BROWN
Smart Consulting

Armstrong Creek West Precinct
Infrastructure Servicing Report

September 2011

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Table of Contents

1 Introduction

About this Report

This infrastructure servicing report addresses the infrastructure and utilities servicing requirements for the Armstrong Creek West Precinct (ACWP).

Trunk infrastructure required to service the ACWP includes:

- stormwater drainage infrastructure comprising main drains, retardation storages, water quality treatment facilities, overland flow paths, etc;
- trunk sewerage infrastructure comprising trunk sewers;
- main supply potable water pipelines;
- trunk recycled water infrastructure;
- electricity and natural gas supply systems; and
- telecommunications.

This report will specifically address:

- availability and capacity of existing infrastructure in ACWP;
- ultimate ACWP infrastructure servicing requirements;
- limitations/constraints to the servicing of staged developments;
- Infrastructure funding accountability; and
- Infrastructure staging.

2 Armstrong Creek Urban Growth Area (ACUGA)

The Armstrong Creek Urban Growth Area (ACUGA) is the largest contiguous growth area in Victoria, consisting of 2,500 hectares of developable land. ACUGA is located to the south of the Geelong-Warnambool railway line between Ghazeepore Road (to the west) and the Barwon River (to the east). At present the Armstrong Creek area is primarily rural in nature.

At full development, Armstrong Creek is expected to accommodate approximately 22,000 new households, or a total population of approximately 54,000 persons.

The area will ultimately be serviced by one Major Activity centre, two Neighbourhood Activity Centres and a number of local centres. ACUGA will have its own education and health facilities, 320 hectares of employment land and significant recreational areas.

In May 2008 the Armstrong Creek Urban Growth Plan – Framework Plan (UGP) was adopted. The UGP seeks to guide the development of Armstrong Creek in a way which meets best practice urban planning principles, including an emphasis on environmental sustainability, water sensitive urban design, social/community needs and provision of a range of residential densities and styles. Refer to Figure 1 below for details.

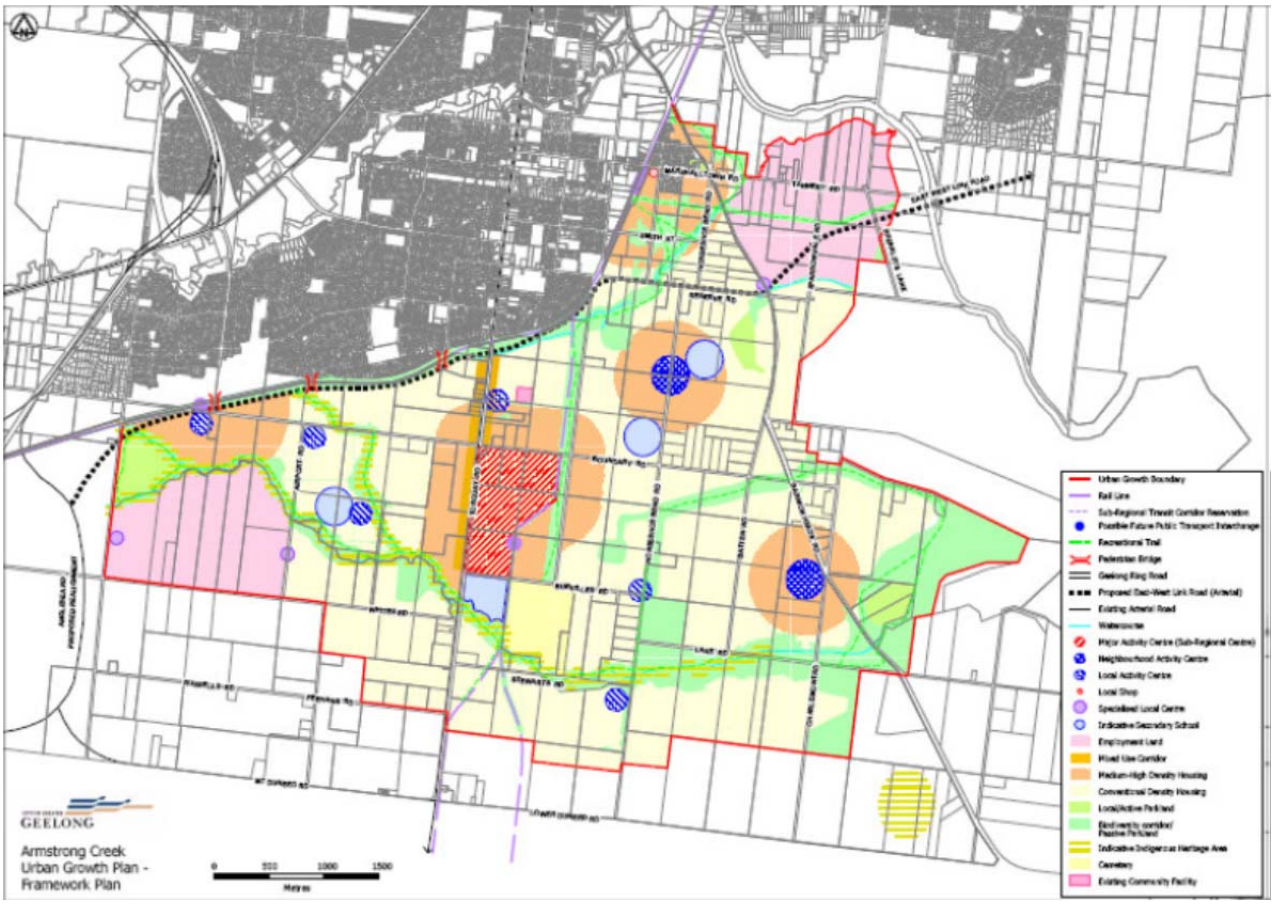


Figure 1 - Armstrong Creek Urban Growth Plan - Framework Plan (refer to Appendix A for enlarged version)

3 Civil Interagency Infrastructure Delivery Plan (CIIDP)

In late 2007 the City of Greater Geelong formed the Interagency Infrastructure Working Group to commence strategic planning for the delivery of essential services and civil infrastructure for ACUGA. The group was made up of:

- Barwon Water (sewer and water);
- City of Greater Geelong (local road and drainage);
- Powercor (electricity);
- SP AusNet (gas);
- Telstra (telecommunications); and
- VicRoads (arterial roads).

The group developed a first principles infrastructure servicing strategy that best meet the constraints of the sites, each organisations economic / funding requirements and the growth areas land use planning objectives. The report titled "Civil Interagency Infrastructure Delivery Plan" was published and released in February 2009.

The CIIDP provides an outline of the baseline concept plans of each of the agencies for the expedited delivery of requisite trunk infrastructure. The agencies also stipulated their preferred baseline sequencing that established a coordinated interagency delivery sequence on a precinct by precinct basis and culminated in the preferred staging sequence as shown in Figure 2 below.

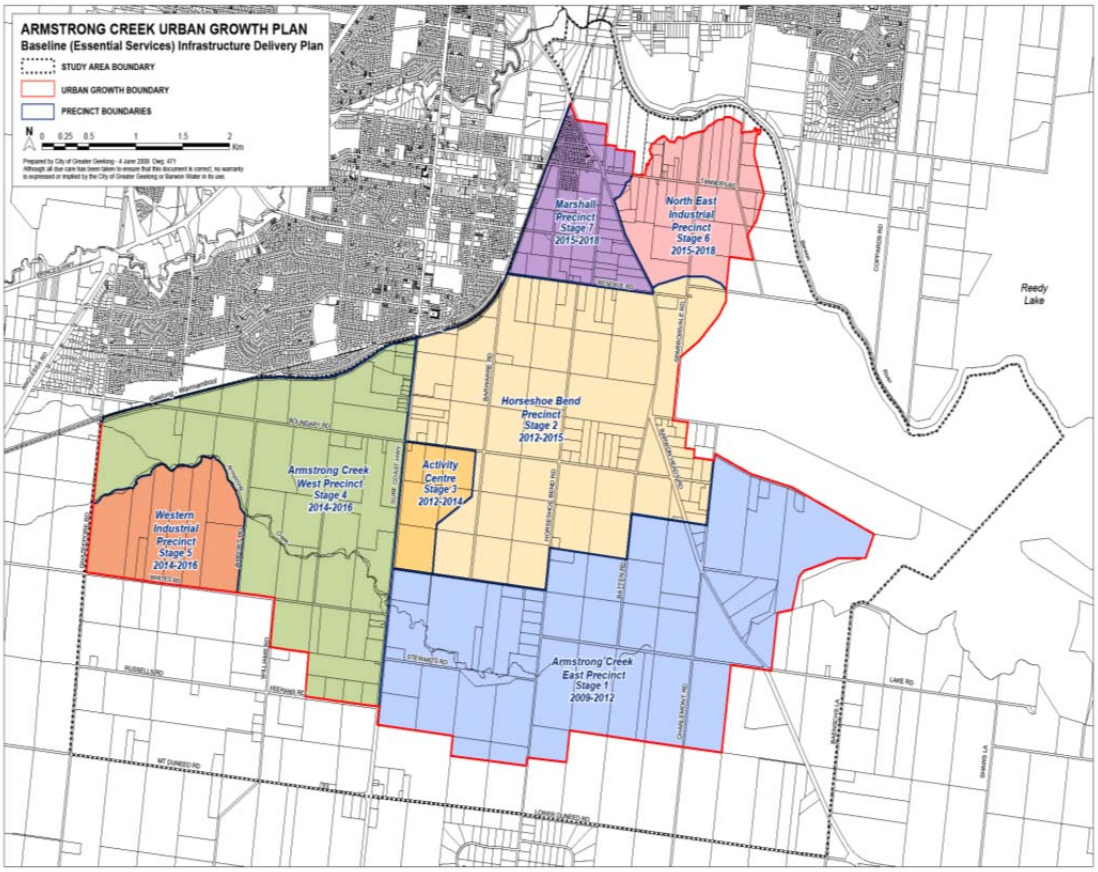


Figure 2 - Armstrong Creek Urban Growth Area (refer to Appendix A for enlarged version)

The Armstrong Creek West Precinct (ACWP) has been designated as Stage 4 of ACUGA.

4 Armstrong Creek West Precinct (ACWP)

ACWP is one of seven precincts within the Framework Plan area. The ACWP is located on the west side of the Surf Coast Highway. The precinct is approximately 559 hectares in area, is bounded by the Surf Coast Highway to the east, the existing Melbourne-Warrnambool railway line to the north, Ghazeepore Road to the west and an irregular boundary to the south comprising the Armstrong Creek, Whites Road and Feehans Road.

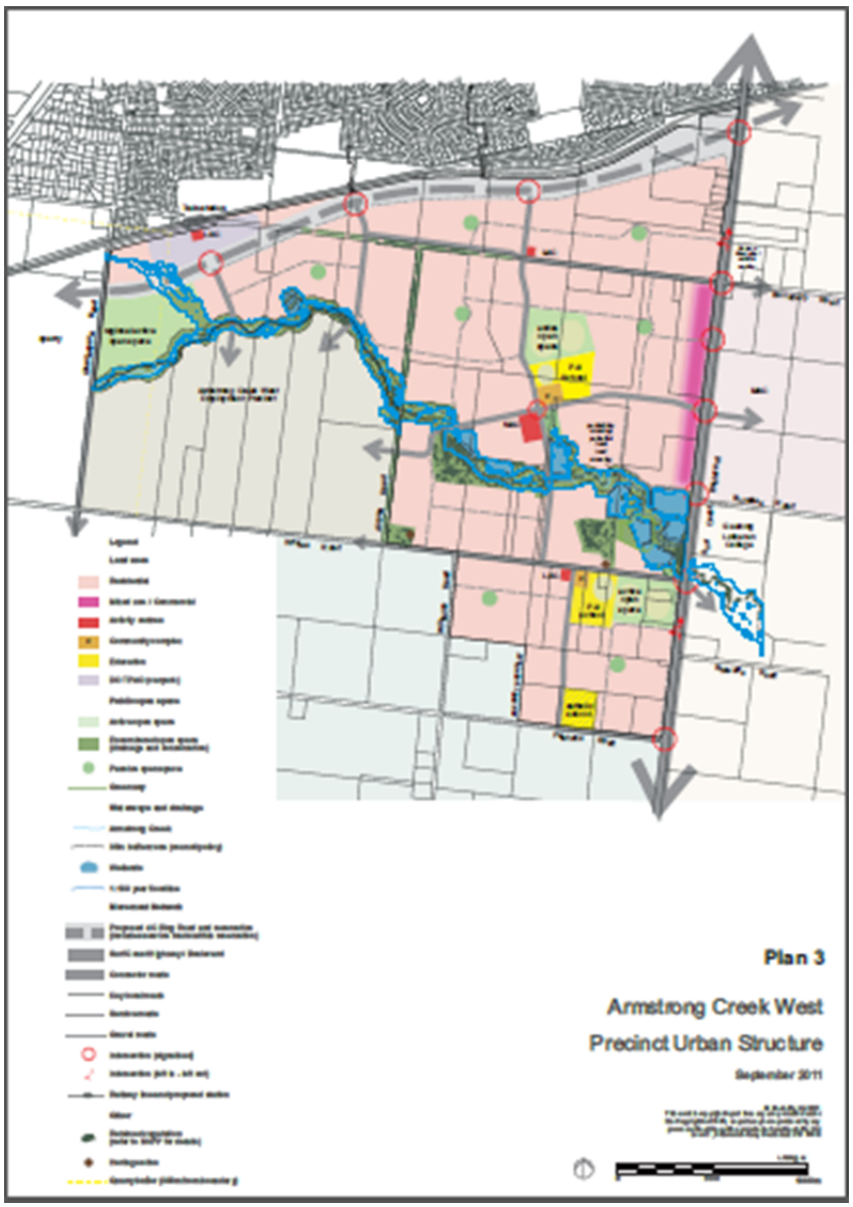
The precinct is located immediately south of the existing suburbs of Grovedale and Waurn Ponds however, is separated by the railway line. The precinct is expected to have a total population of approximately 16,000 persons at full development.

A draft Masterplan has been prepared for this precinct that is predominately residential but also contains a mix of other uses as described below.

Figure 3 - ACWP Masterplan (refer to Appendix A for enlarged version)

Key elements of the Masterplan are:

- Conventional and Medium Density Residential;
- High Density and Mixed Use Precinct;
- Neighbourhood Activity Centre;
- Local Activity Centres;
- Community Facility;
- Educational areas; and
- Open Space and Habitat Zones.



5 Precinct Development Staging

The roll-out of ACWP development infrastructure shall be determined on the basis of the following criteria:

- the most efficient and effective delivery of infrastructure overtime;
- the availability of existing infrastructure to facilitate expedited delivery;
- having due regard to trunk infrastructure construction requirements; and
- physical constraints and opportunities to development planning and delivery.

The development shall initiate from the Armstrong Creek/Surf Coast Highway interface and fan out along the Armstrong Creek corridor.

6 Road Network Overview

6.1 Proposed Road Network

An integrated transport and traffic strategy is proposed for ACUGA incorporating a hierarchy and network of roads, cycle access and pedestrian ways. A road network plan was included in the CIIDP that outlined the primary internal road network and the VicRoads strategy for future arterial roads. The key elements of this plan are outlined as follows:

(a) Arterial Roads

ACUGA will be well serviced by existing and future Arterial Roads. The Arterial Roads proposed for ACUGA are as follows:

- New Geelong Ring Road (Section 4C) providing a link between the Geelong Bypass and the Bellarine Peninsula. Section 4C of the Geelong Ring Road, adjacent to ACWP will be a four lane divided roadway with provision for widening to six lanes. Widening to six lanes has the potential to incorporate two on-road bus lanes. Provision has also been made for on road cycle lanes and provision for pedestrian/shared path on the south side;
- Upgrade of Surf Coast Highway (3 lanes each way with service roads); and
- Upgrade of Barwon Heads Road (2 lanes each way with service roads).

Typical road cross sections for each of the above arterial roads are shown in Appendix B.

(b) Connector Roads

The City of Greater Geelong adopted a road network strategy to interconnect arterial roads with more frequent, narrow, connector roads at 800 metre spacing throughout ACUGA. The connector roads are generally envisaged to comprise of one traffic lane in each direction, with generous footpaths, shared or dedicated cycle paths, and kerbside parking provided on both sides. These collector streets will distribute traffic evenly, avoiding almost entirely the need for major, heavily-trafficked roads which are typically unpleasant and unsafe for pedestrians and cyclists, and create a barrier between development on either side.

These roads would be built by developers as urban development progressed and incorporate the retention of existing road reserve native vegetation as far as it is practically possible, ensure priority movement and access for public transport and provide intersection treatments to prioritise pedestrian and cyclist movements.

The road network shown on the draft PSP for ACWP is based on a grid framework that has been modified to respond to the location of natural and existing site features.

The modified grid-based network is generally in accordance with the key design principles outlined above.

All roads within ACWP are proposed to be connector or lower order roads (excluding Section 4C of the Geelong Ring Road).

(c) Lower Order Roads

Lower order roads will provide access to individual properties and other local roads in its vicinity. Lower order roads will encourage low speed environments, encourage amenity and environmental needs.

(d) Major Intersections

As shown in Figure 3 above ACWP connects to the external road network at seven signalised intersections along the Surf Coast Highway and three signalised intersections along Section 4C of the Geelong Ring Road.

7 Infrastructure Servicing

7.1 Stormwater Drainage

The City of Greater Geelong is the responsible regulatory Authority for the management of stormwater infrastructure to ACUGA and ACWP.

Natural drainage systems exist throughout ACUGA including Armstrong Creek and defined gullies/depressions with overland flow generally directed to the east and Lake Connewarre/Barwon River. The Corangamite Catchment Management Authority (CCMA) is the responsible regulatory Authority for administration of major natural waterways and associated systems including Armstrong Creek.

7.1.1. ACUGA Servicing Strategy

The City of Greater Geelong has developed a stormwater management strategy for Armstrong Creek that utilises an integrated water systems analysis to explore the performance of a range of stormwater management options for ACUGA. The document titled "Armstrong Creek – Stormwater Management Strategy" seeks to recognise the downstream benefits from investment upstream and to encourage developer investment in contemporary sustainable water cycle management design and construction practices, including the use of rainwater tanks and water sensitive urban design.

The stormwater management strategy has been designed to:

- Adopt an integrated approach to stormwater management that meets objectives for hydraulic capacity and water cycle management;
- Minimise the disturbance of waterways created by altered flow regimes and protect natural drainage and aquatic ecosystems;
- Maintain and protect the water quality in receiving waters, the down stream environment and the Ramsar wetlands;
- Enhance the value and public amenity of the existing stream corridors, biodiversity and environment of Armstrong Creek as a key asset of the urban growth area; and
- Provide for public safety.

7.1.2. Existing Assets

Armstrong Creek is deemed a drainage asset but has limitations on its capacity to manage major ARI storm events. There are existing major culverts across the Surf Coast Highway and Ghazeepore Road. Otherwise there are minimal drainage assets in ACWP.

7.1.3. ACWP Servicing Strategy

The ACWP consists of residential and commercial development, and public open space. Development within the precinct will increase the impervious surface.

The "Armstrong Creek West Precinct Structure Plan Flooding Investigations" report prepared by Water Technology in association with Neil Craigie Pty Ltd considers the flood behaviour under the pre and post development catchment conditions for ACWP, and outlines the flood management treatments proposed. The flood management treatments aims to mitigate any adverse impacts on flood behaviour due to the development of ACWP. In particular consideration will be given to maintaining pre-development (existing) peak flows into Armstrong Creek, and in Armstrong Creek at Airport Road and the Surf Coast Highway.

For this precinct, the principal flood management treatment proposed is a number of wetland/retarding basins. A centralised flood management approach has been adopted with proposed wetlands/retarding basins located adjacent to Armstrong Creek. These locations enable the enhancement of the values and the amenity of Armstrong Creek, provides for efficient use of drainage infrastructure, and minimises ongoing maintenance requirements.

The wetland/retarding basin arrangements will be offline with a 20m minimum setback from the Armstrong Creek corridor.

As well as providing flood storage, the wetlands will be designed to meet best practice targets for stormwater treatment, being suspended solid annual load reduction of 80%: total nitrogen annual load reduction of 45% and total phosphorus annual load reduction of 45%.

The conceptual wetland/retarding basin arrangements proposed are consistent with the Urban Growth Plan and the City of Greater Geelong stormwater management strategy.

(a) Major Drainage System

The major system works proposed as part of the stormwater management plan comprises the construction of wetland/retarding basins at the significant sub-catchment outlets to Armstrong Creek. The wetlands/retarding basins will be formed using existing depressions, with excavation and the construction of embankments where required. Wetlands/retarding basins will be sited to minimize vegetation disturbance and to make best use of the terrain as to minimise earthworks.

(b) 100-Year Flood Level/Property Freeboard

Freeboard above the 100-year ARI flood level will comply with City of Greater Geelong requirements. The minimum freeboard standards are:

- Floodplain -Building Floor Level 600mm
  - Building Pad/Platform Level 300mm (ground level around building)
- Overland Flow Path - Building Floor Level 300mm

(c) Minor Drainage System

The minor system drainage system will be designed and installed in accordance with current best practice.

The minor drainage system servicing ACWP will be a piped network typically specific to each sub-precinct interconnected to the major system. Minor drains will generally be provided in accordance with urban design and development staging limitations of the sub-precincts.

Minor drains typically collect runoff from tenements/properties and roadways and convey stormwater discharges to the major systems.

(d) Drainage System Design Standards

The Average Recurrence Intervals (ARI's) to be adopted for ACWP are:

	Minor System	Major System
• Residential	5-year	100-year
• Neighbourhood Shopping Centres (NAC & LAC)	10-year	100-year

(e) Domestic Rainwater Tanks

As a recycled water/third pipe system is proposed for ACWP by Barwon Water the demands for rainwater tank supplies are reduced and although it is still recommended that property owners install rainwater tanks this requirement will not be mandated for ACWP.

7.1.4. Infrastructure Funding Accountability

Provision of major drainage system infrastructure necessary to service planned growth within ACUGA will be funded via development contribution charges. In order for an item or project to be included in a Development Contribution Plan (DCP), it must be demonstrated that the precinct needs the infrastructure and that the project will serve the broader community within the precinct, rather than individual developers/landholders.

For ACWP the DCP will likely include the construction of the linear detention, water quality treatment trains and wetlands between Gazeepore Road and Surf Coast Highway.

7.1.5. ACWP Infrastructure Staging

The construction of major drainage infrastructure within ACWP will be dependent on the overall staging and timing of precinct development. With initial development proposed at the lower reaches of ACWP abutting Surf Coast Highway it would be necessary to implement staged or full construction of required retarding basin(s) in this vicinity to manage the water quality, stormwater volumes and velocities into Armstrong Creek generated by the initial development.

7.2 Sewerage

Barwon Water is the responsible regulatory Authority for the provision of sewerage infrastructure to ACUGA and ACWP.

7.2.1. ACUGA Servicing Strategy

Barwon Water has conducted studies and prepared the "Armstrong Creek Sewer Overview Catchment Servicing Plan" for ACUGA. The plan has identified 13 sewer sub-catchments all of which ultimately connect to the existing outfall sewer, which carries sewage to the Black Rock Water Reclamation Plant.

The sub-catchments are predominately serviced by gravity sewerage systems but four of the smaller sub-catchments located in the Armstrong Creek East Precinct and the North East Industrial Precinct will be pumped back to this outlet.

The Barwon Water report that provides an overview of the ACUGA trunk sewerage strategy is included in Appendix B for information.

7.2.2. Existing Assets

(a) Trunk

There is no existing Barwon Water trunk infrastructure within ACWP.

(b) Reticulation

There are no existing Barwon Water reticulated sewerage infrastructure in ACWP.

7.2.3. ACWP Servicing Strategy

The ACWP will be serviced via a trunk sewer generally following the alignment of Armstrong Creek. This sewer commences at the existing Main Outfall Sewer and extends west towards the Surfcoast Highway through the Armstrong Creek East Precinct. The sewer commences as 900mm diameter and is a 700mm diameter at the Surfcoast Highway.

The existing Main Outfall sewer transports sewage to the Black Rock Water Reclamation Plant for treatment. The sewer is generally on a north/south alignment midway between Batten Road and Charlemont Road and is located centrally within a sixteen (16) metre wide easement that covers its route through the Armstrong Creek East Precinct.

From the Surfcoast Highway, Barwon Water proposes to extend the trunk sewer within ACWP generally along the alignment of Armstrong Creek and associated linear drainage pathway as it represents the lowest level throughout the area enabling smaller subdivisional sewers to be linked to the trunk system at appropriate locations. The sewer will be 700mm diameter at the Surfcoast Highway before dropping to a 375mm diameter as it heads north west along the Creek. Connections will enable other areas to be serviced from the pipeline. Refer to Figure 4 below for details.

7.2.4. Infrastructure Funding Accountability

The Essential Services Commission (ESC) determinations dictate that trunk sewerage assets exceeding DN 225 and servicing multiple developments must be funded by the water agency.

A development with multiple owners and one developer acting on behalf of the owners will generally be considered one development for the purposes of new customer contributions. Should developers wish to develop remote from shared services, in accordance with the Essential Services Commission (ESC) pricing determinations, the application of "bring forward" charges may be required. Bring forward charges relate to the construction of out of sequence shared assets which do not form part of a logical extension to Barwon Water's existing water, sewer and recycled water network. This will need to be further discussed with developers as the Subdivision Plans are prepared for each area.

Beyond the planning phase for the Armstrong Creek West Precinct there will be no sole developer acting for the multiple owners and thus each of the multiple owners would act independently.

7.2.5. ACWP Infrastructure Staging

The trunk sewer adjacent to Armstrong Creek extending west from the existing main outfall sewer to Surf Coast Highway is likely to be completed late 2012 subject to obtaining access to land along Armstrong Creek within reasonable timeframes allowing extension into the ACWP shortly after. Consideration should be given to eduction of sewage as a temporary solution if the trunk sewer is not available at the time of subdivision.

Developer funded connections would be considered to connect to Stage 1 sewerage mains, i.e. the 700mm gravity sewer at the intersection of the Surfcoast Highway and Whites Road, in accordance with Figure 4. Barwon Water will work with developers to find appropriate staging solutions or evaluate appropriate "bring forward" charges to construct assets which meet developers timeframes.

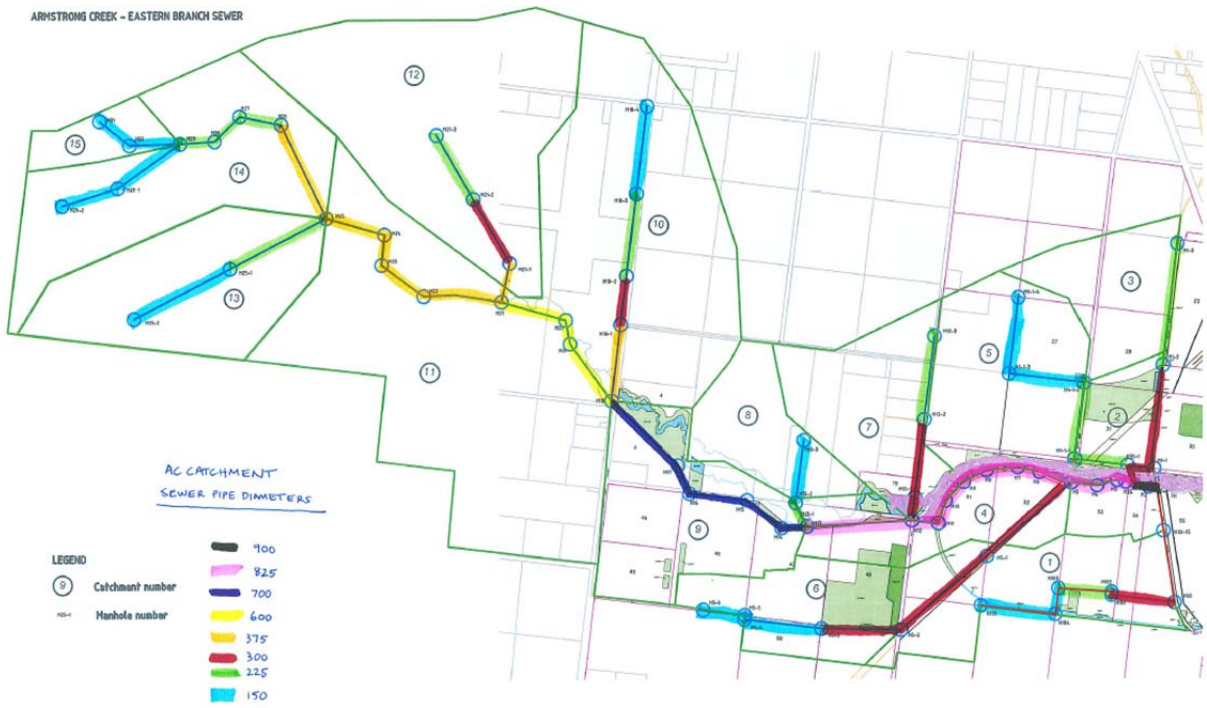


Figure 4 – Armstrong Creek Trunk Sewerage Infrastructure Plan(refer to Appendix A for enlarged version)

7.3 Water Supply

Barwon Water is the responsible regulatory Authority for the provision of potable water infrastructure to ACUGA and ACWP.

7.3.1. ACUGA Servicing Strategy

Barwon Water has conducted studies and prepared the "Armstrong Creek, Water Overview, Zone Servicing Plan" for ACUGA.

The plan proposes a water supply concept design for ACUGA that comprises a supply system supplied from the Pettavel Basin via the Bellarine Transfer Main. There will be three zones; high level, medium level and low level with pressure reducing valves limiting reticulation water pressures to acceptable levels within the respective zones.

The Barwon Water report that provides an overview of the ACUGA water supply strategy is included in Appendix B for information.

7.3.2. Existing Assets

a) Supply Mains

Barwon Water has constructed a new 1200/1050mm water main parallel to its existing 750mm Bellarine Transfer Main along the south of the railway line at the north of the ACWP. This new pipeline runs from Ghazeepore Road to Surfcoast Highway. A new (900mm to 600mm) water main has been extended from the Bellarine Transfer main at Grovedale to the Armstrong Creek East Precinct via Boundary and Charlemont Roads. This main has the ability to service development within the ACWP. Depending upon the rate of growth in Armstrong Creek and the Bellarine Peninsula, additional transfer mains will need to be constructed upstream and downstream of this new pipeline.

b) Reticulation

Existing water reticulation assets comprise minor water mains up to DN 100 servicing rural and rural residential properties in this area.

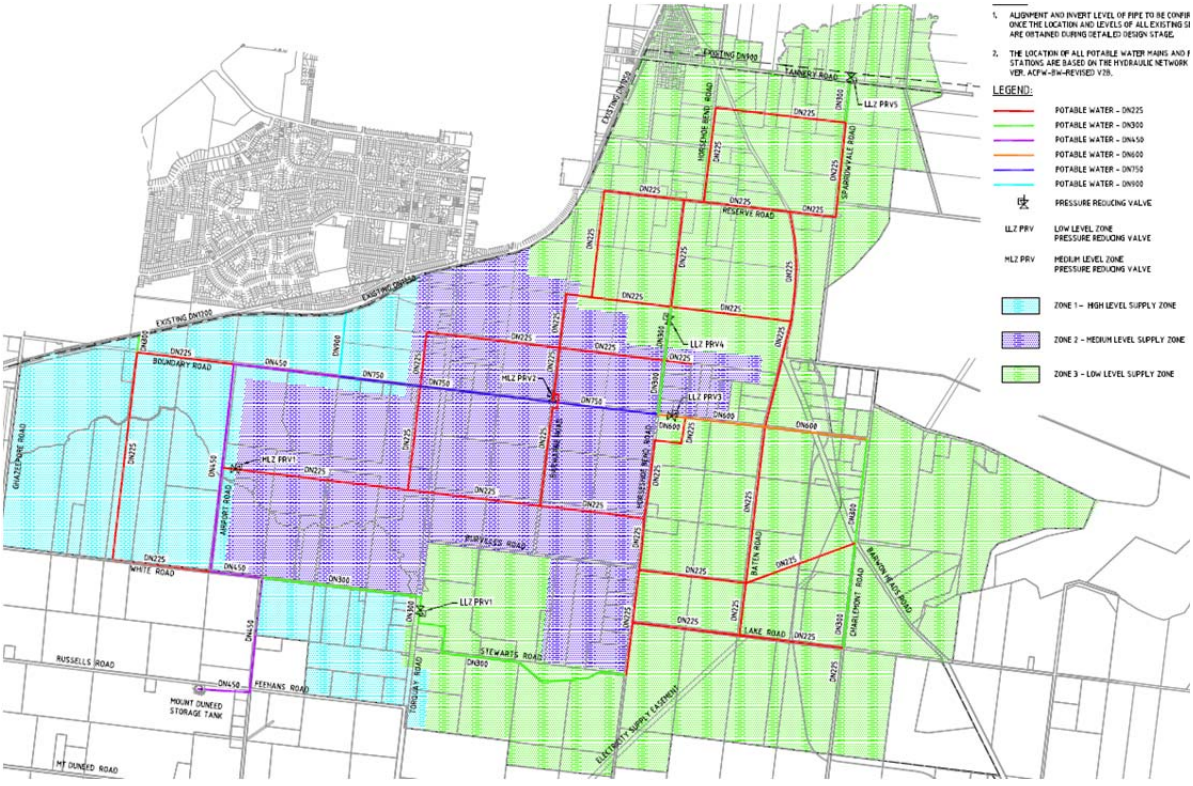


Figure 5 – Armstrong Creek Water Supply Network Plan (refer to Appendix A for enlarged version)

7.3.3. ACWP Servicing Strategy

Barwon Water has constructed a new 1200/1050mm water main parallel to its existing 750mm Bellarine Transfer Main along the south of the railway line at the north of the ACWP. This new pipeline runs from Ghazeepore Road to Surfcoast Highway. A new (900mm to 600mm) water main has been extended from the Bellarine Transfer main at Grovedale to the Armstrong Creek East Precinct via Boundary and Charlemont Roads. This main has the ability to service development within the ACWP. Depending upon the rate of growth in Armstrong Creek and the Bellarine Peninsula, additional transfer mains will need to be constructed upstream and downstream of this new pipeline.

Further connectivity to ACWP will be provided along major internal roads with a main supply network comprising DN 450, DN375 and DN 300 pipelines.

As part of the overall potable water supply system for the Armstrong Creek area, five Pressure Reducing Stations are designated to be located within ACWP. These stations are to be located in either municipal reserves with an appropriately sized easement or within dedicated reserves. The size of the easement or dedicated reserve will be determined on a case by case basis having regard for operational requirements of the facility. Site fencing for security purposes will be required around these stations.

The indicative ACWP network of main supply pipelines is shown in Figure 5 above.

7.3.4. Infrastructure Funding Accountability

The Essential Services Commission (ESC) determinations dictate that potable water supply assets exceeding DN 150 and servicing more than one discrete development is regarded as shared assets and as such will be subject to reimbursement by the water agency.

A development with multiple owners and one developer acting on behalf of the owners will generally be considered one development for the purposes of new customer contributions. Should developers wish to develop remote from shared services, in accordance with the Essential Services Commission (ESC) pricing determinations, the application of "Bring Forward" charges may be required. Bring Forward charges relate to the construction of out of sequence shared assets which do not form part of a logical extension to Barwon Water's existing water, sewer and recycled water network. This will need to be further discussed with developers as the Subdivision Plans are prepared for each area.

Beyond the planning phase for the Armstrong Creek West Precinct there will be no sole developer acting for the multiple owners and thus each of the multiple owners would act independently.

7.3.5. ACWP Infrastructure Staging

Construction works have recently been completed on the feeder main along Boundary Road which will supply water to ACUGA and ACWP.

Developer funded connections would be considered to connect to Stage 1 water mains, i.e. the 900/700mm water main in Boundary Road or the 300mm water main in Whites Road , in accordance with Figure 4. Barwon Water will work with developers to find appropriate staging solutions or evaluate appropriate "bring forward" charges to construct assets which meet developers timeframes.

7.4 Recycled Water

Barwon Water is the responsible regulatory Authority for the provision of recycled water infrastructure to ACUGA and ACWP.

7.4.1. ACUGA Servicing Strategy

Barwon Water proposes to construct a wastewater treatment plant at the Black Rock Water Recycling Plant capable of producing both Class A and Class C recycled water. Construction of the Black Rock Recycled Water Plant is expected to be completed in 2013.

Class A recycled water will be pumped from the proposed Black Rock water reclamation facility via an 10 kilometre pressure main to a header tank to be located in Russells Road, Mt. Duneed.

Class A water will be reticulated to households and commercial users via a third pipe distribution network throughout ACUGA. A preliminary network of trunk infrastructure has been assessed by computer simulated network analysis with pipe sizes for transfer and distribution mains ranging from DN 1050 to DN 300.

There will be three zones; high level, medium level and low level with pressure reducing valves limiting recycled water pressures to acceptable levels within the respective zones.

7.4.2. Existing Assets

There is no existing recycled water/third pipe network in ACUGA.

7.4.3. ACWP Servicing Strategy

The main supply of recycled water to ACWP will be via a proposed water storage tank facility to be located in Russells Road, Mt Duneed. Supply from this facility is proposed via feeder mains ranging from DN 750 to DN 1050 in the southern portion of the precinct. The feeder mains will gradually downsize as the system develops further north and west with the natural progression of development. The indicative ACWP recycled water trunk infrastructure network is shown in Figure 6 below.

7.4.4. Infrastructure Funding Accountability

The Essential Services Commission (ESC) determinations dictate that trunk recycled water assets exceeding DN 150 and servicing multiple developments must be funded by the water agency.

A development with multiple owners and one developer acting on behalf of the owners will generally be considered one development for the purposes of new customer contributions. Should developers wish to develop remote from shared services, in accordance with the Essential Services Commission (ESC) pricing determinations, the application of "Bring Forward" charges may be required. Bring Forward charges relate to the construction of out of sequence shared assets which do not form part of a logical extension to Barwon Water's existing water, sewer and recycled water network. This will need to be further discussed with developers as the Subdivision Plans are prepared for each area.

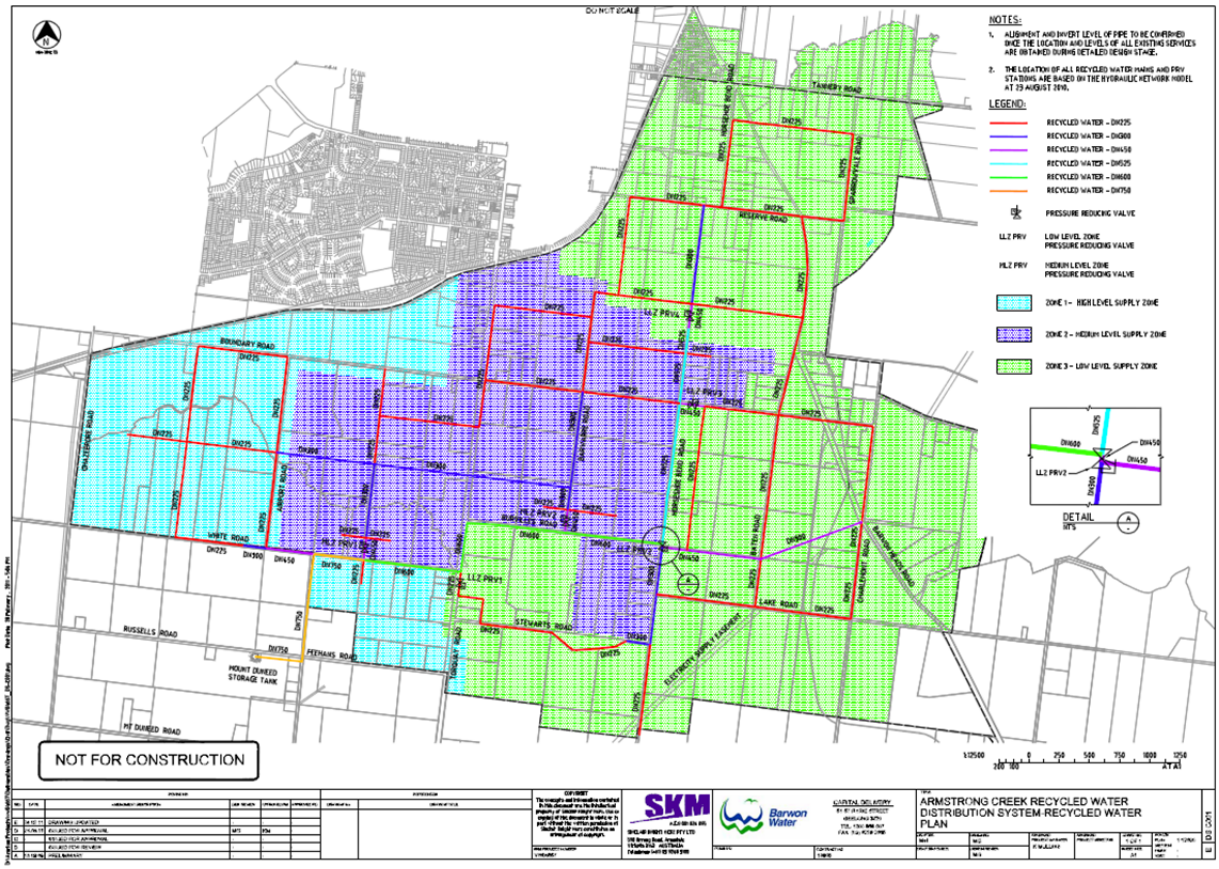
Beyond the planning phase for the Armstrong Creek West Precinct there will be no sole developer acting for the multiple owners and thus each of the multiple owners would act independently.

7.4.5. ACWP Infrastructure Staging

Developers will be required to install a reticulated third pipe system as part of staged subdivisional works regardless if the trunk infrastructure has not been installed. In the interim , the third pipe system will be supplied with potable water via cross connections into the potable water mains.

Recycled water feeder mains along Williams Road and Whites Road are likely to be completed in 2013.

Developer funded connections would be considered to connect to Stage 1 recycled water mains i.e. the 600/750mm recycled water main in Whites Road, in accordance with Figure 6. Barwon water will work with developers to find



appropriate staging solutions or evaluate appropriate "bring forward" charges to construct assets which meet developer time frames.

Figure 6 - Armstrong Creek Recycled Water Infrastructure Plan(refer to Appendix A for enlarged version)

7.5 Power Supply - Domestic

Powercor is the responsible regulatory Agency for the provision of electrical power supply to ACUGA and ACWP.

7.5.1. ACUGA Servicing Strategy

Powercor has a number of feeder lines passing through ACUGA and an ongoing 10 year plan to upgrade its network to meet the expected load growth and to improve reliability throughout the Region. It is, therefore, well positioned to be able to service the entire urban growth area of Armstrong Creek from 2013 when additional capacity will be provided in the feeder lines with the establishment of the new Torquay Zone Substation for Torquay/Jan Juc and a local substation within the Urban Growth Area. In the interim Powercor is able to service development of the Armstrong creek West Precinct and/or along the Surf Coast Highway.

All new underground electrical infrastructure will be located within existing and proposed road reservations and include appropriately sized and located kiosk substation reserves. Underground power supply distribution networks will be installed in shared trenches with telecommunications assets.

7.5.2. Existing Assets

Existing power supply assets servicing ACUGA comprise interconnected feeder mains, two from the Waurn Ponds Zone Substation and one from the Geelong East Zone Substation.

Existing 22kV feeder lines from the Waurn Ponds Zone Substation run along Boundary Road, Ghazeepore Road, Whites Road and the Surf Coast Highway. These assets have the capacity to service initial developments in the south eastern portion of ACWP. Existing overhead power supply assets throughout ACWP are shown below in Figure 7.

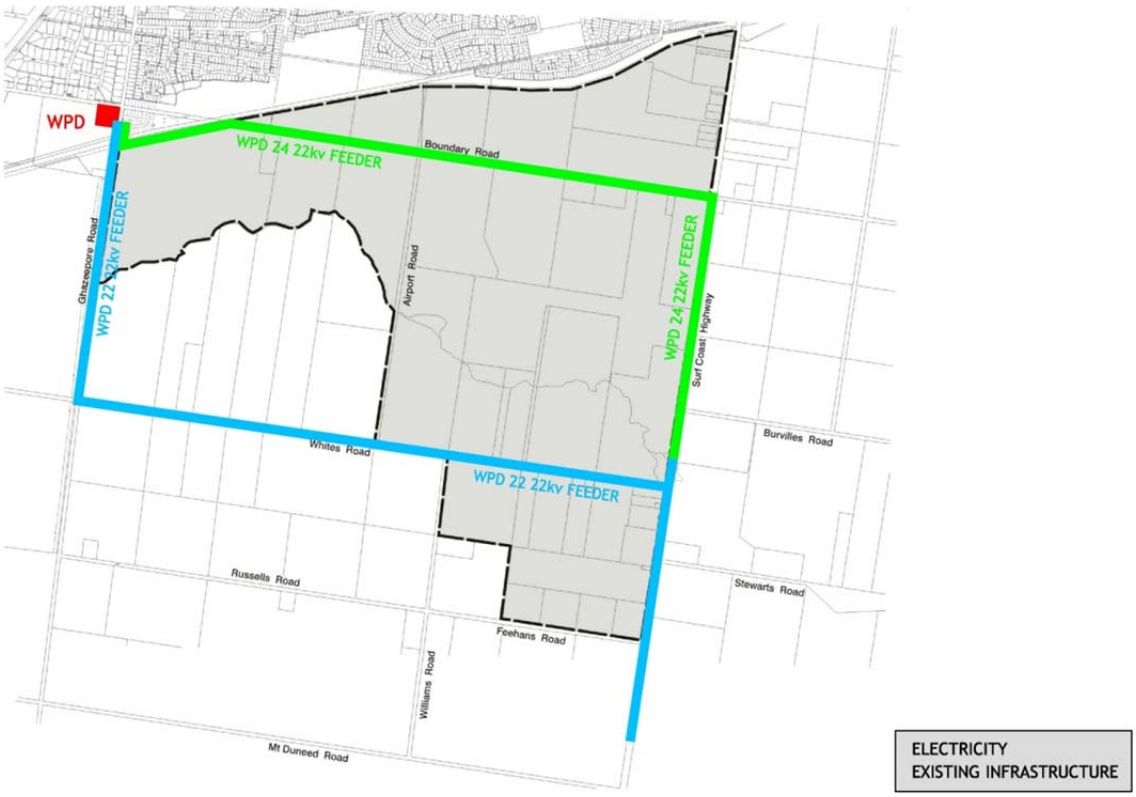


Figure 7 - ACWP Electricity Transmission Asset Plan

7.5.3. ACWP Servicing Strategy

Powercor has advised and/or confirmed that for ACWP:

- there are no future plans to re-route the existing 22kV feeder mains or to reconfigure to an underground supply. Any proposal to reconfigure these assets to an underground supply would be subject to negotiation of a suitable funding arrangement to cover the cost of such works.

- all new electrical infrastructure will be provided via an underground network located within existing and proposed road reservations and include appropriately sized and located kiosk substation reserves.

- recent upgraded transformer capacity works have been undertaken at the Waurn Ponds Zone Substation in order to adequately service the initial demands of the ACUGA.

- from 2012 onwards, Powercor has planned infrastructure projects in order to provide services to the anticipated continually developing precincts within ACUGA.

- Developments can be provided with supply from the network under the usual supply contract conditions and normal cost benefit calculations will apply whereby Powercor will provide rebates towards both high voltage and low voltage infrastructure under current policy.

7.5.4. Infrastructure Funding Accountability

Existing network upgrade works under its 10-year upgrade plan will be funded by Powercor. Should progressive urban development in ACUGA exceed load growth of the Powercor upgrade program then out of sequence works may be required potentially triggering the abovementioned "bought forward" costs scenario that will be a charge to developers. The possibility of this scenario occurring cannot be predicted at this stage.

All underground electricity networks installed as part of the urban development process will be developer funded with Powercor providing rebates to the developer for low voltage and high voltage infrastructure installed.

7.5.5. ACWP Infrastructure Staging

As outlined above the recent upgrade of transformer capacity works at the Waurn Ponds Zone Substation will service the initial demands of the ACWP. From 2012 onwards, Powercor has projects planned to augment its infrastructure to keep pace with the continually developing precincts within ACUGA.

7.7 Natural Gas

SP AusNet is the responsible regulatory Agency for the provision of natural gas to ACUGA and ACWP.

7.7.1. ACUGA Servicing Strategy

Existing DN 160 HP (High Pressure) transmission pipelines are the only SP AusNet assets in ACUGA and these mains are located along Ghazeepore Road and Mt. Duneed/Lower Duneed Roads.

The SP AusNet gas supply strategy for ACUGA proposes a grid of DN 150 HP mains distributing supply to the overall reticulation network. Interconnection with the existing transmission system will be made at Horseshoe Bend Road in the south and Ghazeepore Road in the west.

The SP AusNet supply strategy for the ACUGA is outlined in the gas infrastructure plan included in Appendix B. The indicative ACWP natural gas supply network is shown in Figure 8 below.

7.7.2. ACWP Servicing Strategy

Supply options for the initial development of ACWP is limited. The existing DN 160 HP transmission pipeline in Ghazeepore Road and Mt. Duneed/Lower Duneed Roads are primarily for supply to users east and south of ACUGA. SP Ausnet have indicated limited supply of approximately 600 lots can be taken from the Mt. Duneed Road main after the installation of a field regulator near the corner of Lower Duneed Road and Horeshoe Bend Road. Due to the location of the proposed field regulator and the timing of Armstrong Creek East Precinct development, very limited if any capacity to service ACWP is anticipated.

Supply of gas to ACWP in a totally developed form is reliant upon the installation of a second field regulator in the vicinity of Ghazeepore Road and the Geelong-Warnambool railway line from which larger feeder mains, generally DN 160, will be taken into the precinct to allow off-takes into various developments where sizes will generally be DN100, DN63 or DN40.

7.7.3. Infrastructure Funding Accountability

The scope and associated cost for supply of natural gas supply will be assessed in accordance with SP AusNet's new estate policy and any shortfall will be funded by the developer.

For out of sequence works SP AusNet may seek cost sharing arrangements from the developer.

SP AusNet has advised that this matter cannot be assessed until specific development details are provided. A business case can then be prepared (by SP AusNet) to determine the level of developer contribution if warranted.

7.7.4. ACEP Infrastructure Staging

The SP AusNet gas supply strategy includes a sequence schedule for provision of gas infrastructure staged over a 10-year period.

7.8 Telecommunications

Under the current proposed National Broadband Network rollout system, developments coming on line from January 2011 will be serviced via a fibre network.

From 1 January 2011 NBN Co Limited will be the wholesale provider of last resort in new developments within or adjacent to its long term fibre footprint. Telstra will not have infrastructure responsibilities but will be a retail provider of last resort.

NBN Co. may use whatever operational arrangements it chooses to service new developments, including sub-contracting and build-operate-transfer arrangements. NBN Co. will use such arrangements to make infrastructure available in a timeframe which will enable occupiers of lots to access fibre-based voice telephony and other services.

NBN Co. will establish a panel of appropriately qualified and experienced providers who can bid to install fibre on its behalf.

7.8.1. ACUGA Servicing Strategy

Under the CIIDP, Armstrong Creek is planned to be a smart community with the highest level of "future proofed" telecommunications serviced with optic fibre to all premises.

Telstra was a member of the IIWG and conducted assessments for the provision of telecommunications infrastructure to ACUGA. Telstra at that time stated that it is able to service Armstrong Creek with optic fibre but works will require upgraded facilities and placement of cables in shared trenches with electricity assets.

7.8.2. Existing Assets

Telecommunications infrastructure servicing Armstrong Creek is limited and not suitable for the future demands of ACUGA.

7.8.3. Infrastructure Funding Accountability

From 1 January 2011, developers will be expected to ensure that pit and pipe, including trenching, design and third party certification for development approval purposes are installed and are fibre-ready, to NBN Co's specifications. Developers will meet the cost of pit and pipe.

NBN Co in accordance with the government commitment to the rollout of the fibre network will be responsible for costs associated with supply and installation of the fibre network within the developer provided pit and pipe structural network.

7.8.4. ACWP Servicing Strategy

Major upgrades to infrastructure in order to provide a sufficient service to the general Armstrong Creek area will be the responsibility of NBN Co.

The existing Grovedale exchange has been identified as a suitable site to incorporate the necessary fibre network infrastructure based on sufficient space and power being available at this facility.

Ongoing government debate and negotiations are continuing and constant monitoring of this process and its outcomes will determine the eventual roll-out timing for a fibre network.

8 Conclusion

All of the responsible authorities/agencies have investigated their general infrastructure requirements for provision of service infrastructure to ACUGA.

Design and documentation of major trunk infrastructure and utility services are at an advanced state that will enable delivery of such service to ACWP.

There are deemed to be no major limitations or obstacles to the timely delivery of trunk infrastructure to service the initial stages of ACWP development.

Appendix A - Report Figures

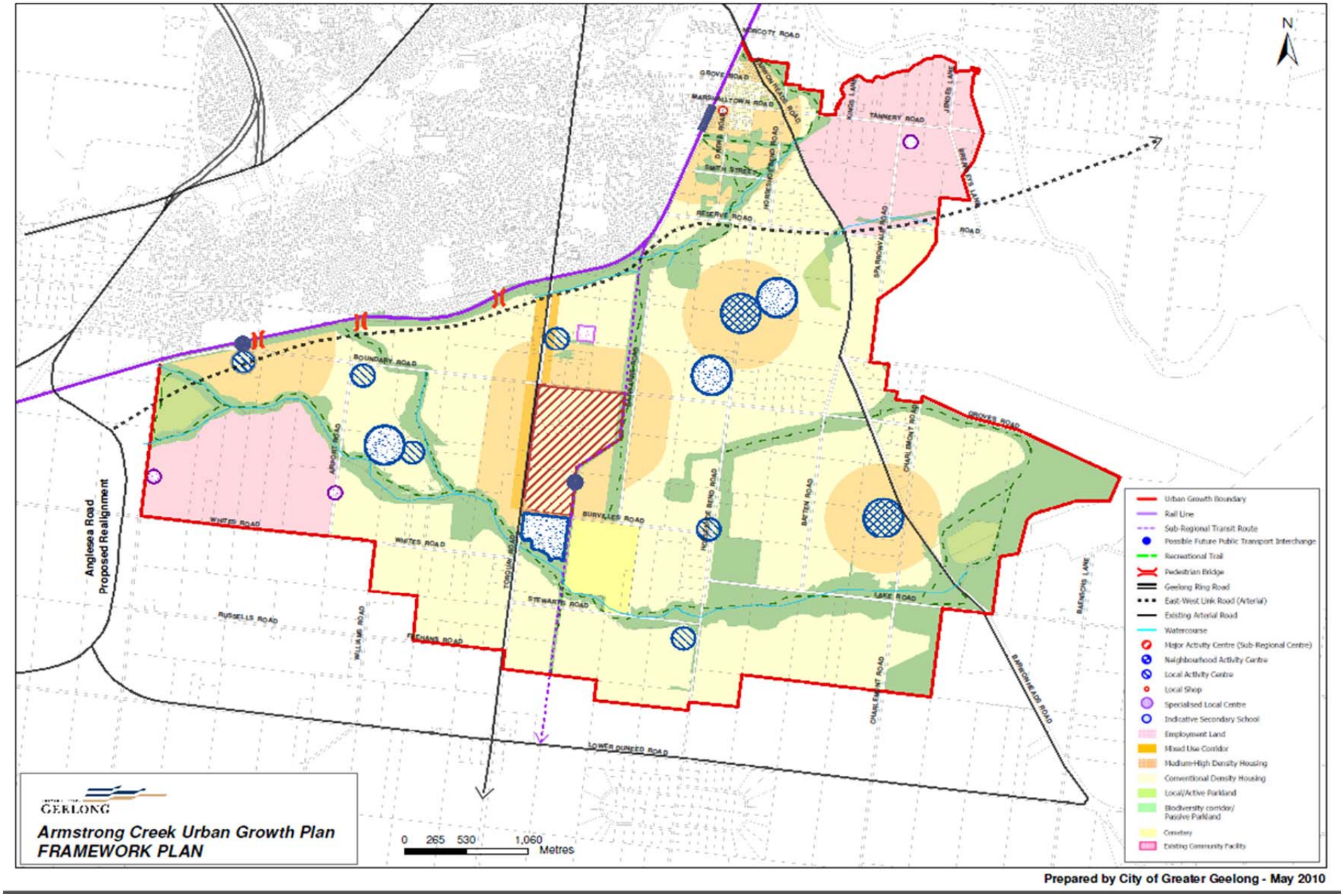


Figure 1 – Armstrong Creek Framework Plan

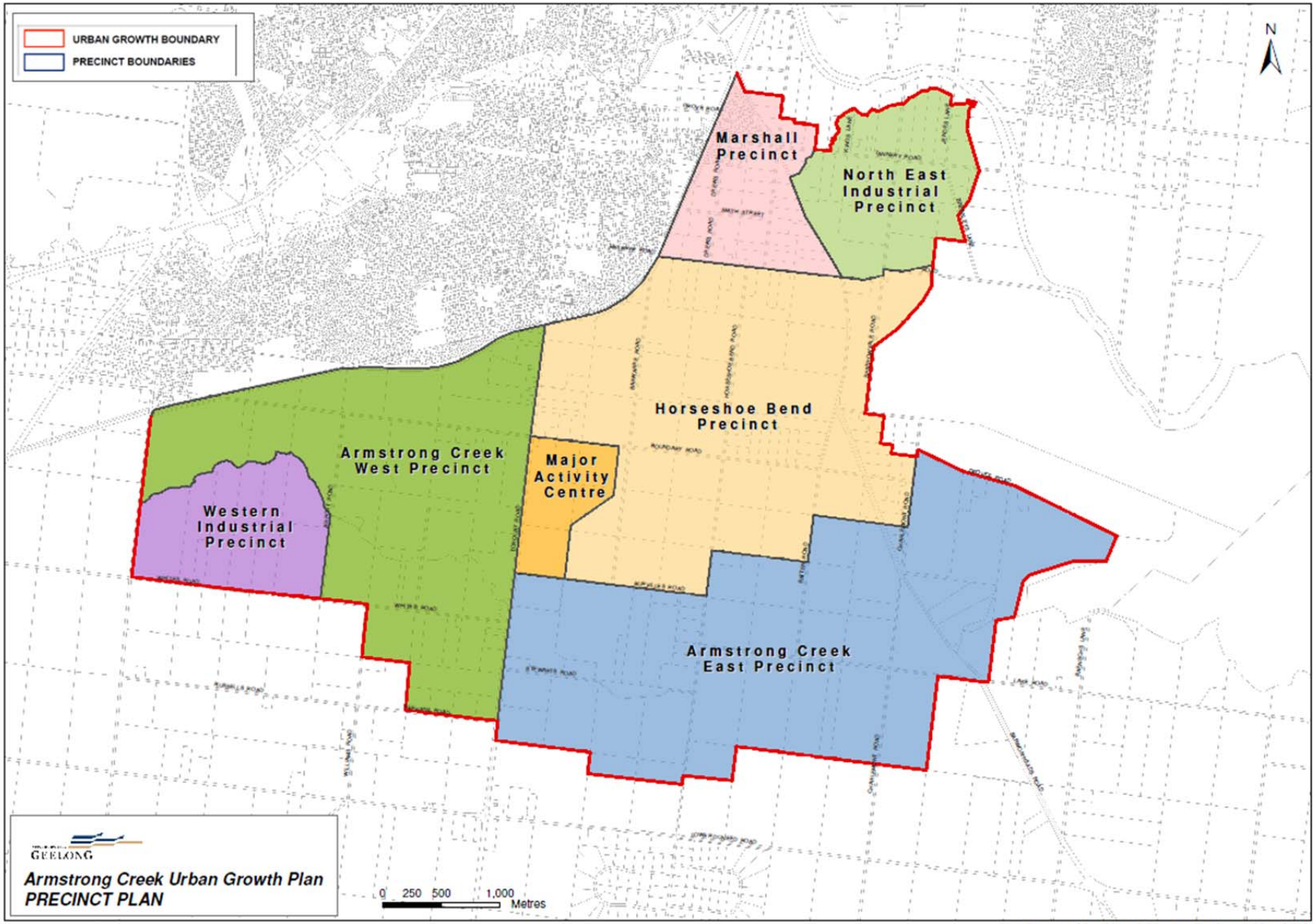


Figure 2 – Armstrong Creek Precinct Plan

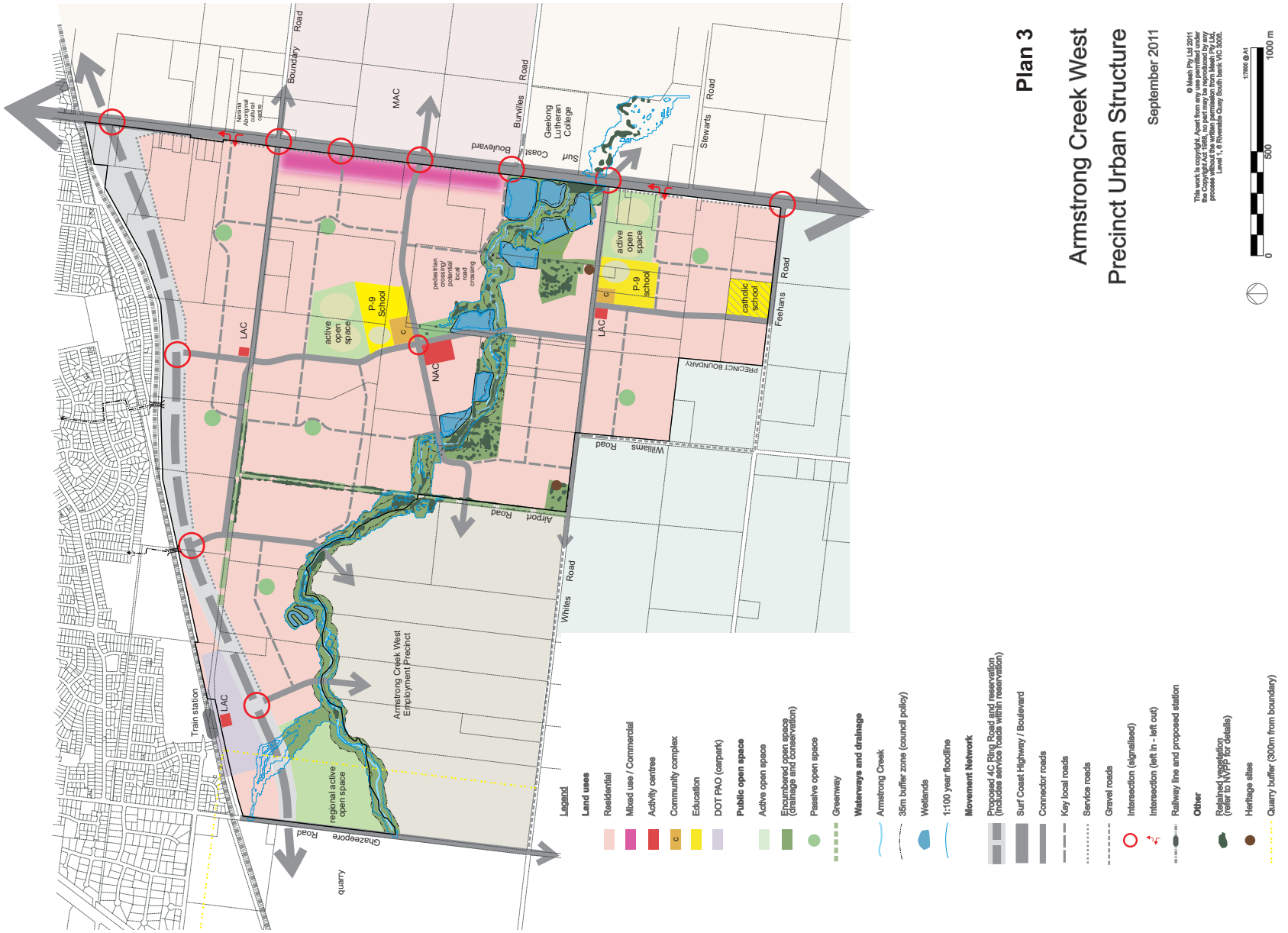


Figure 3 – Armstrong Creek West Precinct Masterplan

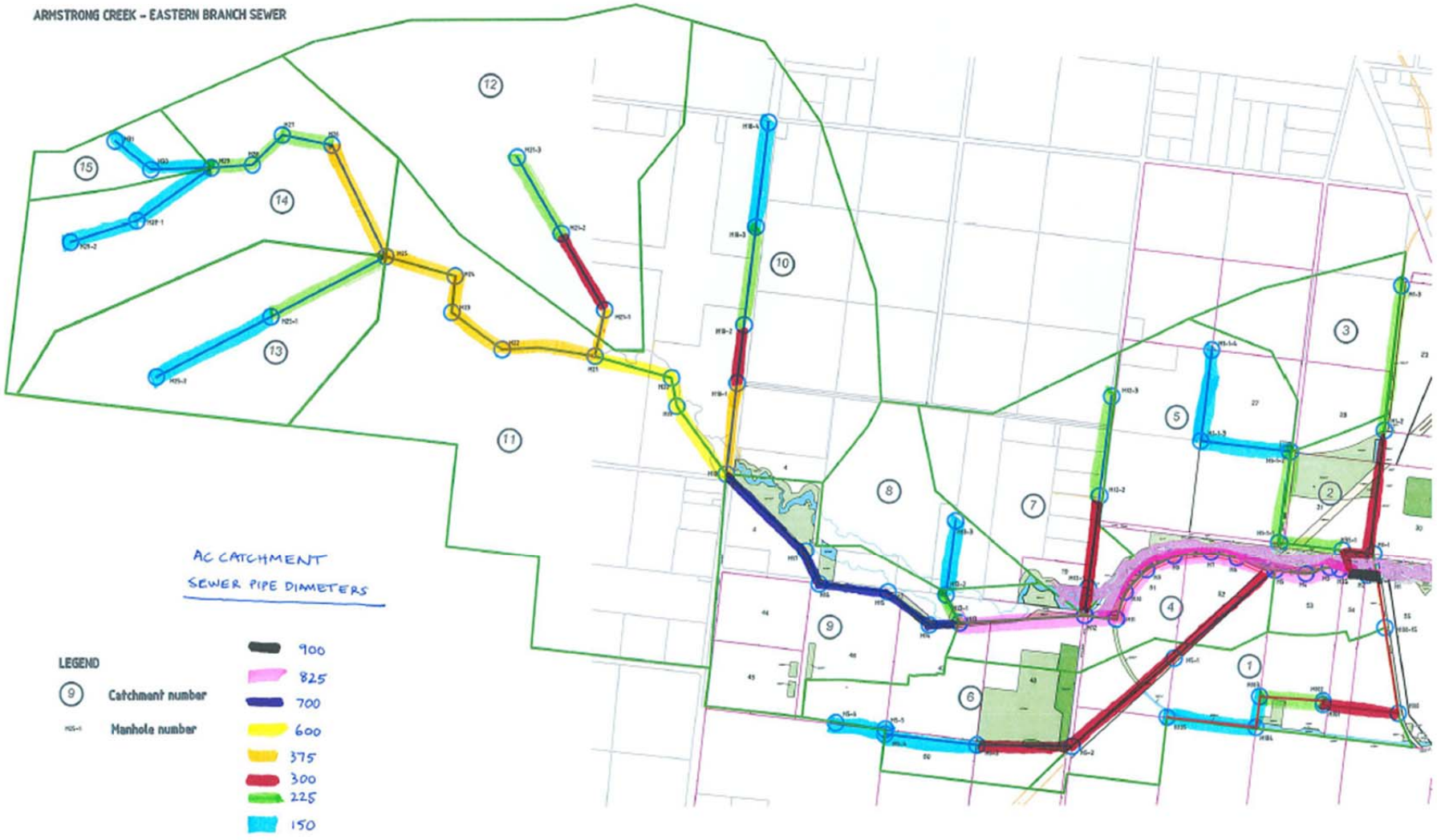


Figure 4 – Armstrong Creek Trunk Sewerage Infrastructure Plan

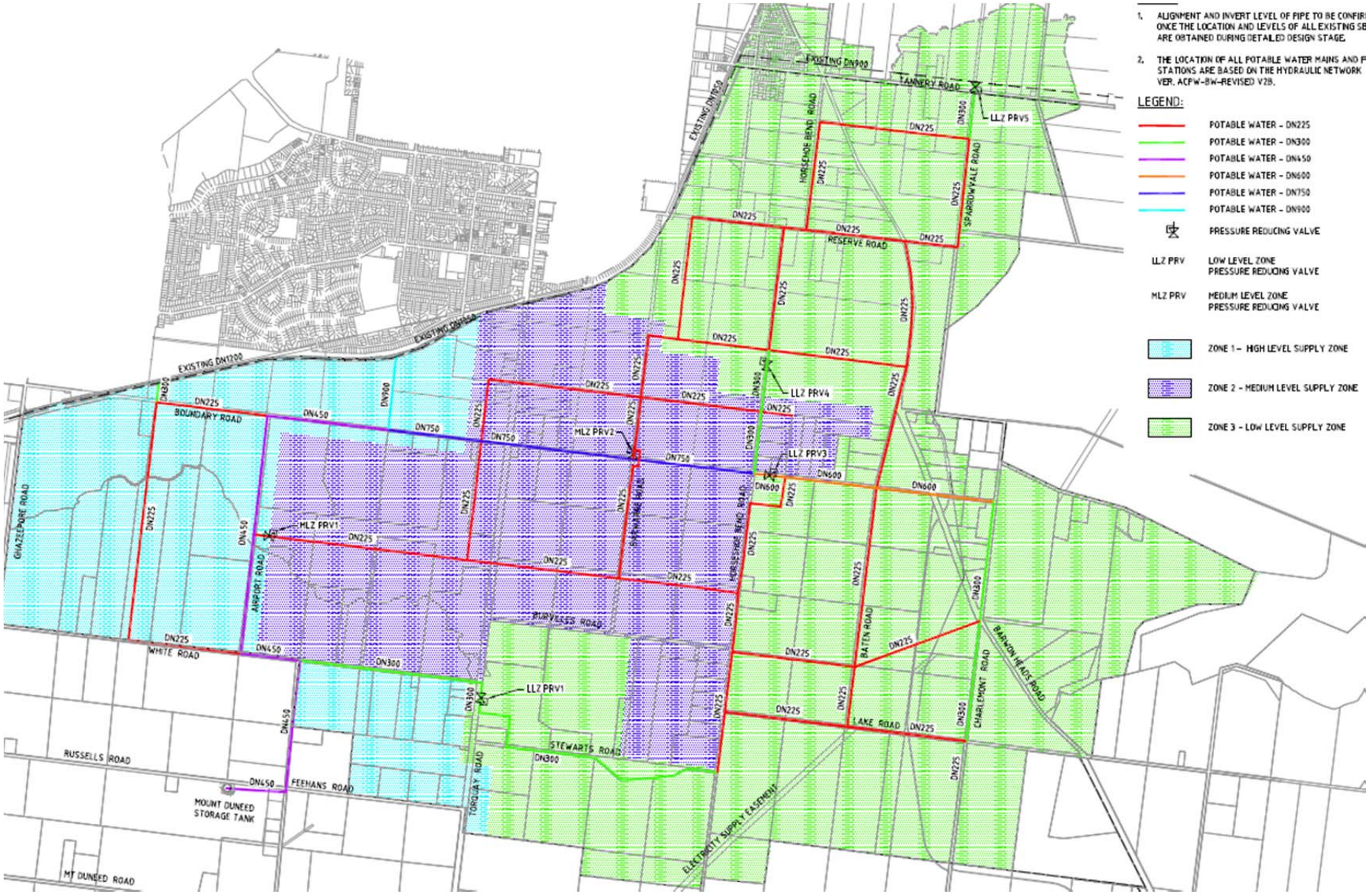


Figure 5 – Armstrong Creek Water Supply Network Plan

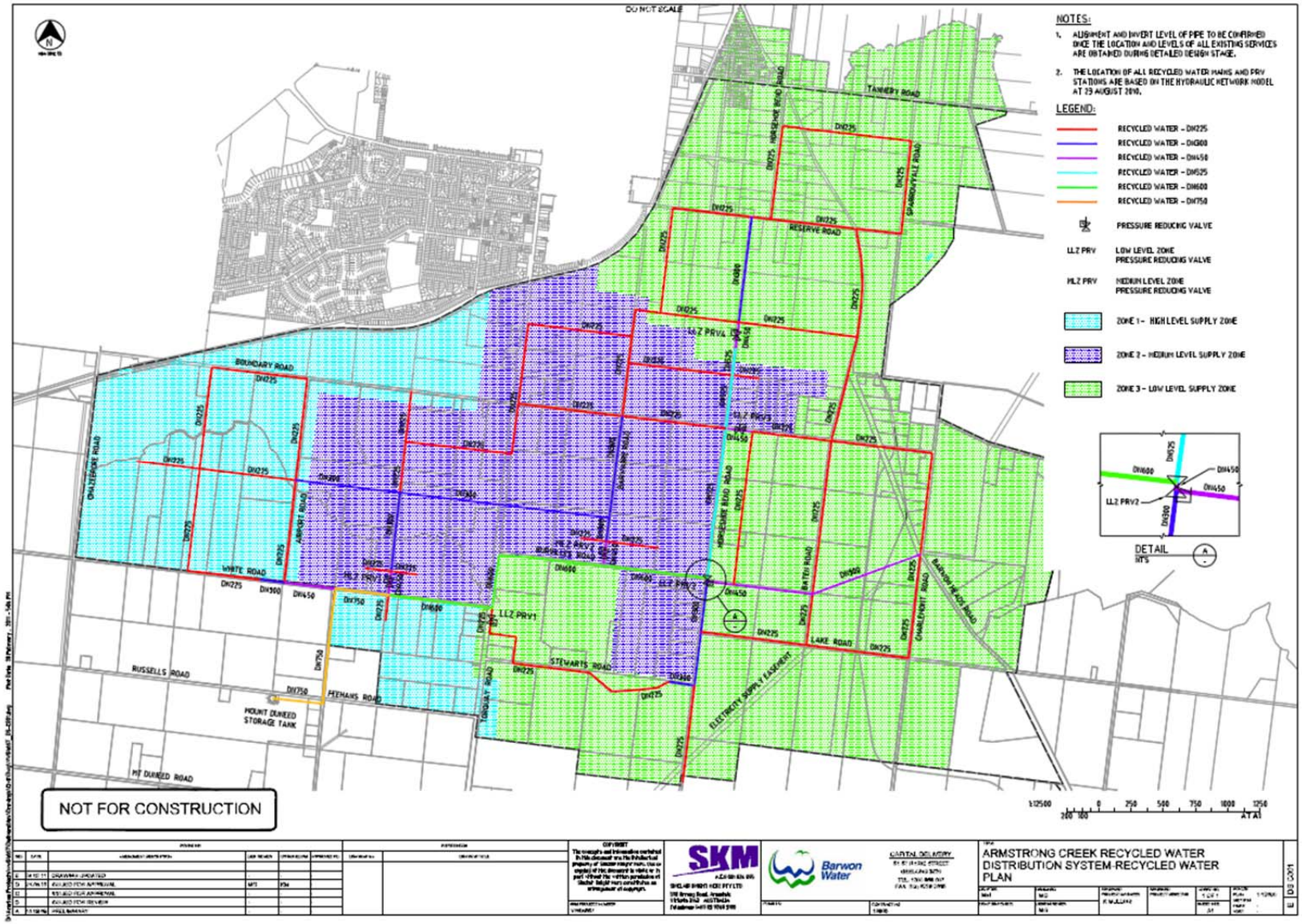


Figure 6 - Armstrong Creek Recycled Water Infrastructure Plan

Armstrong Creek West Precinct

Infrastructure Servicing Report

Appendix B - CIIDP Attachments

Report Attachment

Attachment 1 – Barwon Water Mains Water Supply & Sewerage Services

Attachment 2 – Arterial Road Type Cross Sections

Attachment 1: Barwon Water Mains Water Supply & Sewerage Services

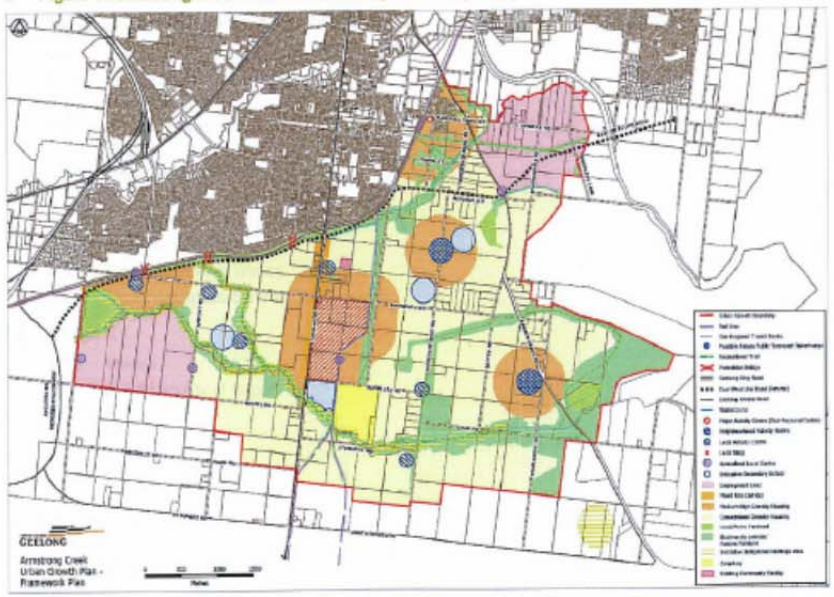
1. Executive Summary

Introduction

Armstrong Creek Urban Growth Area (the Growth Area) is a mixed use development, situated approximately 10 kilometres south of the Geelong CBD. It covers 2350 Ha of land and will accommodate 22,000 residential dwellings. It will also include employment zones, activity centres, mixed use corridors, active parkland and passive open space which together with the residential areas are estimated to require approximately 7 GL of water per annum. The exhibited Armstrong Creek Urban Growth Plan (UGP) is shown in Figure 1 below.

Barwon Water requires concept designs of water and sewer systems to accommodate development in the Growth Area. This report contains a review of existing documentation, development scenarios (sequencing, yields and rates), water demands and sewage load estimates, servicing plans, an implementation plan, concept designs and a cost estimate.

Figure 1 Armstrong Creek Framework Plan (COGG May 2008)



Note: The analysis for the concept designs shown in this report are based on City of Greater Geelong's November 2007 Urban Growth Plan.

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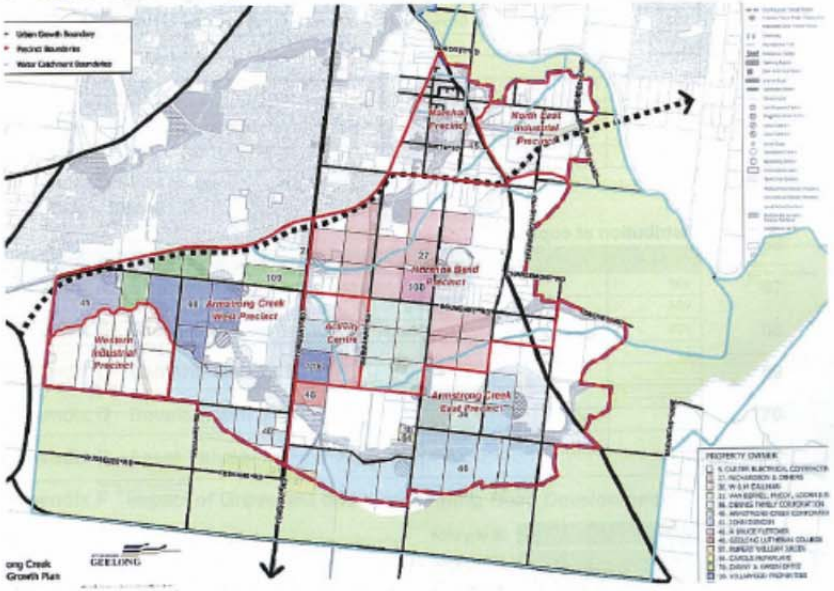
Development Characteristics

The Growth Area consists of seven precincts which have been delineated by the City of Greater Geelong in its Precinct Plan and as shown in the figure below.

Figure 2 Draft Armstrong Creek Precinct Plan (COGG 2007)



The Marshall Precinct and the North East Industrial Precinct are situated in the north east corner of the development area and contains a number of relatively fragmented land holdings.

The Horseshoe Bend Precinct is immediately below the Marshall Precinct and the North East Industrial Precinct. It is a relatively large precinct which will contain predominantly residential areas and activity centres. It stretches from Torquay Road (also known as the Surf Coast Highway) at its western boundary to past Barwon Heads Road on its eastern Boundary. Land holdings in this Precinct have been consolidating through recent acquisitions by property developers.

Armstrong Creek East Precinct is in the south eastern corner of the Growth Area. It is a large precinct which essentially matches the Armstrong Creek catchment east of Torquay Road. Land holdings in this precinct have been consolidating through recent acquisitions by property developers.

The Activity Centre Precinct is a small precinct in the centre of the Growth Area and includes a major Activity Centre. This is anticipated to be the primary shopping and entertainment area within the Growth Area. The Precinct is immediately east and adjacent to Torquay Road.

Armstrong Creek West Precinct is in the north western corner of the development and will include primarily residential land. It is one of two precincts on the western side of Torquay Road and includes all the land immediately adjacent to the western side of Torquay Road.

The Western Industrial Precinct is in the south western corner of the development and will include primarily industrial land. It generally includes the land south of the Armstrong Creek.

Development Staging

Whilst the staging of development will be determined by the City of Greater Geelong, the timing and order of release of the precincts was qualitatively assessed against criteria established by Barwon which considered the needs of Barwon Water, Developers and the City of Greater Geelong. Both the City of Greater Geelong and Barwon Water participated in the assessment process. Based on the assessment it was determined from a water and sewerage servicing perspective that precincts should be released in the following order;

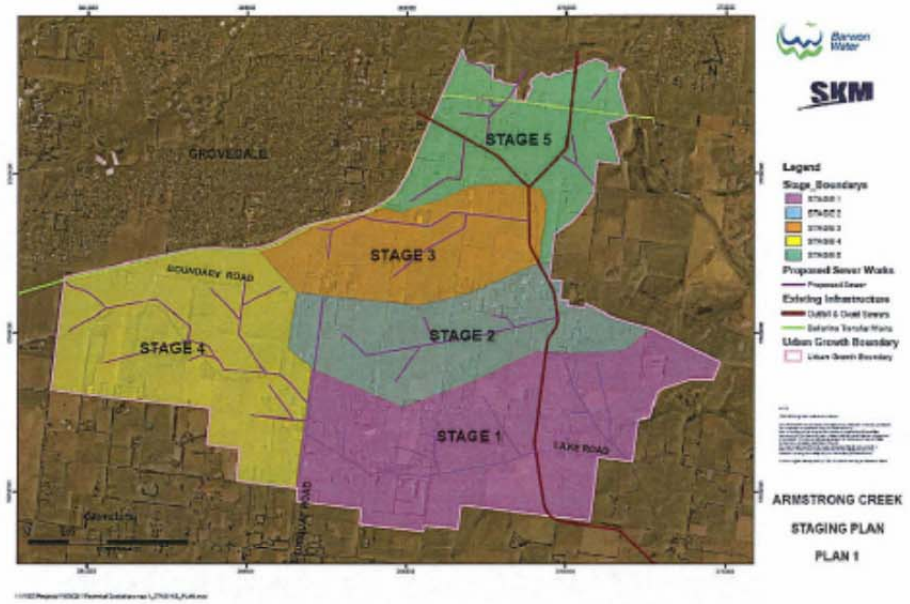
- Armstrong Creek East Precinct
- Horseshoe Bend Precinct
- Activity Centre
- Armstrong Creek West Precinct
- Marshall Precinct
- Western Industrial Precinct
- North East Industrial Precinct

The City of Greater Geelong advised that the Growth Area will be fully developed within a period of 10 years and therefore some of the smaller precincts were combined or incorporated into larger precincts to create a more realistic stage plan as shown in the list below and in Figure 3.

- Stage 1 – Armstrong Creek East Precinct
- Stage 2 – Horseshoe Bend Precinct (South) and Activity Centre Precinct
- Stage 3 – Horseshoe Bend Precinct (North)
- Stage 4 - Armstrong Creek West Precinct and Western Industrial Precinct
- Stage 5 – Marshall Precinct and North East Industrial Precinct

Notwithstanding the above preferred staging sequence, the concept designs have been developed with sufficient flexibility to accommodate other staging scenarios.

- Figure 3 Stage Plan



Design Criteria

The water concept design was developed to ensure that customers receive water pressure within a range of 20 metres and 50 metres. The sewer concept design was developed to ensure that sewers are capable of accommodating a 1 in 5 year storm event. The concept designs considered a range of inputs including;

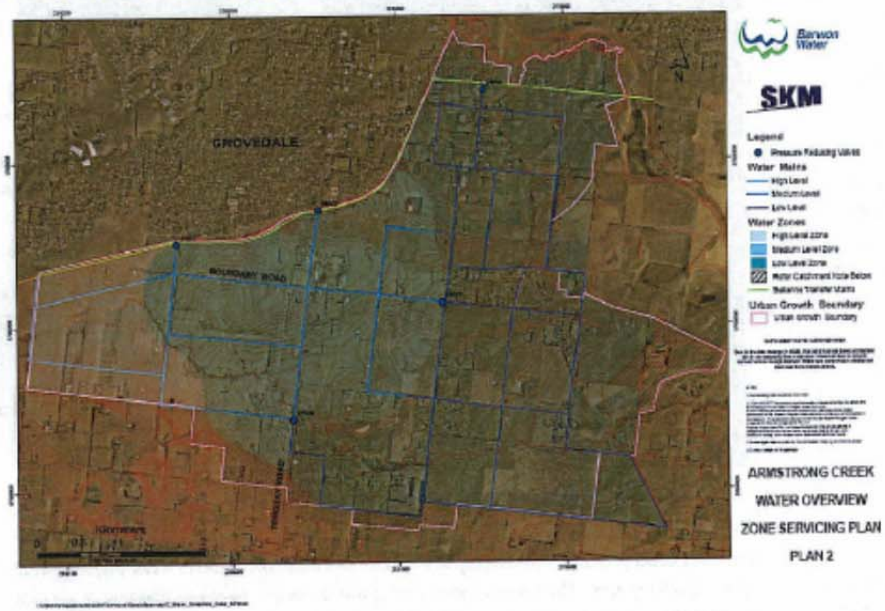
- the location of the Bellarine Transfer Main and Barwon Water's previous strategic water planning,
- the location of the Ovoid and Outfall Sewer and Barwon Water's previous strategic sewer planning,
- known biodiversity sites (based on data from City of Greater Geelong's UGP),
- known European heritage sites (based on data supplied by the City of Greater Geelong), and
- known cultural heritage sites (based on a database supplied by the City of Greater Geelong).

A more detailed description of the design criteria and design approach used is discussed later in this report.

Water Infrastructure Requirements

The water concept design is shown in the figure below.

Figure 4 Water Concept Plan



The water concept design consists of 3 zones which will be supplied from Pettavel Basin via the Bellarine Transfer Mains. A high level zone will be supplied directly from the Bellarine Transfer Main. A medium level zone will be supplied by 2 Pressure Reducing Valves (PRVs) which are likely to be located adjacent to the Bellarine Transfer Main near Airport Road (PRV1) and Torquay Road (PRV2). A low level zone will be supplied by 3 PRV's which will be located adjacent to the Bellarine Transfer Main (PRV3), at the intersection of Horseshoe Bend Road and Boundary Road (PRV4) and near the intersection of Torquay Road and Armstrong Creek (PRV5).

It is estimated that it will cost $48.3M to construct the water supply system including the cost of pipe assets and PRV's internal to the Growth Area and the cost of the next stage of the Bellarine Transfer Main, but excluding the cost of reticulation assets (to be funded by developers) and other works external to the Growth Area such as the Pettavel Basin.

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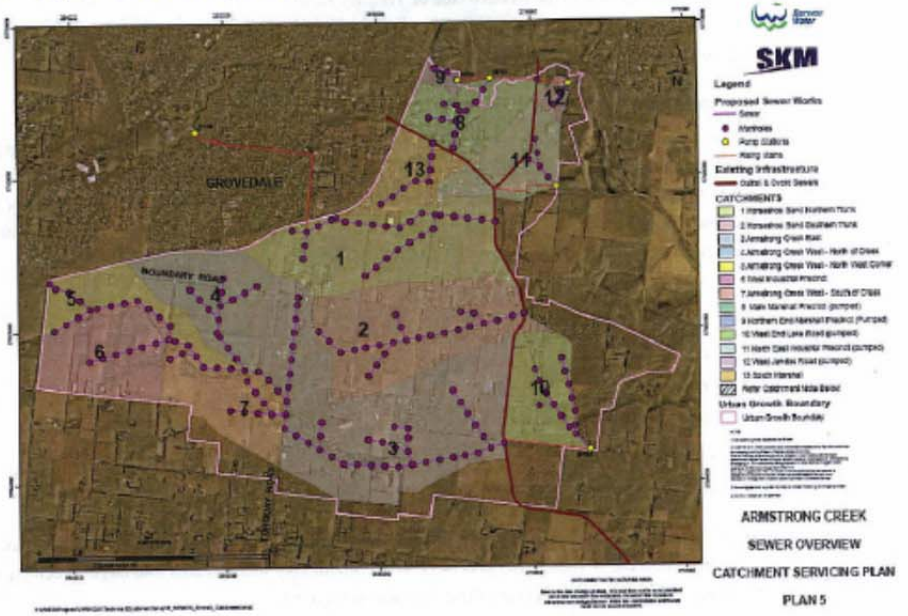
Sewer Infrastructure Requirements

The sewer concept design is shown in the figure below.

Figure 5 Sewer Concept Plan



The sewer concept plan includes 13 sub-catchments all of which ultimately connect to the Outfall Sewer, which carries sewage to the Black Rock Water Reclamation Plant (WRP). Due to the alignment of the Outfall Sewer which cannot hydraulically control the lowest areas of the Growth Area it is required to install four sewage pumping stations (SPSs) and rising mains. Three of the SPSs are located in the northern section of the development, with the other SPS to be located in the south east corner. The majority of the development will be served by the Armstrong Creek Branch Sewer which follows the alignment of Armstrong Creek. This sewer will serve areas west of Torquay Road and most of the area south of Boundary Road. The remaining area will be served by three separate branch sewers.

It is estimated to cost $33.8M to construct the sewer system including the cost of pipe assets and SPSs internal to the Growth Area and the works required to connect development at Grovedale, but excluding the cost of

reticulation assets (to be funded by developers), Outfall Sewer upgrade costs and costs associated with connecting hypothetical development west of the Ring Road.

Implementation Plan

A program was developed for the implementation of the water and sewer concept designs based on completing the following activities;

- DTF Approval
- Land Access Negotiations
- Investigations (including Flora & Fauna, Heritage, Geotech & Town Planning)
- Design
- Construction Tender, Construction, Commissioning & Hand Over.

Based on the program developed release dates were determined for each of the 5 stages previously discussed. Table 1 below shows the completion dates of the five stages. Note that work on later stages will be undertaken prior to earlier stages being completed, e.g. consideration is being given to immediately undertaking the detailed design of Stage 2 works in addition to Stage 1 works.

- **Table 1: Staging Completion Dates**

Stage Number	Target Completion Date	Serviceable Land Opened (Ha)
1	2011/12	475
2	2013/14	485
3	2014/15	327
4	2015/16	679
5	2017/18	384

Cost Estimate

A conceptual cost estimate was produced for both the water and sewer concept design which included all assets greater than basic size (> DN150 for water and > DN225 for sewer). The cost estimate is shown over the page.

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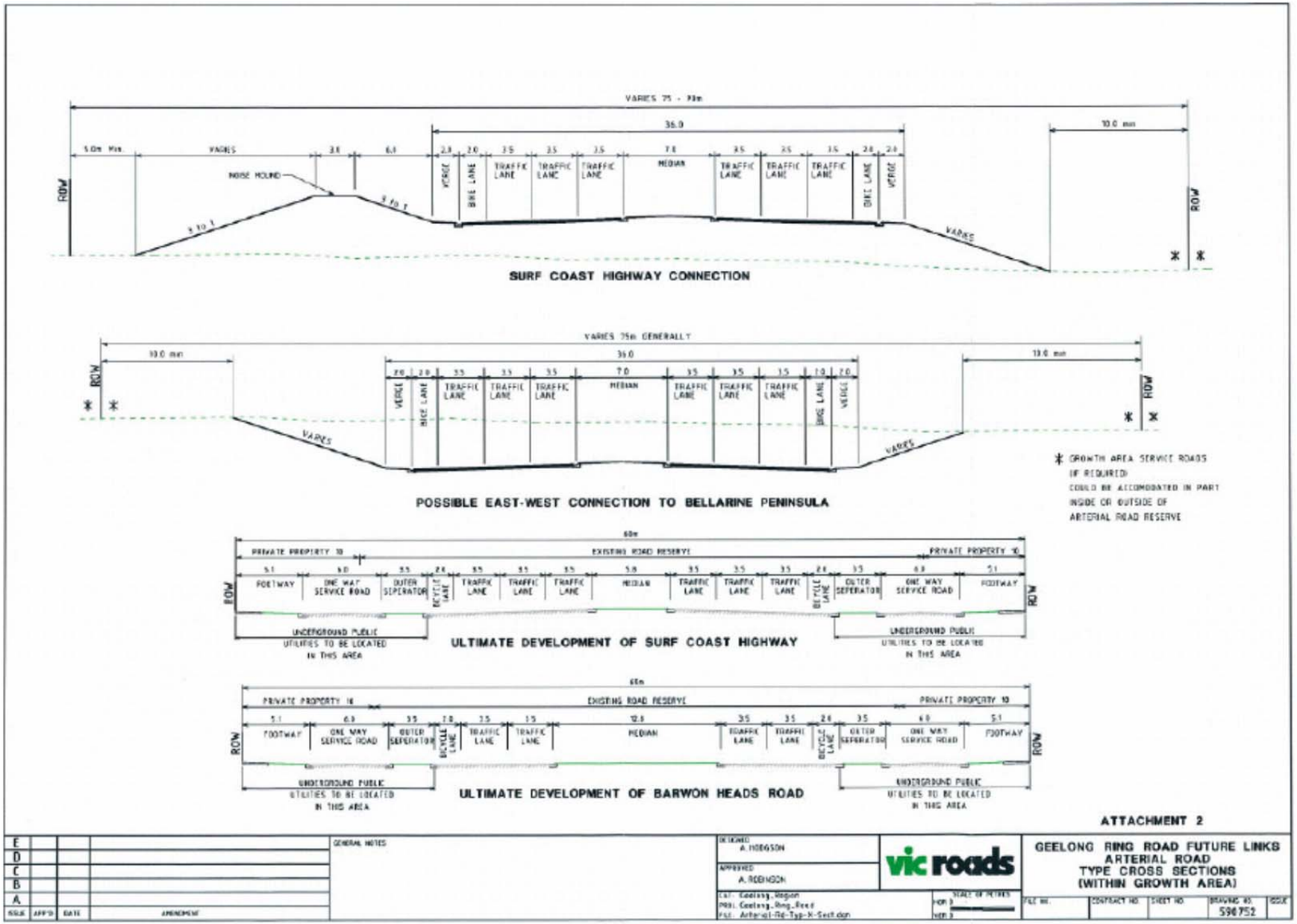

Attachment 2 – Arterial Road Type Cross Sections