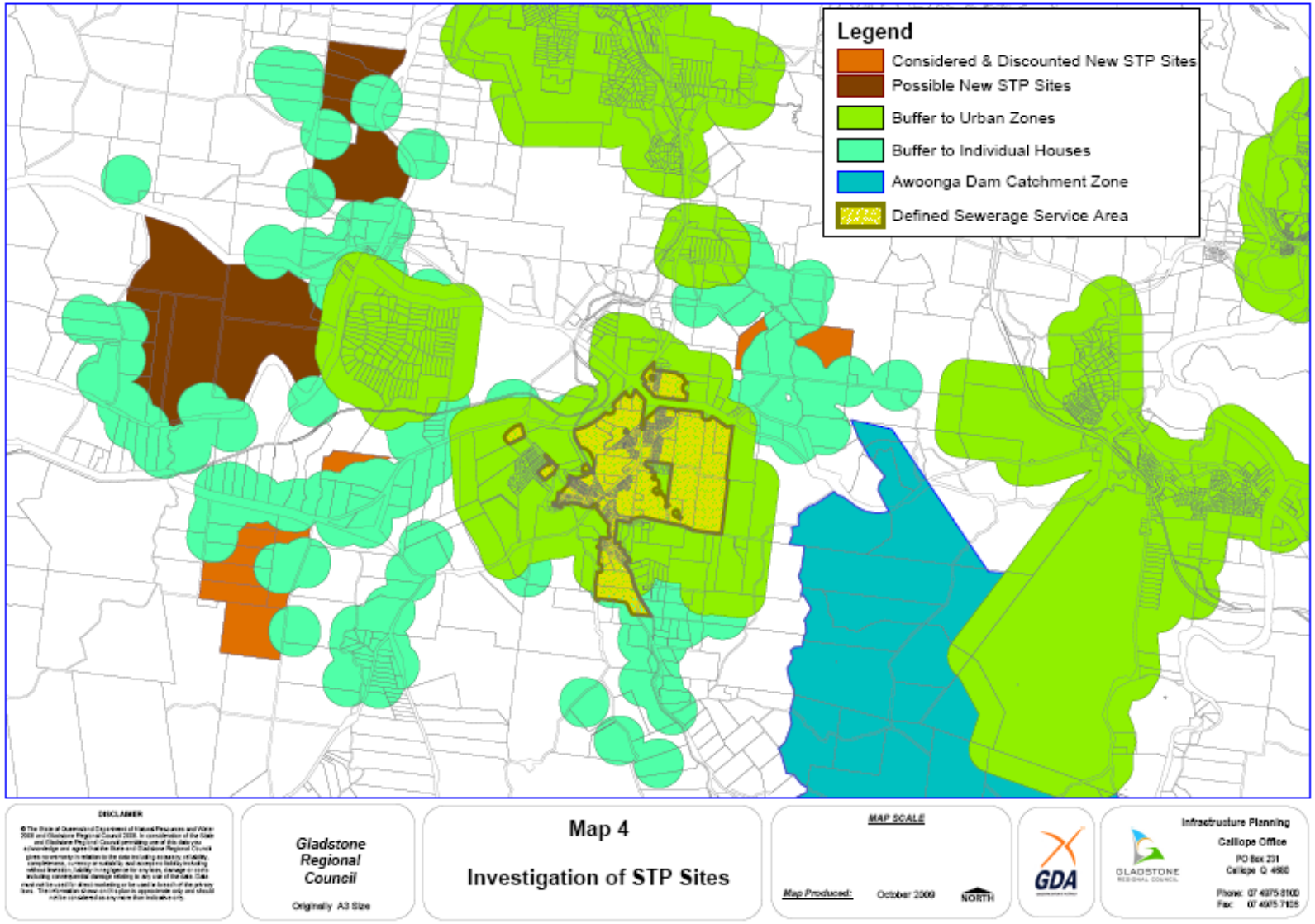
MAP 2 – Calliope Defined Sewerage Service Area



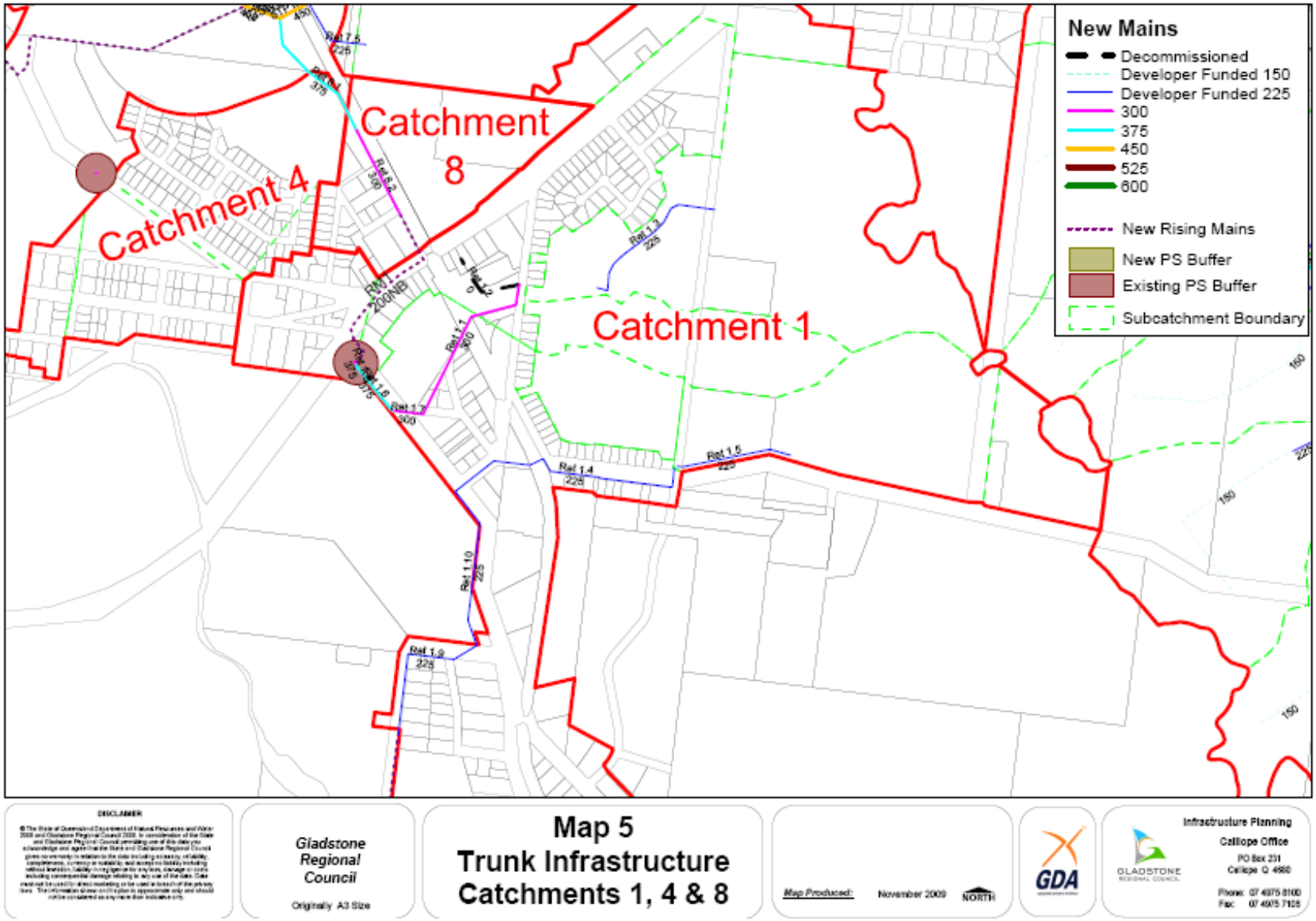
MAP 3 – Catchments



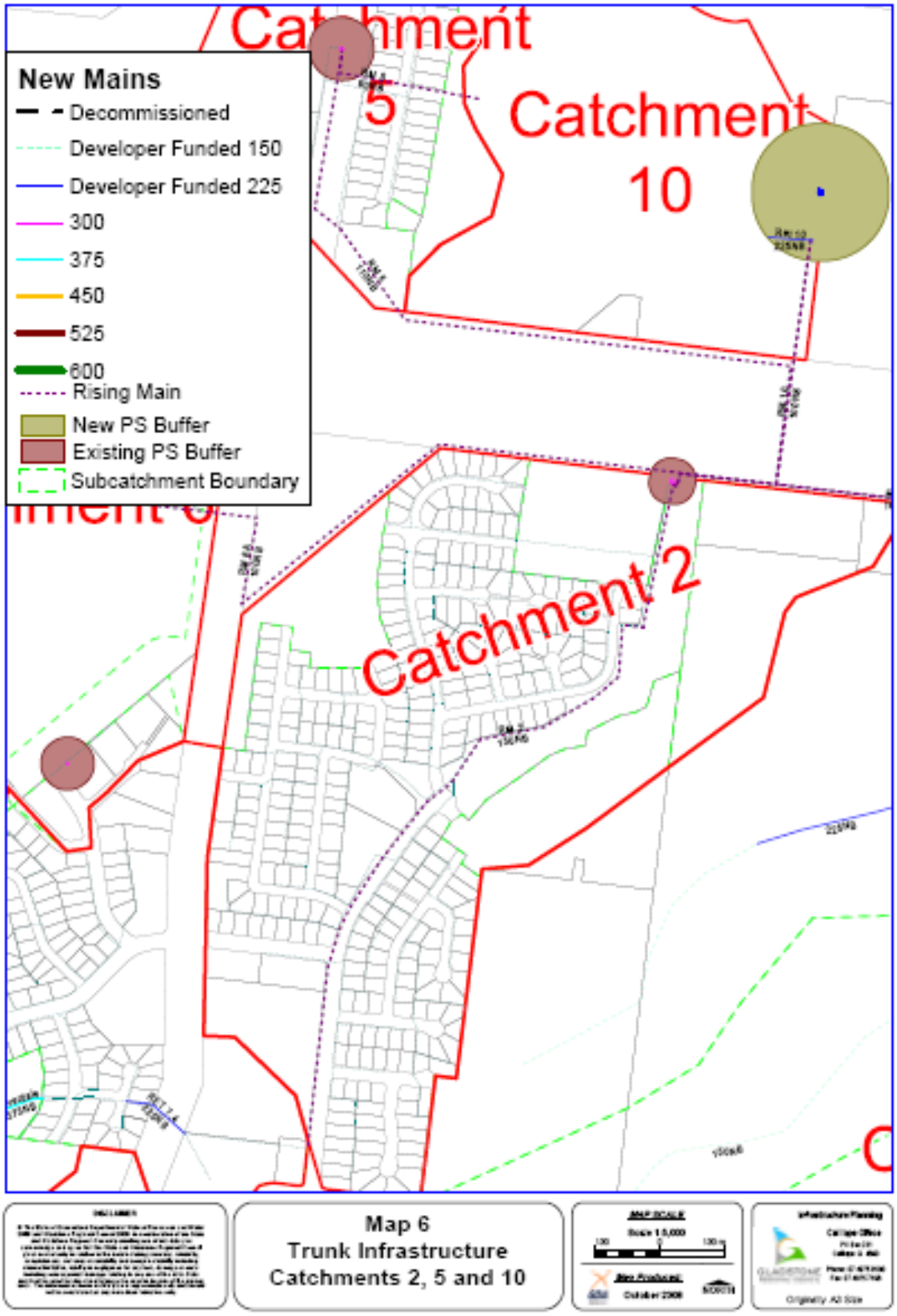
MAP 4 – Investigation of STP Sites



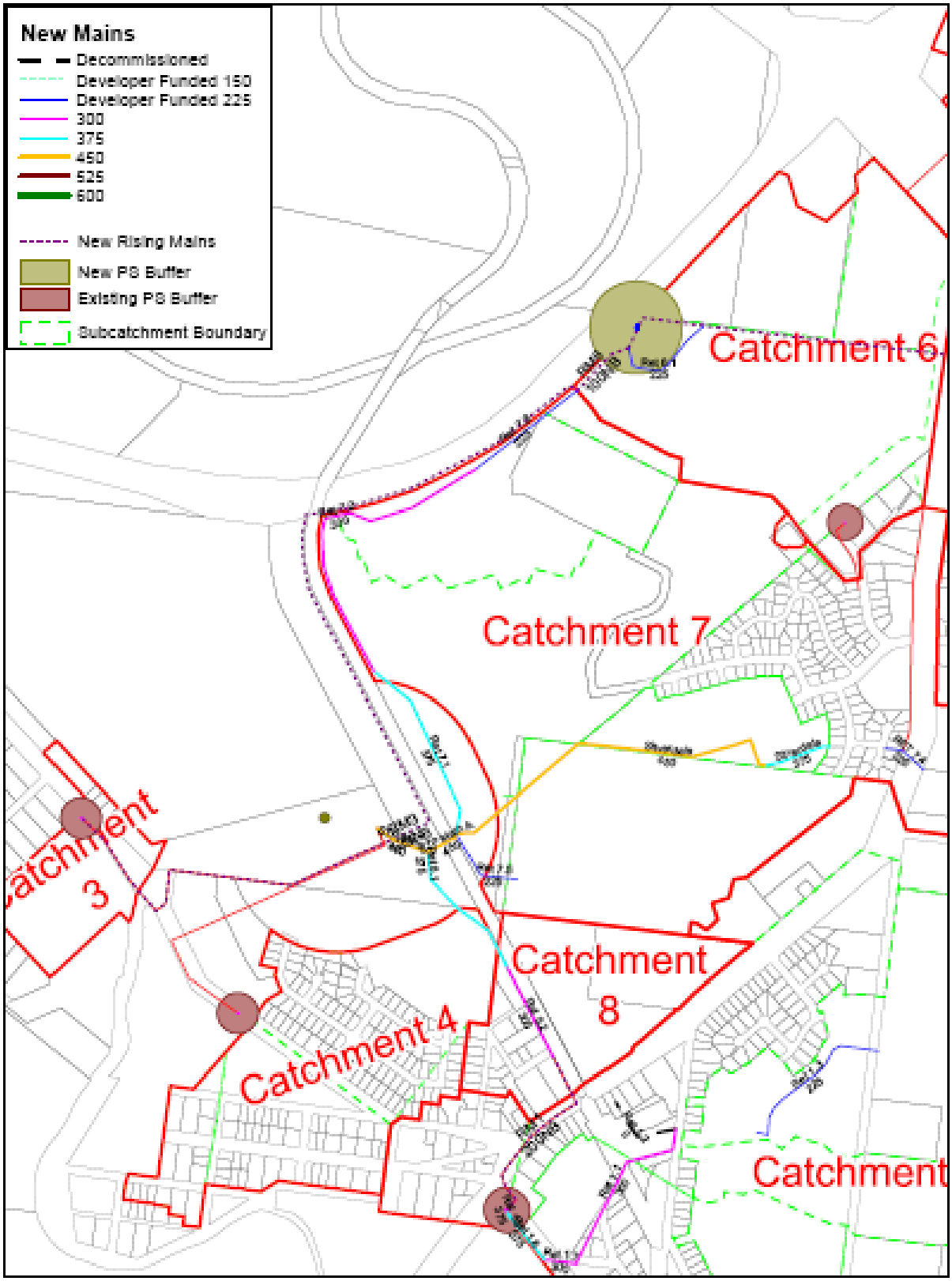
MAP 5 – Trunk Infrastructure Catchment 1



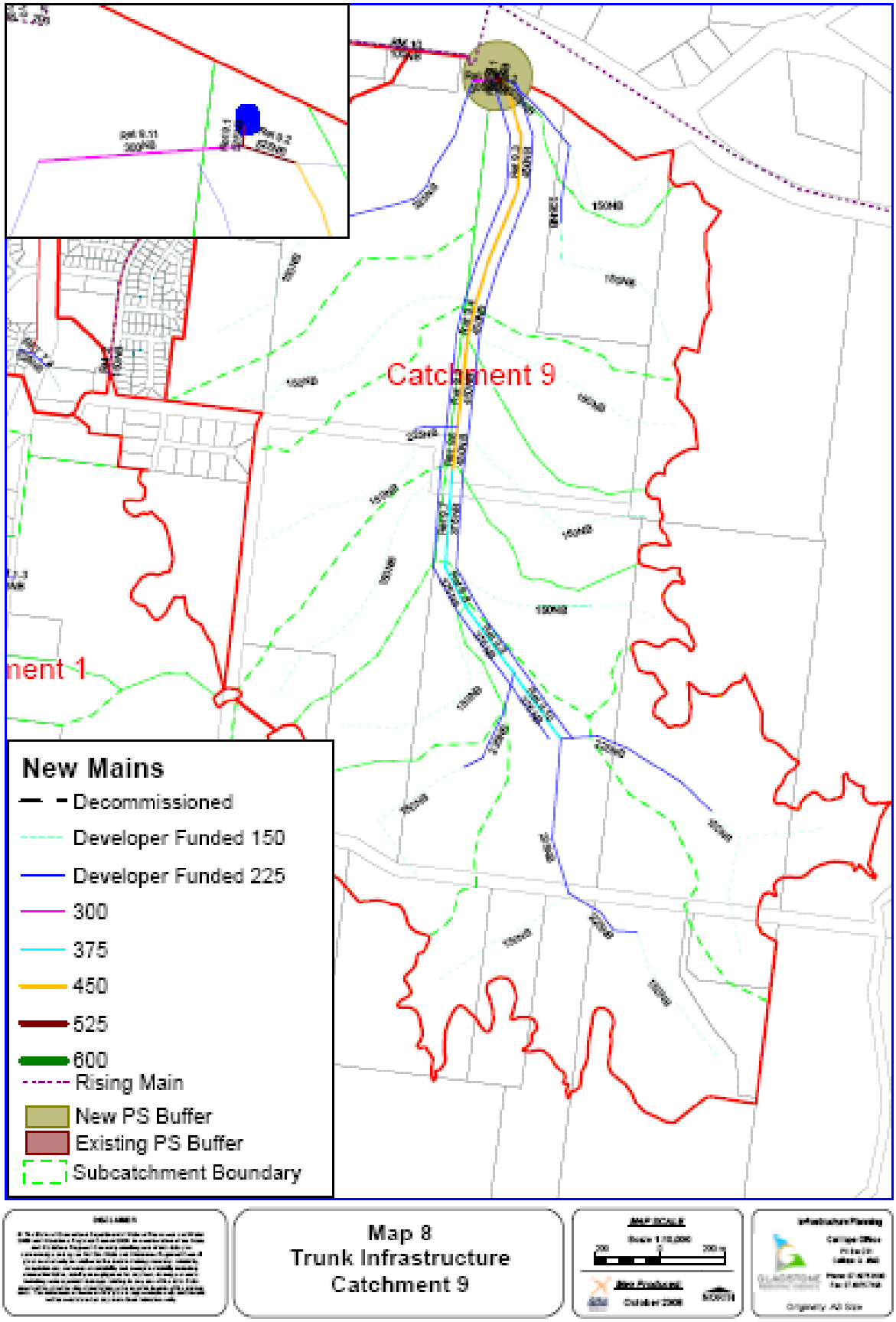
MAP 6 – Trunk Infrastructure Catchments 2, 5 and 10



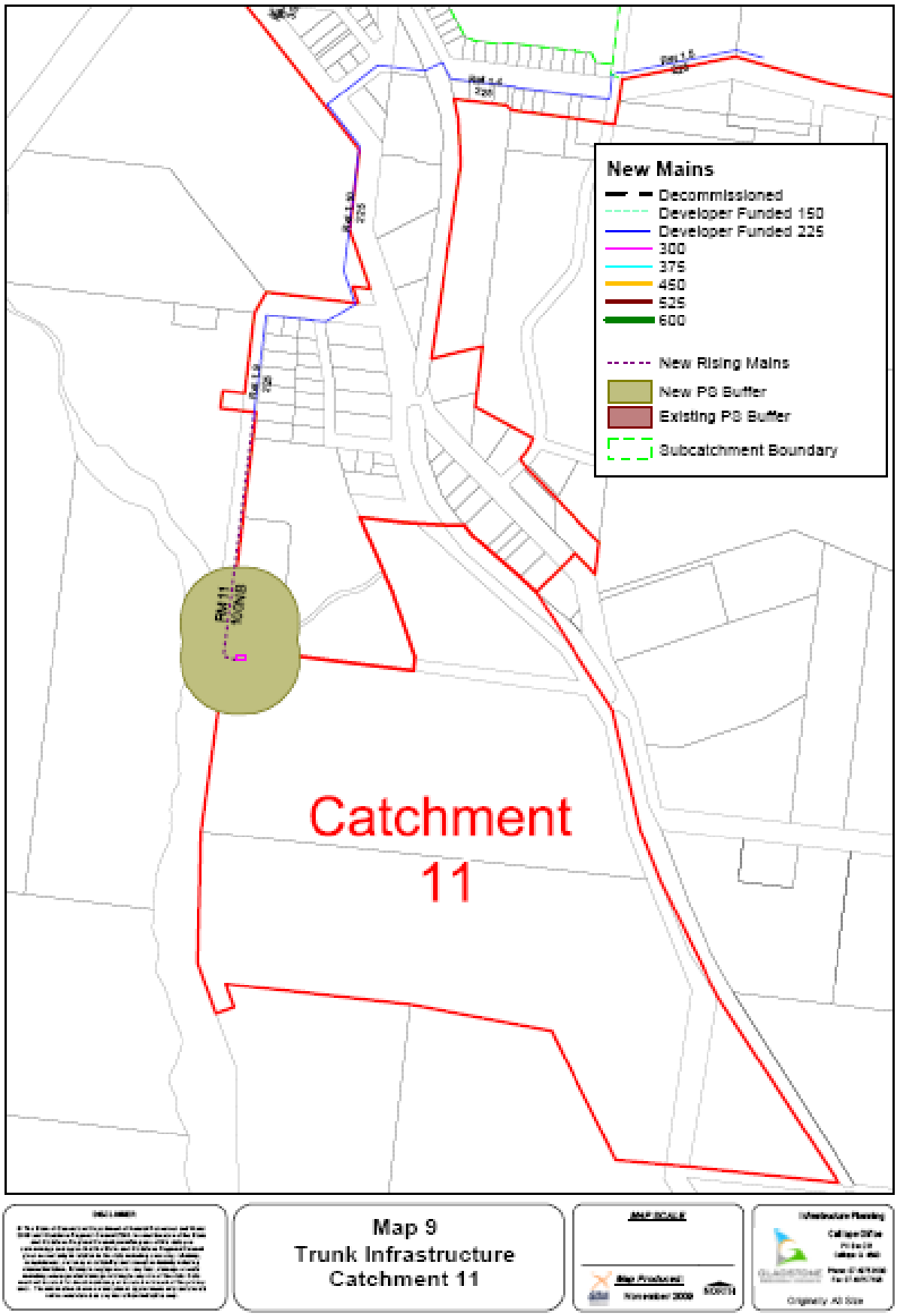
MAP 7 – Trunk Infrastructure Catchment 3, 4, 6, 7 & 8



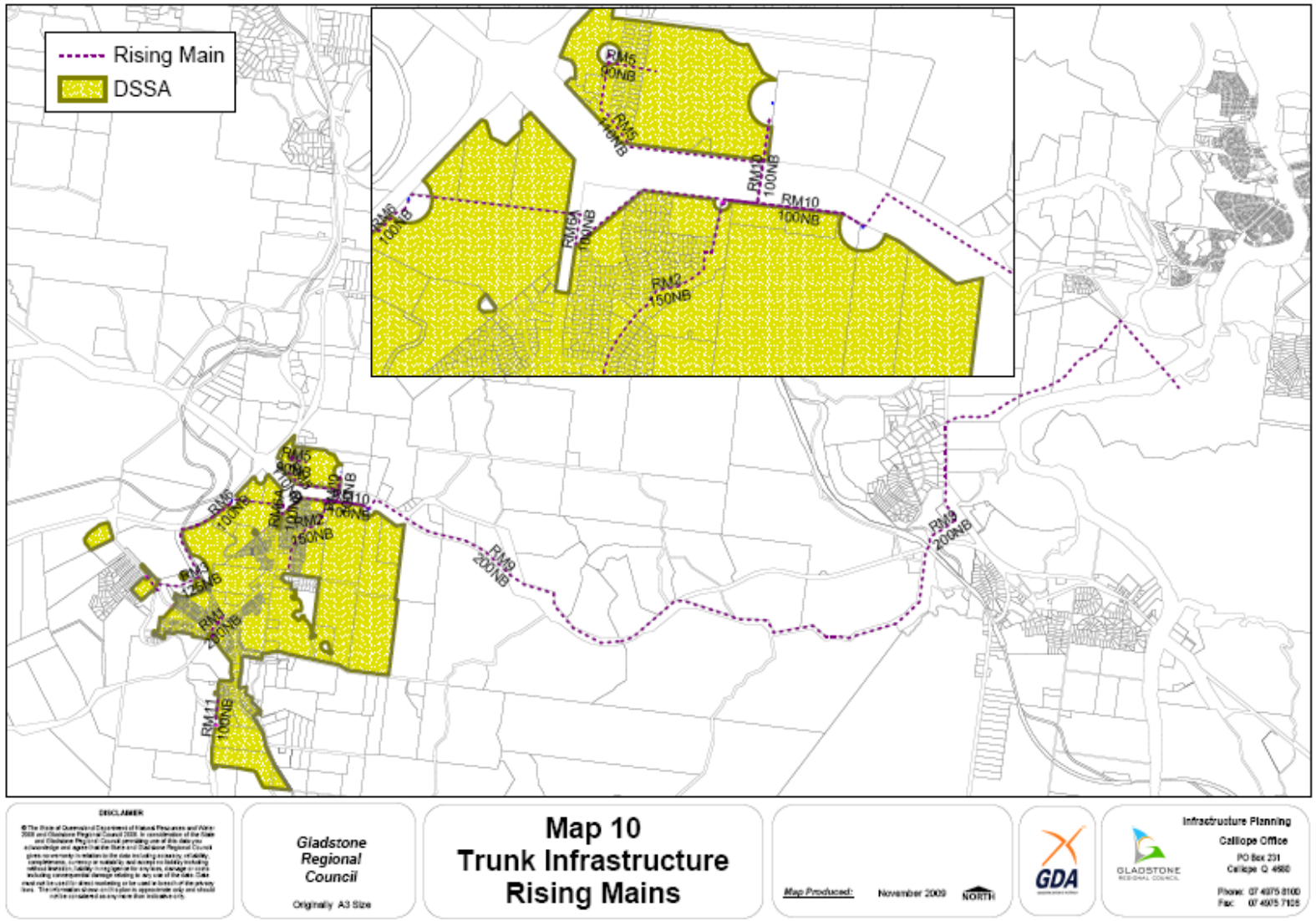
MAP 8 – Trunk Infrastructure Catchment 9



MAP 9 – Trunk Infrastructure Catchment 11



MAP 10 – Trunk Infrastructure Rising Mains



B Tables

Capital Infrastructure Plans

TABLE B.1 Capital Infrastructure Plan – STP's

Year	ET's	Description	Location	Details	Cost
2010	770	Plant Augmentation	Current STP Site	Increase Plant capacity to 6,000EP Construction by ???? Design by Worley Parsons	$4,500,000
2010		Effluent Reuse Schemes	149 Stowe Road	Supply of water to construction site Site to treat and irrigate all water by self (to Class A+)	$550,000
2010	1170	Wet Weather Storage	Current STP Site	Construct 30ML storage in addition to existing	$1,100,000
2011	1350	Sludge Lagoons	Current STP Site	Commission Mechanical Dewatering	$510,000
2011	1420	Effluent Reuse Schemes	Golf Club (north)	This is some of the area currently being irrigated. Need to improve Irrigation capabilities	$790,000
2015	1700	Effluent Reuse Schemes	Golf Club South	Requires increase of treatment Capacity to Class A+	$4,580,000
2019	2280	'Purchase' Capacity of TS Plant	Current STP Site	Contribute appropriate cost of TS STP site, in order to utilise. ie. Obtain capacity for Calliope	$4,051,000
2020	2360	Additional Clarifiers	Tannum Sands STP	Duplicate Clarifiers to bring plant capacity to 15,000EP	$675,000
2025	2790	QAL Reuse Line	Tannum Sands	QAL Reuse Lines Augmentation	$1,027,000
2025	2830	Effluent Reuse Schemes	Golf Club South	Augment Irrigation system to cover entire site	$400,000
2028	3110	Effluent Reuse Schemes	Rugby and Cricket	Irrigate site with Class A+ Effluent	$380,000
2029	3280	Effluent Reuse Schemes	Pony Club	Irrigate site with Class A+ Effluent	$540,000
2032	4400	New Bioreactor and Clarifiers	Tannum Sands STP	Duplicate Bioreactor and Clarifiers to bring plant capacity to 30,000 EP	$4,950,000
2047	6270	Full Duplication of Plant	Tannum Sands STP	Full Duplication of Plant to capacity of 60,000EP	$16,716,000

TABLE B.2 Capital Infrastructure Plan – Pumped Systems

Catchment	Stage	Description	Cost	Current ET	Asset Trigger Point	ET to Trigger Asset	Year
1	1	Upgrade Storage capacity of site (emergency and operational) Emergency Storage of 60m^3 Operating of 4m^3	$ 298,000	302	300	-2	2009
	2	Install Jockey Pumps to well Pumpset of 43l/s @ 21m (typ. 21KW) & 20l/s @ 18m Upgrade Rising Main to 200mm Upgrade storage to 8m^3 (operating) & 120m^3 (emergency)	$ 719,000		590	288	2019
	3	Remove Jockey Pumps	$ 30,000		750	448	2024
	4	Ultimate Capacity of Site Increase Emergency Storage to 160m^3 New pumpset of 54l/s @ 22m (typ 30kw)	$ 563,000		1135	833	2035
	Ultimate	Ultimate Capacity of Site			1585		
	Total		$ 1,610,000				
2	1	Upgrade Emergency Storage to 61m^3	$ 162,000	386	324	-62	2010
	2	Reroute Station to #9 Downsize pumps to 12KW (18.5l/s @ 13m) Rising Main to be 150mm PVC-M	$ 330,000		Occur as part of Stage 2 of PS #9		2020
	Ultimate	Ultimate Capacity of Site			622		
	Total		$ 492,000				

Catchment	Stage	Description	Cost	Current ET	Asset Trigger Point	ET to Trigger Asset	Year
3	1	Development of Construction Camp New Pump Set of 8l/s @13m (typ 14.4kw) New Rising Main 125NB Poly Increase Operating storage to 1.1m^3 Increase Emergency Storage to 21m^3	$ 490,000	30	91	61	2010
	2	Diversion of Flows to PS 6 (reduce load on STP) New Pump Set of 8l/s @54m (typ 34kw) Extend Rising Main 125NB Poly	$ 595,000	30	Occur as part of Reduced load on STP		2036
	Ultimate	Ultimate Capacity of Site			215		
	Total		$ 1,085,000				
4	1	Upgrade Storage capacity of site (emergency and operational) emergency storage of 26m^3 operational storage of 1.3m^3	$ 188,000	273	63	-210	2009
	Ultimate	Ultimate Capacity of Site			275		
5	1	Reroute Rising Main due to Main Roads Flyover Rising Main to be 110 OD Poly	$ 327,000	75	75	0	2010
	2	Re-Route Rising Main to PS10 Smaller pumps can be installed (typically 4kW) Rising Main to be 90 OD Poly	$ 148,000		Occur after PS 10 developed		2021
	Ultimate	Ultimate Capacity of Site			115		
	Total		$ 475,000				

Catchment	Stage	Description	Cost	Current ET	Asset Trigger Point	ET to Trigger Asset	Year
6	1	Relocate Pump Station and Rising Main due to development New Well to have operating storage of 2m^3, emergency storage 40m^3 Pumps typically 24kW Rising Main to be 100 PVC-M	$ 452,000	11	11	Part of New Subdivision	2010
	2	Relocate the Rising Main due to Calliope STP capacity being reached New Rising Main to be 150PVC-M @ 2360m New pumps required due to elevation, 21l/s @ 43m (typically 48kW)	$ 1,280,000				2030
	3	Divert PS6 and PS3 to PS 9 Increase operating storage to 3m^3 Increase Emergency Storage to 60m^3	$ 146,000	11	405	394	2036
	Ultimate	Ultimate Capacity of Site			620		
	Total		$ 1,878,000				

Catchment	Stage	Description	Cost	Current ET	Asset Trigger Point	ET to Trigger Asset	Year
9	1	Pump Effluent to STP via Don Cameron Drive Pumps at 10.2l/s @ 39m, typically 25kW Emergency of 30m^3 Operating of 1.5m^3 Rising Main of 100 PVC-M, 10000m	$ 756,000	0	1	1	2010
	2	Pump Effluent to Tannum Sands STP New Well operating storage of 10m^3, emergency storage of 190m^3 Pumpset to 68l/s @ 74m, typically 122kW Rising Main 225 PVC-M	$ 8,098,000		300	300	2020
	3	Pump Pump Effluent to TS STP, via new Well New Well Emergency Storage of 360m^3, Operating Storage of 18m^3 Pump Set 125l/s @ 66m, typically 167kW Rising Main of 300mm PVC-M	$ 11,354,000		1980	1980	2034
	4	Utilise both stage 2 and 3 wells for ultimate capacity Emergency Storage of 640m^3 Pumpset to 223l/s @ 78m (typically 240KW) Utilise both 225mm and 300mm mains in parallel	$ 2,507,000		3690	3690	2045
	Ultimate	Ultimate Capacity of Site			6585		
	Total		$ 22,715,000				

Catchment	Stage	Description	Cost	Current ET	Asset Trigger Point	ET to Trigger Asset	Year
10	1	Construct New Station Divert #5 into Catchment Pumpset required 15l/s @ 23m, typically 10kW Rising Main 100mm Emergency Storage = 43m^3 Operating of 2.2m^3	$ 653,000	0	1	1	2021
	Ultimate	Ultimate Capacity of Site			440		
11	1	Construct New Station Pump into Catchment 1 Pumpset required 16l/s @ 22m, typically 16kW Rising Main 100PVC Emergency Storage = 44m3 Operating of 2.3m3	$ 603,000	0	1	1	2010
	Ultimate	Ultimate Capacity of Site			450		

TABLE B.3 Capital Infrastructure Plan – Gravity Systems

Item	Type	Diameter	Description	Associated Catchments	Estimated Cost	Current ET	Asset Trigger Point	ET to Trigger Asset	Year
STP Main	Upsize	450	Upgrade STP Trunk Main from 300/375NB	ALL	$110,000	1263	3030	1767	2035
STP Main - A	Upsize	450	Increase Main size from 375	7	$209,000	926	1270	344	2025
RET 1.1	Realign	300	Realignment and upsizing of 225NB main from Muirhead St to PS1	1	$227,000	27	400	373	2021
RET 1.2	Decommission		Decommission 225NB Main, as part of Realignment of Ret 1.1		$60,000	27	400	373	2021
RET 1.3	New	225	New 225NB main from Herbertson Rd to Muirhead Street servicing Subcatchment 1A	1	$170,000	27	1		2010
RET 1.4	Realign	225	New/Realinged 225NB main from Morcom St to Taragoola Rd servicing 1D and E	1	$265,000	0	190	190	2037
RET 1.5	New	225	New 225NB main servicing Catchment 1D and 1E	1	$120,000	0	1		2013
RET 1.6	Upsize	375	Increase Main from 225NB to service Catchments 1A, B, C, D, E and H	1	$91,000	129	210	81	2011
RET 1.7	Upsize	300	Increase Main from 150NB to service Catchments 1A, B, and C	1	$41,000	27	210	183	2016
RET 1.8	Upsize	375	Increase main from 225NB to service all of Catchment 1. This enters the Pump Station	1	$5,000	302	780	478	2010

Item	Type	Diameter	Description	Associated Catchments	Estimated Cost	Current ET	Asset Trigger Point	ET to Trigger Asset	Year
RET 1.9	Upsize	225	Increase main from 150NB to ensure service of Catchment 1 & 11.	1, 11	$163,000	25	220	195	2016
RET 1.10	Upsize	225	Increase main from 150NB to ensure service of Catchment 1 & 11.	1, 11	$161,000	56	180	124	2034
RET 6.1	New	225	New 225NB main entering new PS	6	$109,000	Required as part of any development in Catchment 6			2010
RET 7.1	New	375	New 375NB trunk main in Catchment 7	6, 7	$299,000	Required as any development of Catchment 6			2009
RET 7.2	New	300	New 300NB trunk main in Catchment 7	6, 7	$410,000	Required as any development of Catchment 6			2009
RET 7.3	New	225	New 225NB trunk main in Catchment 7	6, 7	$131,000	Required as any development of Catchment 6			2009
RET 7.4	Regrade	225	Regrade existing 'flat' main to gain additional flow capacity	2, 5, 9	$58,000	461	600	139	2010
RET 8.1	Upsize	300	Increase size of main from 300NB	1, 8	$219,000	337	940	603	2029
RET 8.2	Upsize	300	Increase size of main from 225NB	1, 8	$29,000	302	750	448	2024
RET 9.1	New	375	New 375NB centre trunk main entering new PS	9	$60,000	Assess when development occurs in associated Catchments		458	2031
RET 9.2	New	375	New 375NB centre trunk main servicing all except 9A	9	$44,000	Assess when development occurs in associated Catchments		458	2033

Item	Type	Diameter	Description	Associated Catchments	Estimated Cost	Current ET	Asset Trigger Point	ET to Trigger Asset	Year
RET 9.3	New	525	New 525NB trunk main servicing all except 9A & B	9	$10,000	Assess when development occurs in associated Catchments		458	2033
RET 9.4	New	525	New 525NB trunk main servicing all except 9A, B, C & D	9	$38,000	Assess when development occurs in associated Catchments		458	2040
RET 9.5	New	450	New 450NB trunk main servicing all except 9A, B, C, D & E	9	$576,000	Assess when development occurs in associated Catchments		458	2043
RET 9.6	New	450	New 450NB trunk main servicing 9H, I, J, K, L, & M	9	$90,000	Assess when development occurs in associated Catchments		458	2045
RET 9.7	New	450	New 450NB trunk main servicing 9H, J, K, L, & M	9	$236,000	Assess when development occurs in associated Catchments		458	2046
RET 9.8	New	450	New 450NB trunk main servicing 9J, K, L, & M	9	$114,000	Assess when development occurs in associated Catchments		458	2047
RET 9.9	New	375	New 375NB trunk main servicing 9K, L, & M	9	$204,000	Assess when development occurs in associated Catchments		458	2048
RET 9.10	New	375	New 375NB trunk main servicing 9K & M	9	$102,000	Assess when development occurs in associated Catchments		458	2049
RET 9.11	New	375	New 375NB main Servicing Catchment 9A	9	$163,000	Assess when development occurs in associated Catchments		458	2043
MISC1		450	Possible Council Contributions to 9" mains		$69,000				2011
MISC2		450	Possible Council Contributions to 9" mains		$38,000				2019
MISC3		225	Possible Council Contributions to 9" mains		$174,000				2024
MISC4		225	Possible Council Contributions to 9" mains		$174,000				2030

TABLE B.4 Capital Funding Plan

Year	New Lots	Development Revenue	Infrastructure Costs	Balance
2008		$0		$0
2009	0	$0	-$1,326,000	-$1,326,000
2010	81	$861,597	-$9,282,000	-$9,746,403
2011	150	$1,595,550	-$1,565,000	-$9,715,853
2012	55	$585,035	$0	-$9,130,818
2013	96	$1,021,152	-$120,000	-$8,229,666
2014	105	$1,116,885	$0	-$7,112,781
2015	80	$850,960	-$4,580,000	-$10,841,821
2016	92	$978,604	-$41,000	-$9,904,217
2017	80	$850,960	$0	-$9,053,257
2018	75	$797,775	$0	-$8,255,482
2019	95	$1,010,515	-$4,944,000	-$12,188,967
2020	125	$1,329,625	-$9,103,000	-$19,962,342
2021	75	$797,775	-$1,088,000	-$20,252,567
2022	85	$904,145	$0	-$19,348,422
2023	90	$957,330	$0	-$18,391,092
2024	140	$1,489,180	-$78,000	-$16,979,912
2025	120	$1,276,440	-$1,537,000	-$17,240,472
2026	105	$1,116,885	$0	-$16,123,587
2027	115	$1,223,255	$0	-$14,900,332
2028	127	$1,350,899	-$380,000	-$13,929,433
2029	140	$1,489,180	-$766,000	-$13,206,253
2030	165	$1,755,105	-$1,280,000	-$12,731,148
2031	150	$1,595,550	-$10,000	-$11,145,598
2032	150	$1,595,550	-$4,950,000	-$14,500,048
2033	208	$2,212,496	-$614,000	-$12,901,552
2034	157	$1,670,009	-$11,515,000	-$22,746,543
2035	175	$1,861,475	-$107,000	-$20,992,068
2036	210	$2,233,770	-$741,000	-$19,499,298
2037	180	$1,914,660	-$265,000	-$17,849,638
2038	195	$2,074,215	$0	-$15,775,423
2039	160	$1,701,920	$0	-$14,073,503
2040	254	$2,701,798	-$90,000	-$11,461,705
2041	219	$2,329,503	$0	-$9,132,202
2042	179	$1,904,023	$0	-$7,228,179
2043	205	$2,180,585	-$275,000	-$5,322,594
2044	255	$2,712,435	$0	-$2,610,159
2045	294	$3,127,278	-$2,621,000	-$2,103,881
2046	263	$2,797,531	-$204,000	$489,650
2047	232	$2,467,784	-$16,818,000	-$13,860,566
2048	285	$3,031,545	-$163,000	-$10,992,021
2049	255	$2,712,435	-$170,000	-$8,449,586
2050	340	$3,616,580	$0	-$4,833,006
2051	315	$3,350,655	$0	-$1,482,351
2052	140	$1,489,180	$0	$6,829

TABLE B.5 Current Capacity of Pump Stations and Rising Mains

Pump Station	Discharge Pipe/Pump Set						Pump Station					Emergency Storage		Capacity		
	Pipe	Velocity (m/s)	Pumped Flowrate (l/s)	Pipe Loss Per Meter	Total Head (m)	Flow ET's	Required Pump Storage Capacity (KL)	Actual Well Size (Kl)	Difference (KL)	Total Retention Time (hrs)	Current Actual Well ET	Emergency Storage Capacity (kL)	Current Storage ET	Capacity (ET) (maximum)	Current ET's	Available ET's
1	100 uPVC PN 12	2.55	20.0	0.051	42.22	591	2.88	1.22	-1.66	0.33	251	4.93	50	50	300	-250
2	150 uPVC PN 12	1.26	20.0	0.01	47.50	591	2.88	4.18	1.30	1.77	857	31.63	324	324	385	-61
	150 AC Class C	1.19		0.0085												
3	80 uPVC PN 12	1.05	5.0	0.0144	19.67	148	0.72	0.89	0.17	1.47	183	8.93	91	91	30	61
4	100 uPVC PN 12	1.15	9.0	0.0122	14.58	266	0.72	0.94	0.22	1.10	193	6.13	3	3	275	-272
5	100 uPVC PN 12	0.89	7.0	0.0078	36.73	207	1.30	1.15	-0.15	3.20	235	27.14	278	207	75	132
6	63 PE80B PN12.5	1.17	2.4	0.029	19.38	71	1.01	0.51	-0.50	0.50	104	3.56	36	36	10	26

TABLE B.6 Staged and Ultimate Capacity of Pump Stations and Rising Mains

Site	ET Capacity	Pump Rate l/s	Operating Storage KL	Emergency Storage KL	RM Size	Head Loss m	Retention Time Hrs
Pump Station 1 Current Infrastructure	300	20	2.88	29.25	100 uPVC PN 12	45.10	0.89
Pump Station 1 Stage 1	590	20	2.88	57.53	100 uPVC PN12	45.10	0.45
Pump Station 1 Stage 2 (jockey pump system)	750	43	6.19	73.13	200 PVC-M	20.10	1.25
Pump Station 1 Stage 3 Remove Jockey Pump	1135	43	6.19	110.66	200 PVC-M	20.10	0.82
Pump Station 1 + 11 Ultimate Stage Stage 4	1585	54	7.78	154.54	200 PVC-M	21.79	0.63
Pump Station 2 First Physical Limitation	324	20	2.88	31.59	150 PVC	47.23	3.06
Pump Station 2 Until Transfer over to #9	622	20	3.04	60.65	150 PVC	61.59	1.61
Pump Station 2 - Ultimate transfer over to #9	540	18.50	2.632	52.65	150 PVC-M	12.87	1.26
Pump Station 3 Construction Camp Added	215	7.28	1.048	20.96	125 Poly	13.09	1.75
Pump Station 3 Construction Camp Added diverted in PS 6	215	8.00	1.048	20.96	125 Poly	23.39	4.66
Pump Station 4 Current Infrastructure	275	9	1.341	26.81	100 uPVC	15.33	1.12
Pump Station 5 reroute Rising Main due to FlyOver Into #2	115	7	1.01	11.21	110 Poly SDR 13.6 PE80	34.06	6.37
Pump Station 5 reroute Rising Main to PS10	115	4	0.58	11.21	90 Poly SDR 13.6 PE80	18.49	0.61
Pump Station 6 Relocation	405	14.0	2.02	39.49	100 PVC-M	18.59	0.38
Pump Station 6 Relocation Divert To PS#9	405	21.0	3.02	39.49	150 PVC-M	43.01	5.35
Pump Station 6 + 3 Divert To PS#9	620	21.0	3.02	60.45	150 PVC-M	43.01	5.35
Pump Station 9 - Stage 1 Divert Flow to Don Cameron Drive	300	10.20	1.46	29.25	100 PVC-M	39.03	1.57
Pump Station 9 - Stage 2 Divert Flow to Tannum Sands (2020) Initial Requirements	1980	68.00	9.65	193.05	225 PVC-M	74.10	15.13
Pump Station 9 - Stage 3 Using 300Ø RM (at 2034) 3 pumps	3690	125.0	17.99	359.78	300 PVC-M	66.05	14.42
Pump Station 9 - Stage 4 Ultimate (END) 3 pumps	6585	223.0	32.102	642.04	225 PVC-M & 300 PVC-M	77.49	8.17
Pump Station 10 Ultimate with 5 pumping in	440	14.900	2.15	42.90	100 PVC-M	23.16	0.94
Pump Station 11 Ultimate Stage	450	16.0	2.30	43.88	100 PVC-M	22.14	0.58

TABLE B.7 Permitted ET Range in Reticulated Mains

Grade (1 : X)	150DIA	225DIA	300DIA	375DIA	450DIA	525DIA	600DIA
1000							3852
900						2727	
730					1922		
570				1271			
420			766				
300							7623
290		458					
200					4015	6404	
150	215						
50	373	1102	2579	5075			

Extract Courtesy Noosa Council - Table 4.5.1 Noosa Council Planning Scheme Policy

TABLE B.8 Minimum ET's Required For Scouring

PIPE DIA (mm)	MINIMUM GRADE (1:X)	MINIMUM DEPTH OF FLOW (mm)	MINIMUM No OF TENEMENTS	MINIMUM PUMPED FLOW - L/S
150	150	25	4	2
225	290	40	170	5
300	420	50	270	8
375	570	70	530	15
450	730	80	690	19
525	900	95	970	27
600	1000	110	1360	36

C Figures

FIGURE C.1 225 NB Pipe Capacity

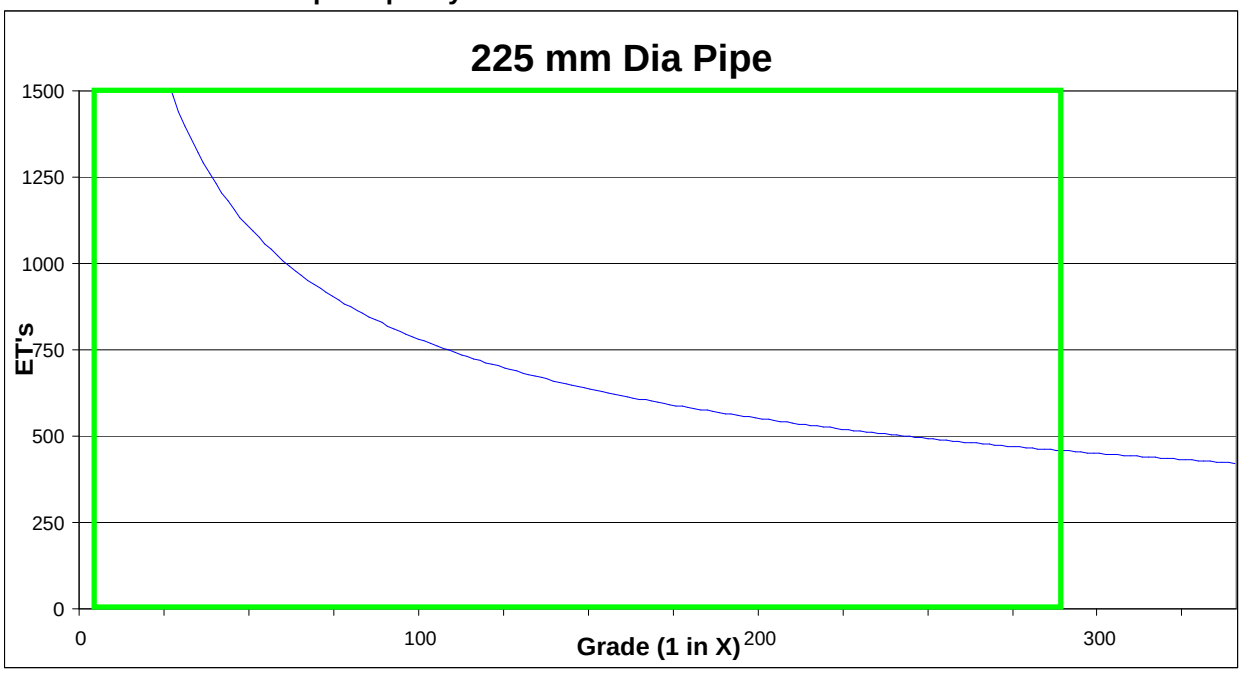


FIGURE C.2 300 NB Pipe Capacity

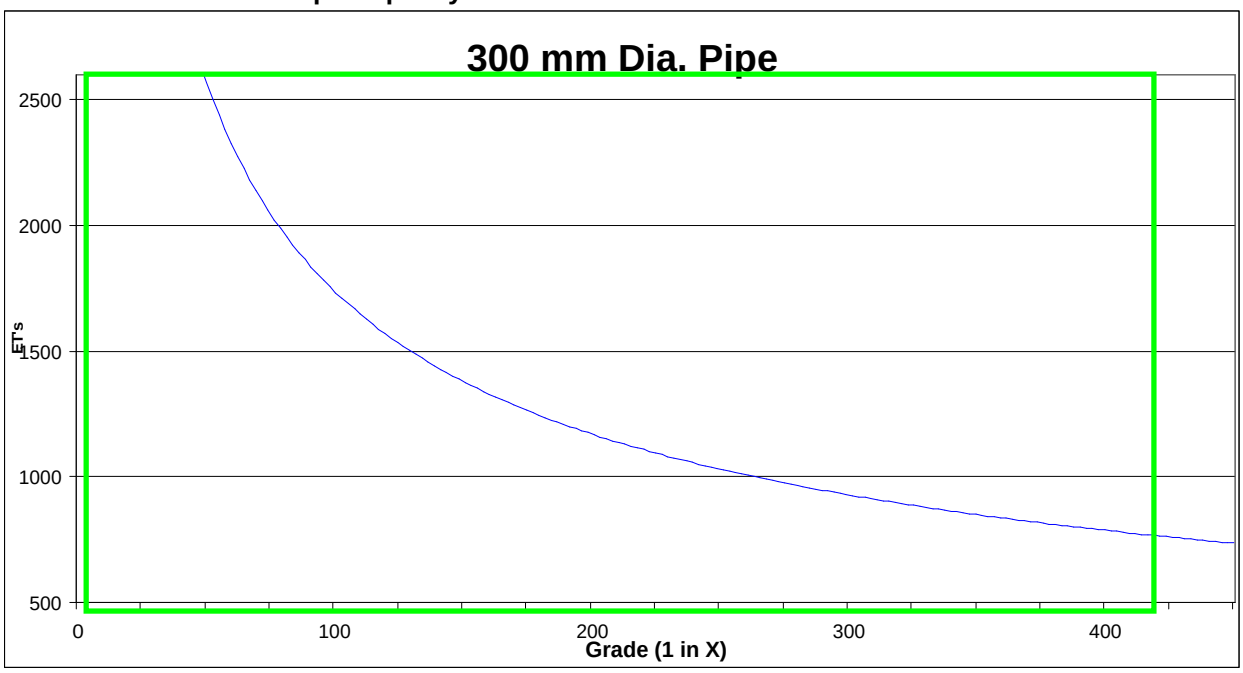


FIGURE C.3 375 NB Pipe Capacity

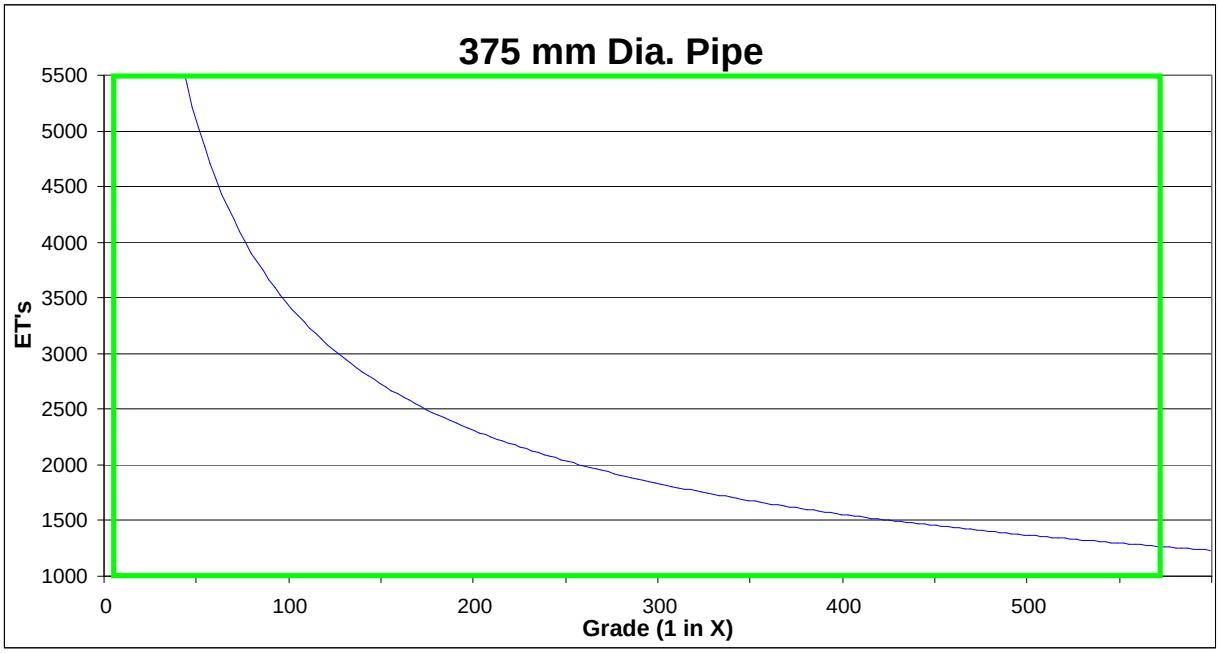


FIGURE C.4 450 NB Pipe Capacity

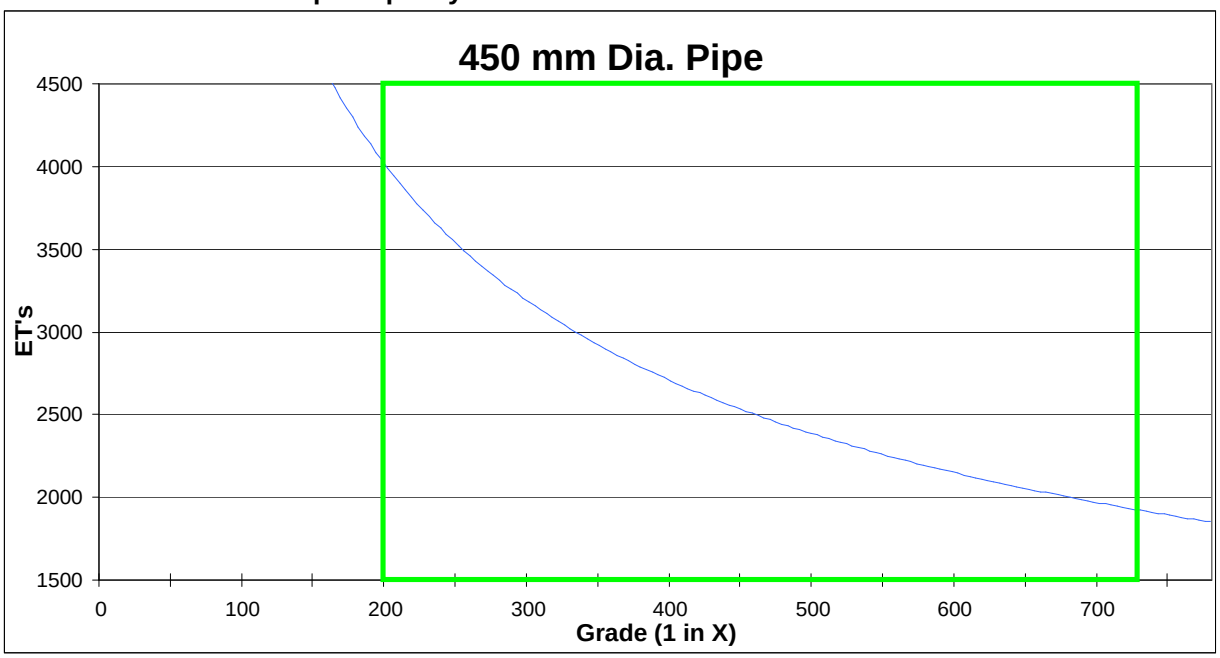


FIGURE C.5 525 NB Pipe Capacity

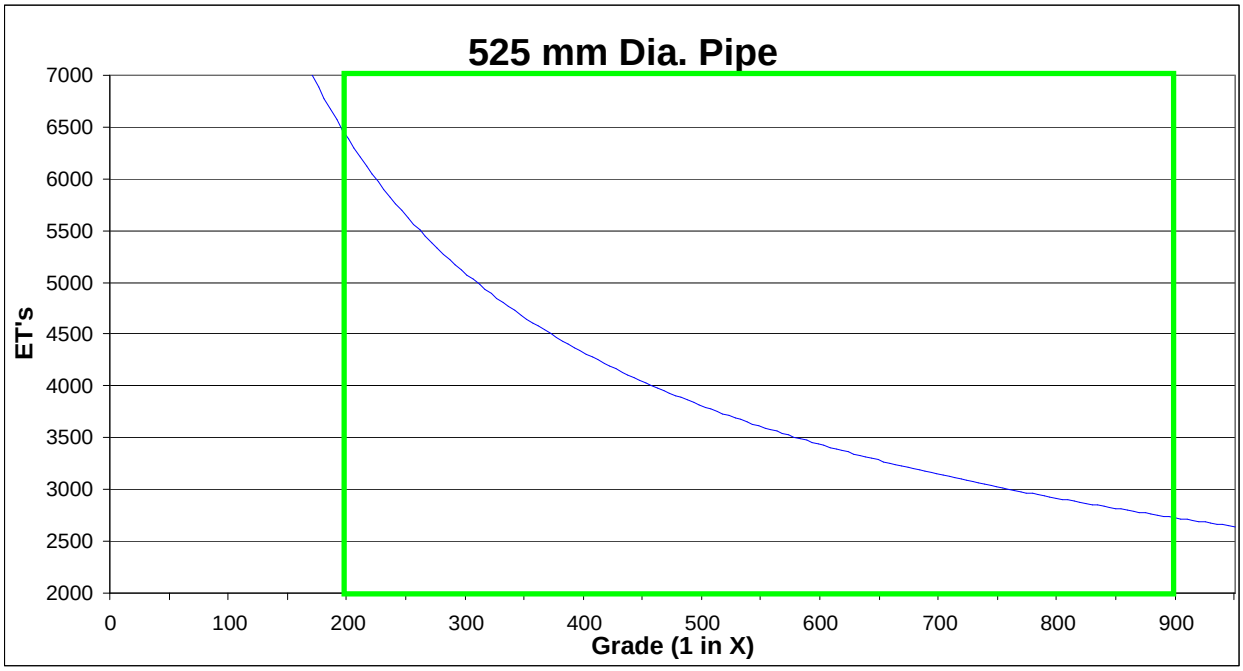
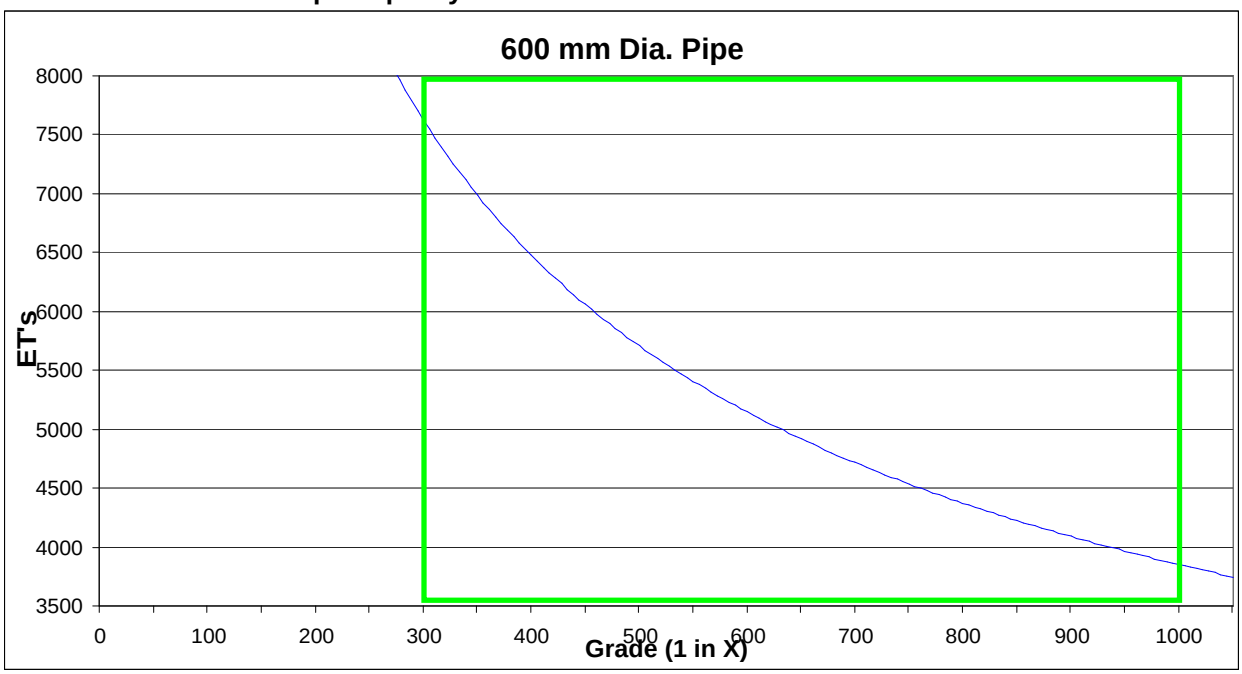


FIGURE C.6 600 NB Pipe Capacity



D Key Terms and Concepts

Current Capacity
Capacity of system based on actual current connections and approved development applications

Development
Any actual or anticipated lot, work or use resulting from 'development' as defined in the Integrated Planning Act 1997 which creates a demand for infrastructure.

DSSA
This is the Declared Sewerage Service Area. This area identifies where residential development (sewerage connections) can occur without the need for any revision to this plan.

Equivalent Person (EP)
Basic unit or units used for determining the change in demand for water or sewerage services as a result of a proposed development. This unit is based on a comparison with the usage of a service by an average occupant of an average residential dwelling.

Equivalent Tenement (ET)
Basic unit used to determine the change in demand for connections. The unit is based on a standard family, comprised of 2.6 EP.

Ultimate Capacity
Current Capacity plus future anticipated development.

Oversizing Payment
A payment which is equivalent to the difference in the installation cost of the council required main and a 225NB main, or a larger main is specifically required for the proposed development. The payment figure will be determined by Council at regular periods.

Infrastructure Contribution
A charge applied to development through the conditions of the development permit for the provision of trunk infrastructure that services, or is planned to service, the development.

Inter Connecting Mains,
These are mains which are required for the development, but will also service a future development. These mains will be required to be extended to the boundary of the development in a location which is easily connected, and provides appropriate potential to develop further properties.

Interim External Works
These are works which are external to the development, however, due to a number of issues including 'leap frog development' will only be temporary in

nature. That is, they will be decommissioned when relevant further development occurs.

Internal Sewer Mains,
These are mains which are utilised only by the development in question, and may include trunk infrastructure.

“Leap Frog” Development
This is development which does not form a continuous development pattern to the collection point.

Planning Assumptions
Those statements within the planning scheme that outline the basis for planning, design and funding the networks of infrastructure that are to serve development undertaken in the community.

Sequential Development
This is development which occurs in a format which ‘radiates’ out from the central collection point (nominally the Pumping Station), in a continuous development pattern.

Trunk Infrastructure
Infrastructure which is part of:

the Sewerage Treatment Facilities,
the Pumping Station Facilities (including Rising Mains), and
sewers which are greater than 225NB, or
downstream of an asset listed above.