

# Water and Sewer Servicing Report

Toondah Harbour and Weinam  
Creek PDAs Structure Plan  
Development

CEB06456

Prepared for  
Redland City Council

10 January 2014



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## Executive Summary

Redland City Council and Economic Development Queensland (EDQ) are jointly developing the Structure Plan for the recently identified Priority Development Areas of Toondah Harbour and Weinam Creek. Cardno are engaged to provide water and sewer servicing advice for the two development sites.

The summary of Water and Sewerage Servicing for each Draft Structure Plan Report for the Toondah Harbour and Weinam Creek Priority Development Areas (PDA) is provided below.

### **Toondah Harbour PDA**

Water and Sewer services to the PDA are required to meet minimum service standards adopted by Redland City Council. Required upgrades for servicing the PDA have proved simplistic for water and comparatively complex for sewer.

The Alexandra Hills Low Level Zone supplies water to the PDA site via a 150mm main and a 100mm reticulation main along Middle Street. Water supply to the PDA will meet the desired standards of service.

Two sewerage pump stations service the PDA, with the downstream network of pump stations, rising mains and gravity main network transporting the sewerage to the Cleveland WWTP. The PDA will require revised infrastructure upgrades as well as the increase and bring forward of additional programmed upgrades, as follows:

- SPS 2 - increase capacity and bring forward the upgrade of pumps, rising main and emergency storage when development commences;
- SPS 4 - increase the pump and emergency storage capacity, and, when development commences, construct a new duplicate 225mm rising main;
- SPS 5 - increase emergency storage capacity plus upgrade pumps 3 years earlier than the planned age driven replacement;
- SPS 6 and SPS 128 - connect existing rising mains, and based on observed flowrate improvements, revise timing of the pump upgrade (and SPS128 decommissioning), and increase capacity of SPS 6 pumps and wet well upgrades to accommodate development flows;
- Bring forward the gravity main upgrade upstream of SPS 5 by approximately 8 years;
- Bring forward the gravity main upgrade upstream of SPS 6 by approximately 3 years; and
- Increase future hydraulic and biological capacity upgrades at the Cleveland WWTP to accommodate the development.

The development will mildly influence sizing of programmed upgrades at Cleveland WWTP. This WWTP catchment has a total 50,000EP DEHP licensed capacity. The available license capacity is currently at 13,700EP as at July 2013, though mass load limits also apply, and the hydraulic and biological capacities at the WWTP are lower, estimated around 1,700EP.

There may be a requirement for development to contribute to the upgrade costs of the sewer servicing infrastructure.

### **Weinam Creek PDA**

Water and Sewer services to the Weinam Creek PDA are required to meet minimum service standards adopted by Redland City Council. Required upgrades for servicing the PDA have proved simplistic for water and comparatively complex for sewer.

The Serpentine Creek Demand Management Area supplies water to the PDA, primarily via a 200mm main along Gordon Street. Water supply to the PDA will meet the desired standards of service with only the following minor infrastructure installed:

- Internal link main partially through the development, from Auster Street to Gordon Street; and
- Internal link main through the development from the Esplanade/Weinam Street to Banana Street/ Marina service main connection

Two sewerage pump stations service the PDA on the north and south of Weinam Creek respectively, with the downstream network of pump stations, rising mains and gravity man network transporting the sewerage to the Victoria Point WWTP. The PDA will require new infrastructure upgrades and may slightly influence the timing and size of programmed upgrades, as follows:

- SPS 90 - upgrade capacity in the rising main and wet well, and increase capacity for the pump upgrade;
- SPS 67 - increase capacity of the pump, rising main, wet well and emergency storage; and
- Increase future hydraulic and biological capacity upgrades at the Victoria Point WWTP to accommodate the development, where operational licence modification allows this, or include development flows with alternate WWTP servicing.

SPS 132 and its rising main have significant available capacity for development in the area and should be utilised where possible in development infrastructure design.

Victoria Point WWTP has an operating license capacity of 12 ML/d dry weather and 36 ML/d wet weather flows, with additional mass load limitations. The design capacity is 34,000EP, with available design capacities of 1000EP as at July 2013. RCC reports the WWTP is performing well at near design capacity; however there is additional for hydraulic and biological capacity restrictions at the WWTP.

There may be a requirement for development to contribute to the upgrade costs of the sewer servicing infrastructure.

### **Recommendations**

Based on the assessments completed in this report it is recommended that:

- For each PDA; the augmentations identified within the report are adopted for planning purposes, and revised with the new IDM and resulting hydraulic models, for the 2014 PIP;
- For each PDA, development servicing requirements are revised and developer contribution costs defined when detailed development layouts are identified;
- The licencing and servicing issues at Victoria Point WWTP are resolved whether the Weinam Creek PDA is pursued or not;
- SPS 132 and its rising main have significant available capacity for development in the area and should be utilised where possible; and
- Upon connection of the new rising mains for SPS 6 and 128, the increase of pump performance should be measured, and the new SPS 6 pump upgrade rescheduled in light of this and the new IDM.

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# 1 Introduction

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Redland City Council and EDC are jointly developing the Structure Plan for the recently identified Priority Development Areas of Toondah Harbour and Weinam Creek. Cardno are engaged to provide water and sewer servicing advice for the two development sites.

The focus of the assessment is on the external networks, which includes existing water reticulation and trunk mains, pumping stations and pressure reducing valves, and existing sewerage reticulation and trunk gravity mains, pump stations and rising mains, and the wastewater treatment plant (WWTP). This is to identify the impact of the increased demands from the PDAs on the existing networks.

## 1.1 Background

Toondah Harbour PDA is located east of Cleveland town centre, and approximately 1 hour drive east of the Brisbane CBD. The PDA covers a total area of approximately 67 hectares (17.5 hectares over land and 49.5 hectares within Moreton Bay). Current land use within the PDA include passenger ferry, vehicle ferry, recreational boat ramp, car parking, parkland, high density and low density residential, dredge spoil pond, CSIRO facility, commercial office and utility services.

The majority of land use within the PDA is car parking, and parkland.

Weinam Creek PDA is located south east of the Cleveland town centre and approximately 1 hour drive south east of the Brisbane CBD. The PDA covers a total area of approximately 42 hectares (36.2 hectares over land and 5.8 hectares within Moreton Bay). Current land use within the PDA include car parking, passenger ferry, vehicle ferry, recreational boat ramp, low density residential, other marine services.

The majority of land use within the PDA is car parking, marina services, and low density residential.

## 1.2 Drivers

The driver for this assessment is the development of the Structure Plans for the Toondah Harbour and Weinam Creek PDAs.

## 1.3 Objectives

The objectives of this report are to:

- Identify the current planning for the surrounding water and sewer infrastructure;
- Determine the servicing requirements of the proposed PDAs; and
- Identify the impacts on the existing system and its current planning.

## 2 Methodology

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Our detailed methodology for undertaking the project has been broken down to the following phase and associated tasks:

- Confirm the Equivalent Person (EP) ratings within each PDA;
- Define the design criteria for water supply and sewerage;
- Develop hydraulic network models to determine water supply network capacity;
- Develop desktop sewer networks to determine indicative locations for pipeline and pump stations (if required);
- Assess the impact of the development on the external water supply and sewerage infrastructure, which may include the identification of proposed connection locations and augmentations, if necessary. This assessment is based on reviewing the capacity of existing infrastructure from current planning reports (which have not been revised);
- Prepare a Draft Water Supply and Sewerage Assessment which proposes a water supply and sewerage servicing strategy ; and
- Prepare a Final Water Supply and Sewerage Assessment.

The gravity main capacity assessment is based on extrapolation of previous planning. A more detailed analysis will be required to confirm this capacity assessment when further data, including updated IDM data, is available.

A high level assessment was completed for Workshop 1, with results provided in a Technical Memorandum. A revised assessment was not required for Workshop 2. A final assessment was completed once the preferred development land uses were defined and provided. This report contains results for both assessments, with associated technical memorandums contained within the appendices.



## 3 Desired Standards of Service

The SEQ WS&S D&C Code (March 2012) is adopted within this report as the guideline for the Desired Standards of Service (DSS) for the assessment. This code is to be adopted by RCC for the up-coming Draft Priority Infrastructure Plan (PIP).

The following water supply and sewerage design criteria from the code apply to the PDS's:

### 3.1 Water Supply

#### 3.1.1 Water Supply Demand

Average Day Consumption (AD) = 230 L/EP/d + 30 L/EP/d (NRW)

*Note: The allowance for NRW of 30L/EP/d accounts for leakage and other losses.*

*Non-Revenue Water shall have no peaking factors applied to it.*

#### 3.1.2 Peaking Factors

	High Density Residential	Commercial/ Industrial
Max Day Max Month /Average Day:	1.5	1.5
Peak Hour /Peak Day:	1.75	1.4
Peak Hour /Average Day:	3.5	2.8

#### 3.1.3 Fire Fighting

Urban:

- Detached Res (<=3 storeys) = 15 L/s for 2hrs with background demands
- Multi story Res (>3 storeys) = 30 L/s for 4hrs with background demands
- Commercial/Industrial buildings = 30 L/s for 4hrs with background demands.
- Risk Hazard Buildings = Assessed on needs basis
- Emergency fire operation conditions that have customer connections = 12m min at the flowing hydrant, 6m elsewhere in mains

Background Demand:

- Residential (Detached/ Multi story): = Highest of 2/3 PH or AD
- Commercial/Industrial: = PH demand (between 10am and 4pm) (single fire event only)

#### 3.1.4 Pressures

(At PH on PD with Reservoirs at MOL) with no flow through service, Urban and Rural:

Minimum Service Pressure:

- Normal operating conditions = 22 m at property boundary
- Properties requiring private boosters = 12m at property boundary
- Maximum Service Pressure = 55m at property boundary

#### 3.1.5 Pipeline Design

Maximum allowable velocity = 2.5 m/s

### 3.1.6 Hazen Williams Coefficient

The following Hazen Williams Roughness Coefficients were adopted in accordance with the SEQ Water and Sewerage Planning Guidelines:

Pipe Diameter (mm)	Adopted Hazen Williams Friction Coefficient "C"
≤150	100
<150 – 300	110

## 3.2 Sewerage

Smart Sewers (RIGS)

### 3.2.1 Sewage Loading

Average Dry Weather Flow (ADWF)	= 200 L/EP/d for RIGS = 180 L/EP/d for NuSewer = 210 L/EP/d for existing conventional sewers
Peak Dry Weather Flow (PDWF)	= C2 x ADWF Where C2 = 4.7 x (EP) -0.105
Peak Wet Weather Flow (PWWF)	= 5 x ADWF for RIGS = 4 x ADWF for NuSewer

### 3.2.2 Gravity Sewer Design

Pipe roughness general Manning's 'n'	= 0.0128
Minimum velocity @ PDWF	= 0.7 m/s
Maximum Velocity @ PWWF	= 3 m/s
Depth of flow @ PWWF	= 75% of pipe depth

### 3.2.3 Rising Mains

Flow Equation	= Colebrook-White
Minimum Velocity	= 0.75 m/s
Maximum Velocity	= 3 m/s

## 4 Populations and Demands/ Flows

The initial servicing assessment, required for Workshop 1, was estimated at 1500EP for each PDA. This was based upon the most recent land use assessment available, the Toondah Harbour potential land use (GHD report 2011), as none were available for Weinam Creek PDA.

The GHD report indicated that Toondah Harbour may gain around 1000 people for land based development or 1500 persons when the full 400 berth marina is included.

**Table 4-1 Initial EP and Flow Estimate**

EPs	Water Demand		Sewer Flow (L/s)	
	AD (kL/d)	PH (L/s)	ADWF (kL/d)	PWWF (L/s)
1500	390	14.5	300	17.4

Finalised land uses for the preferred development option for each PDA were supplied by Redland City Council in mid November 2013. Appendix B contains the land uses for each PDA, and conversion to EPs and flows using RCC adopted DSS. Staging of development was based upon catalyst development occurring between 2015 and 2020, short term development occurring evenly between 2020 and 2035, and long term development occurring between 2035 and 2040.

The table below summarises the EPs and flows across the development timeline for each PDA.

**Table 4-2 Preferred Development Options EPs and Flows**

Year	2015	2020	2025	2030	2035
<b>Toondah Harbour PDA</b>					
Water EP	445	936	1427	1918	2528
Water PH (L/s)	4.3	9.1	14.0	18.8	23.6
Sewerage EP	569	1164	1760	2355	2963
Sewerage PWWF (L/s)	6.6	13.5	20.4	27.3	34.3
<b>Weinam Creek PDA</b>					
Water EP	203	691	1178	1666	1888
Water PH (L/s)	1.9	6.7	11.6	16.4	18.1
Sewerage EP	258	831	1405	1978	2199
Sewerage PWWF (L/s)	3.0	9.6	16.3	22.9	25.5

For the Weinam Creek PDA, most of the resulting demands and flows will be on the north of Weinam Creek, as this is where the majority of development is located.

The EPs and flows for the surrounding system at Toondah Harbour are based on current planning, sourced from the Cleveland Sewerage Planning Report (Cardno, 2009). The EPs and flows for the surrounding system at Weinam Creek are based on current planning, sourced from the Preliminary Design of Pump Stations in Victoria Point Catchment Master Planning Report (Cardno, 2009). Current planning uses the old DSS of 320L/EP/ day for water and 250L/EP/day for sewer.

It is noted that the IDM is currently being revised; however this new EP data was not available at the time of assessment. In light of this, the new IDM should be used within hydraulic modelling analysis to finalise sizing and timing of infrastructure upgrades, and assessed against realised demands and flows.

## 5 Toondah Harbour PDA Water Servicing

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The Toondah Harbour PDA is in the Alexandra Hills Low Level Zone (refer Appendix A, Figure 3), which is sourced from Seqwater's Alexandra Hills Reservoir Complex. As shown in Appendix A, Figure 1, local infrastructure surrounding the site includes 100mm and 150mm diameter reticulation mains. The site is serviced from a 150mm main and a 100mm reticulation main along Middle Street.

### 5.1 Current Planning

The current planning indicates no upgrades are scheduled for the Alexandra Hills Low Level Zone prior to 2025, as indicated in the current Priority Infrastructure Plan (PIP, 2006) and in consultation with Redland City Council.

Growth rate of 2.1% is currently anticipated for the Cleveland area.

### 5.2 Initial Hydraulic Assessment

A preliminary hydraulic assessment was undertaken to provide results at Workshop 1. This assessment assumes development of 1500EP and uses hydraulic software models supplied by Redland City Council to determine the additional servicing infrastructure requirements of this development for existing and future scenarios as follows:

#### **Scenario 1: Existing without PDA**

Hydraulic modelling of the existing system found:

- Minimum pressures at the development and surrounding network are above those required in Redland City Council's DSS;
- Maximum pressures at the development and surrounding network are greater than specified in Redland City Council's DSS;
- Commercial fire flows (30 L/s) can be delivered at the development site at the end of Middle Street; and
- Fire flows can be delivered in the remainder of the surrounding network.

#### **Scenario 2: Existing with PDA**

Hydraulic modelling of the existing system plus development, of 1500EP, found:

- Minimum pressures at the development and surrounding network are above those required in Redland City Council's DSS;
- Maximum pressures at the development and surrounding network are less than the maximum specified in Redland City Council's DSS;
- Commercial fire flows (30 L/s) can be delivered at the development along Middle Street and Emmett Drive; and
- Fire flows can be delivered in the remainder of the surrounding network.

#### **Scenario 3: Ultimate with PDA**

Development water supply demands, using demands for 1500EP, were added in the ultimate planning horizon with the following results:

- Minimum pressures at the development and surrounding network are above those required in Redland City Council's DSS;
- Maximum pressures at the development and surrounding network are less than the maximum specified in Redland City Council's DSS;
- Commercial fire flows (30 L/s) can be delivered at the development along Middle Street and Emmett Drive; and
- Fire flows can be delivered in the remainder of the surrounding network.

### **5.3 Revised PDA Assessment**

Modelling was undertaken using the revised Peak Hour demands, with results indicating that there are no changes to the above assessment advice.

### **5.4 Planning Impacts**

There are no significant planning impacts on current planning.

Note that there may be some local fire flow augmentations required around the development areas depending on final development layout.

## 6 Toondah Harbour PDA Sewer Servicing

The Toondah Harbour PDA is serviced by two pump stations, SPS 13 and SPS 2, as shown in Figure 4. SPS 13 services a small residential area north of the PDA (and a public toilet block within the PDA), and pumps into the gravity main upstream of SPS 2 (that also receives flows from SPS 1), which in turn pumps into the downstream gravity sewer on Middle Street. From this point pump stations 4, 5, 6 and 128, and their associated gravity networks transport the sewerage to the Cleveland WWTP (refer to Figures 4 and 6).

### 6.1 Current Planning

Redland City Council's planned upgrades for the sewerage network were referenced from the 2006 Priority Infrastructure Plan, and the more recent Cleveland Sewerage Planning Report (Cardno, 2009), and the Cleveland Gravity Trunk Mains - Servicing Plan and Capital Project Development (Logan Water Alliance, 2013). As previously noted, this planning is based upon the old DSS of 250L/EP/day.

However, in addition to the new IDM, a new Priority Infrastructure Plan is under development, which will revise the schedule of infrastructure upgrades for this catchment based on a new IDM and the new DSS.

Redland City Council's planned upgrades for the sewerage network, and proposed year of commissioning are provided in the table below.

**Table 6-1 Current Planning for Infrastructure Servicing Toondah Harbour PDA**

SPS #	Pump (L/s)	Duplicate Rising Main (mm dia.)	Wet Well (kL)	Emergency Storage (ML)	Upstream Gravity Main (mm dia.)
2	28 2' 4 2016 4	150 3' 4 2013 4		2018	225/300 2013 4
4	76 2013			2018	
5	243 5 2025				375 2031
6	436 2013	450 2013		2013	375 4 2021 4
128	Decommissioned 6 2013	450 2013			N/A

Note:

1. Items scheduled for prior to 2013 and have not been completed are rescheduled to 2013 in the above table, and shown in italics. These items may not be in RCCs current Capital Works Plan for 2013/14.
2. SPS 2 is also to be resized to meet extended rising main head requirements, and flows.
3. SPS 2 rising main is a replacement and extension, not duplicate, of the 150mm main.
4. Timing and sizing based on revised growth, as per Cleveland Gravity Trunk Mains - Servicing Plan and Capital Project Development (Logan Water Alliance, 2013).
5. Age driven upgrade, from PIP (2006.)
6. Decommissioning with upgrade of SPS 6 and connection to new rising main.
7. Blank items do not have any planned upgrades for capacity, or upgrade sizing has not been provided where dates alone are provided.

SPS 6 and 128 have recently received rising main duplications, though these are not yet connected and so still shown as required in the above table. The impact of duplicate rising main connection on the pumping flowrates (the operation point on each pump curve) of SPS 6 and SPS 128 has not been clarified in the available planning, and may provide additional capacity prior to upgrading SPS 6. SPS 128 will be decommissioned once SPS 6 is upgraded.

SPS 2 has a pump upgrade and rising main extension to Channel Street planned for 2013, in accordance with the PIP (2006), and is on hold pending this report. The *Cleveland Gravity Trunk Mains - Servicing Plan and Capital Project Development (Logan Water Alliance, 2013)* indicated SPS2 pump station upgrade was scheduled for 2016, though the rising main was scheduled for 2013 and the section of gravity main from the proposed rising main to just upstream of SPS4 was not identified for upgrade.

The *same report* also indicated that the short section of 450mm dia. gravity main upstream of SPS5 did not require an upgrade in 2011, only monitoring in the short term (due to previous planning sizing this main as 300 dia.). The *Cleveland Sewerage Planning Report (Cardno 2009)*, indicates the remainder is 450mm dia. theoretically surcharging after 2018, and requires upgrading with a duplicate 375mm dia. main in 2031. The diameters of this main require verification.

In addition to the new IDM, a new Priority Infrastructure Plan is under development, which will likely revise the schedule of infrastructure upgrades for this catchment.

Cleveland WWTP has an operating license capacity of 50,000EP. The available license capacity is currently at 13,700EP as at July 2013, though mass load limits also apply, and the available hydraulic and biological capacities at the WWTP are lower, estimated around 1,700EP.

## 6.2 Initial Servicing Assessment

Initial assessment was based upon an additional 1500EP, applied to SPS 2 in 2013. Hydraulic assessment of the additional demands from development identified the following changes to current planning:

- SPS 2, 4 and 6 pump upgrade flowrates increase;
- SPS 2 and rising main require upgrading to 57L/s and 200mm dia. upon the PDA development starting (assumed to be 2013);
- SPS 4 rising main requires upgrading in 2019 to 200mm dia.;
- Gravity main upgrade upstream of SPS 6 is brought forward by up to 3 years; and
- Emergency storage requirements and timing may change.

Cleveland WWTP is also approaching capacity, and additional flows need to be considered in the sizing and timing of the upgrades.

The potential changes to current planning to resolve the identified issues include:

- Increase capacity of SPS 2, 4 and 6 and relevant rising mains and emergency storage upgrades to accommodate additional flows;
- Upgrade gravity main upstream of SPS 6 in 2018;
- Include additional flows in Cleveland WWTP upgrades; and
- Emergency storage requirements are to be revised under ERA 63(3) 2013.

## 6.3 Revised PDA Assessment

A hydraulic assessment was undertaken using hydraulic computational spreadsheets, aligned with *Cleveland Sewerage Servicing Planning Report (Cardno, 2009)* adopted by Redland City Council. Development lots were added in advance, for example lots expected to be realised by 2015 were added to 2013 planning, rather than 2018 planning.

Appendix C contains the hydraulic output tables.

## 6.4 Planning Impacts

The analysis identified the following schedule and sizing for the upgrades:

**Table 6-2 Augmentation Sizing and Timing – with RCC PDA**

SPS #	Pump (L/s)	Duplicate Rising Main (mm dia.)	Wet Well (kL)	Emergency Storage (ML)	Upstream Gravity Main (mm dia.)
2	74 2013	225 <sup>2</sup> 2013		2013 1	225/300 2013
4	110 2013	225 2013		2018 1	
5	285 2021			2018 1	375 2023
6	470 2013	450 2013		2013 1	375 2018
128	Decommissioned 2013	450 2013		N/A	N/A

Note:

1. Emergency storage requirements are to be revised under ERA 63(3) 2013.
2. Replacement rising main (not duplicate) to extend as required, and remove need for upgrade of gravity main upstream of SPS 4.
3. The timing for sizing of items in grey has not been affected by the proposed development.

The SPS 2 rising main replacement and extension should also ensure the gravity main upstream of SPS 4 does not require upgrading, as per *Cleveland Gravity Trunk Mains - Servicing Plan and Capital Project Development (Logan Water Alliance, 2013)*. Hydraulic modelling of the gravity main, incorporating the new IDM data, and a revisit of options for this gravity main capacity issues should be undertaken to ensure the optimal, potentially staged, solution is adopted.

The gravity main upstream of SPS 5 requires upgrading by 2023, including the section currently under 'monitoring', however sizing and timing should be verified using hydraulic modelling and the new IDM data.

The PDA will require new transfer infrastructure upgrades as well as the increase and bring forward of additional programmed upgrades as per the table above. Any upgrades that are re-scheduled for 2013 as a result of the additional PDA flows are required for the first stage of the PDA.

The development will mildly influence sizing of programmed upgrades at Cleveland WWTP. This WWTP catchment has a total 50,000EP DEHP licensed capacity. The available license capacity is currently at 13,700EP, though mass load limits also apply, and the hydraulic and biological capacities at the WWTP are lower, estimated around 1,700EP.

There may be a requirement for development to contribute to the upgrade costs of the sewer servicing infrastructure.



## 7 Weinam Creek PDA - Water Servicing

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The Weinam Creek PDA is supplied by the Serpentine Creek Demand Management Area (DMA), which is sourced from Seqwater's Heinemann Road Reservoirs. As shown in Figure 1, local infrastructure surrounding the site includes 100mm and 150mm diameter reticulation mains. The site is serviced primarily by a 200mm main along Gordon Street.

### 7.1 Current Planning

Planned upgrades for the water supply network (and proposed year of commissioning) as indicated in the current Priority Infrastructure Plan (PIP, 2006) and in consultation with Redland City Council, include:

- The Serpentine Creek DMA is scheduled to be divided into two DMAs in approximately 2018 (was originally 2013 in the PIP), and construction is triggered by growth and subsequent minimum pressure within the existing zone. The division of these zones is along Weinam Creek.

### 7.2 Initial Servicing Assessment

A preliminary hydraulic assessment was undertaken, to provide results at Workshop 1. This assessment assumes development of 1500EP and uses hydraulic software models supplied by Redland City Council to determine the additional servicing infrastructure requirements of this development for existing and future scenarios as follows:

#### Existing without PDA

Hydraulic modelling of the existing system found:

- Minimum pressures at the development and surrounding network are above those required in Redland City Council's DSS;
- Maximum pressures at the development and surrounding network are greater than the maximum specified in Redland City Council's DSS;
- Commercial fire flows (30 L/s) cannot be delivered at the development site; and
- Fire flows can be delivered in the remainder of the surrounding network.

#### Existing with PDA

Hydraulic modelling of the existing system plus development found:

- Minimum pressures at the development and surrounding network are above those required in Redland City Council's DSS;
- Maximum pressures at the development and parts of the surrounding network are greater than the maximum specified in Redland City Council's DSS;
- Commercial fire flows (30 L/s) cannot be delivered at the development site; and
- Fire flows can be delivered in the remainder of the surrounding network.

#### Ultimate with PDA

Development water supply demands were added in the ultimate planning horizon with the following results:

- Minimum pressures at the development and surrounding network are above those required in Redland City Council's DSS;
- Maximum pressures at the development and surrounding network are less than the maximum specified in Redland City Council's DSS;
- Commercial fire flows (30 L/s) cannot be delivered at the development; and
- Fire flows can be delivered in the remainder of the surrounding network.

### 7.3 Revised PDA Assessment

Modelling was undertaken using the revised Peak Hour demands, with results indicating that there are no changes to the above assessment advice.

## 7.4 Planning Impacts

The potential infrastructure required to resolve the identified issues include:

- A 150mm dia. internal link main partially through the development, from Auster Street to Moores Road (approximately 250m); and
- A 150mm dia. internal link main through the development from the Esplanade/Weinam Street to Banana Street/ Marina service main connection (approximately 400m)

Note that lengths are indicative only, and there may be some local fire flow augmentations required around the development areas depending on final development layout. An alternate location for each fire main may be considered provided fire flows are achieved.

## 8 Weinam Creek PDA – Sewer Servicing

The Weinam Creek PDA is serviced by two pump stations; SPS 90 and SPS 132, which service north and south of Weinam Creek respectively and pump into the gravity sewer along Moogurrapum Creek (refer Figure 5). The sewage is transported to and treated at the Victoria Point WWTP via SPS 67, and the associated gravity networks, as shown in Figure 6.

### 8.1 Current Planning

Redland City Council's planned upgrades for the sewerage network were referenced from the 2006 Priority Infrastructure Plan, and the more recent Preliminary Design of Pump Stations in Victoria Point Catchment Master Planning Report (Cardno, 2009). This planning is based upon the old DSS of 250L/EP/day.

In addition to the new IDM, a new Priority Infrastructure Plan is under development, which will revise the schedule of infrastructure upgrades for this catchment.

Redland City Council's planned upgrades for the Sewerage network, and proposed year of commissioning are provided in the table below.

**Table 8-1 Current Planning for Infrastructure Servicing the Weinam Creek Area**

SPS #	Pump (L/s)	Duplicate Rising Main (mm dia.)	Wet Well (kL)	Emergency Storage (ML)	Downstream Gravity Main (mm dia.)
132				2018 2	
90	38 2018				
67	289 2023	300 2013		2013 <sup>1</sup>	375 3 2018 3

Note:

1. RCC advise this item is not required at this stage, with alternate spill reduction measures (including generators) implemented under the new ERA 63 (3).
2. Emergency storage requirements are to be revised under ERA 63(3) 2013.
3. From Preliminary Design of Pump Stations in Victoria Point Catchment, Cardno 2009.
4. Items scheduled for prior to 2013 and have not been completed are rescheduled to 2013 in the above table, and shown in italics. These items may not be in RCCs current Capital Works Plan for 2013/14.
5. Blank items do not have any planned upgrades for capacity, or upgrade sizing has not been provided (where dates alone are provided).

The gravity main downstream of SPS67 is considered at capacity, with the planning report *Preliminary Design of Pump Stations in Victoria Point Catchment, Cardno 2009* indicating theoretical surcharging occurring in sections of this main in 2008 and 2013, with the duplicate 600 dia. gravity main installation recommended in the 2013-2018 horizon.

### 8.2 Initial Servicing Assessment

Initial assessment was based upon an additional 1500EP, applied to SPS 90 and SPS 137 evenly in 2013.

Hydraulic assessment of the additional flows from development identified the following changes to current planning:

- SPS 90 pump, rising main and wet well capacity is exceeded in approximately 2013;
- SPS 67 pump upgrade capacity requirement increases slightly; and
- SPS 132 and 67 emergency storage upgrade capacity requirement may change.

Victoria Point WWTP is also approaching capacity, and additional flows need to be considered in the sizing and timing of the upgrades and license alterations/ alternate servicing.

The potential changes to current planning to resolve the identified issues include:

- Bring forward upgrade of SPS 90 to 2013, and increase pump and wet well upgrade capacity;
- Upgrade SPS 90 rising main (duplicate 150mm dia.);
- Increase SPS 132 and 67 emergency storage capacity;
- Include additional flows in Victoria Point WWTP future augmentations; and
- Emergency storage requirements are to be revised under ERA 63(3) 2013.

### 8.3 Revised PDA Assessment

A revised hydraulic assessment was undertaken using hydraulic computational spreadsheets, aligned with Victoria Point Catchment Planning. Development lots were added in advance, for example lots expected to be realised by 2015 were added to 2013 planning, rather than 2018 planning.

Appendix C contains the hydraulic output tables.

### 8.4 Planning Impacts

The analysis identified the following schedule and sizing for the upgrades:

**Table 8-2 Revised Planning for Infrastructure Servicing Weinam Creek PDA**

SPS #	Pump (L/s)	Duplicate Rising Main (mm dia.)	Wet Well (kL)	Emergency Storage (ML)	Downstream Gravity Main (mm dia.)
132				2018 1	
90	61 2015	150 2015	2013		
67	314 2020	450 2013		2013 1	450 2 2018

Note:

1. Emergency storage requirements are to be revised under ERA 63(3) 2013.
2. Duplicate gravity main - required size should be verified with hydraulic model.
3. Blank items do not have any planned upgrades for capacity.
4. The timing for sizing of items in grey has not been affected by the proposed development.

SPS 132 and its rising main have significant available capacity for development in the area and should be utilised where possible in development infrastructure design.

The PDA will require new infrastructure upgrades as well as the increase and bring forward of additional programmed upgrades. Any upgrades that are re-scheduled for 2013 as a result of the additional PDA flows are required for the first stage of the PDA.

Victoria Point WWTP has an operating license capacity of 12 ML/d dry weather and 36 ML/d wet weather flows, with mass load limitations. The design capacity is a conservative 34,000EP, and the available design capacities at the WWTP are currently at 1000EP as at July 2013. This available capacity is likely to be used in the near future due to other anticipated development in the catchment.

RCC reports the WWTP is performing well at near design capacity; however there is concern over the future TN (total nitrogen) mass load.

Any development at the PDA will require plant upgrades to mitigate hydraulic and biological (mass) load restrictions at the WWTP. Additionally a revised operating license may be required (which may not be possible), or alternative servicing strategy and upgrades.

There may be a requirement for development to contribute to the upgrade costs of the sewer servicing infrastructure.

## 9 Conclusions and Recommendations

---

The water supply and sewerage servicing conclusions are based on hydraulic assessment and current RCC planning. The updated IDM and new DSS adopted in July 2013 may impact on the infrastructure requirements identified in this report.

### 9.1 Toondah Harbour PDA

The Toondah Harbour PDA was found to have 2528EP (water) and 2963EP (sewer) under the preferred development scenario, with 23.6L/s Peak Hour water demand and 34.3L/s Peak Wet Weather Flow.

#### 9.1.1 Water Supply Servicing

No additional augmentations are required to meet the required water DSS.

#### 9.1.2 Sewer Servicing

To meet the required sewerage DSS, the following augmentations are required:

- SPS 2 - increase capacity and bring forward the upgrade of pumps, rising main and emergency storage when development commences;
- SPS 4 - increase the pump and emergency storage capacity, and, when development commences, construct a new duplicate 225mm rising main;
- SPS 5 - increase emergency storage capacity plus upgrade pumps 3 years earlier than the planned age driven replacement;
- SPS 6 and SPS 128 - connect existing rising mains, and based on observed flowrate improvements, revise timing of the pump upgrade (and SPS128 decommissioning), and increase capacity of SPS 6 pumps and wet well to accommodate development flows;
- Bring forward the gravity main upgrade upstream of SPS 5 by approximately 8 years;
- Bring forward the gravity main upgrade upstream of SPS 6 by approximately 3 years; and
- Increase future hydraulic and biological capacity upgrades at the Cleveland WWTP to accommodate the development.

### 9.2 Weinam Creek PDA

The Weinam Creek PDA was found to have 1888EP (water) and 2199 EP (sewer) under a preferred development scenario, with 18.1L/s Peak Hour water demand and 25.5L/s Peak Wet Weather Flow

#### 9.2.1 Water Supply Servicing

To meet the required water DSS, the following augmentations are required:

- Two new 150mm dia. internal link water mains to meet fire flow requirements, one partially through the development, from Auster Street to Gordon Street; and the other from the Esplanade/Weinam Street to Banana Street/ Marina service main connection; and
- Potential localised water main augmentations, depending on the final development layout, to meet fire flow requirements.

No other additional water infrastructure upgrades required to meet DSS.

#### 9.2.2 Sewer Servicing

To meet the required sewerage DSS, the following augmentations are required:

- SPS 90 - upgrade capacity in the rising main and wet well, and increase capacity for the pump upgrade;
- SPS 67 - increase capacity of the pump, rising main, wet well, emergency storage and downstream gravity main; and
- Increase future hydraulic and biological capacity upgrades at the Victoria Point WWTP to accommodate the development, where operational licence modification allows this, or include development flows with alternate WWTP servicing.

### 9.3 Recommendations

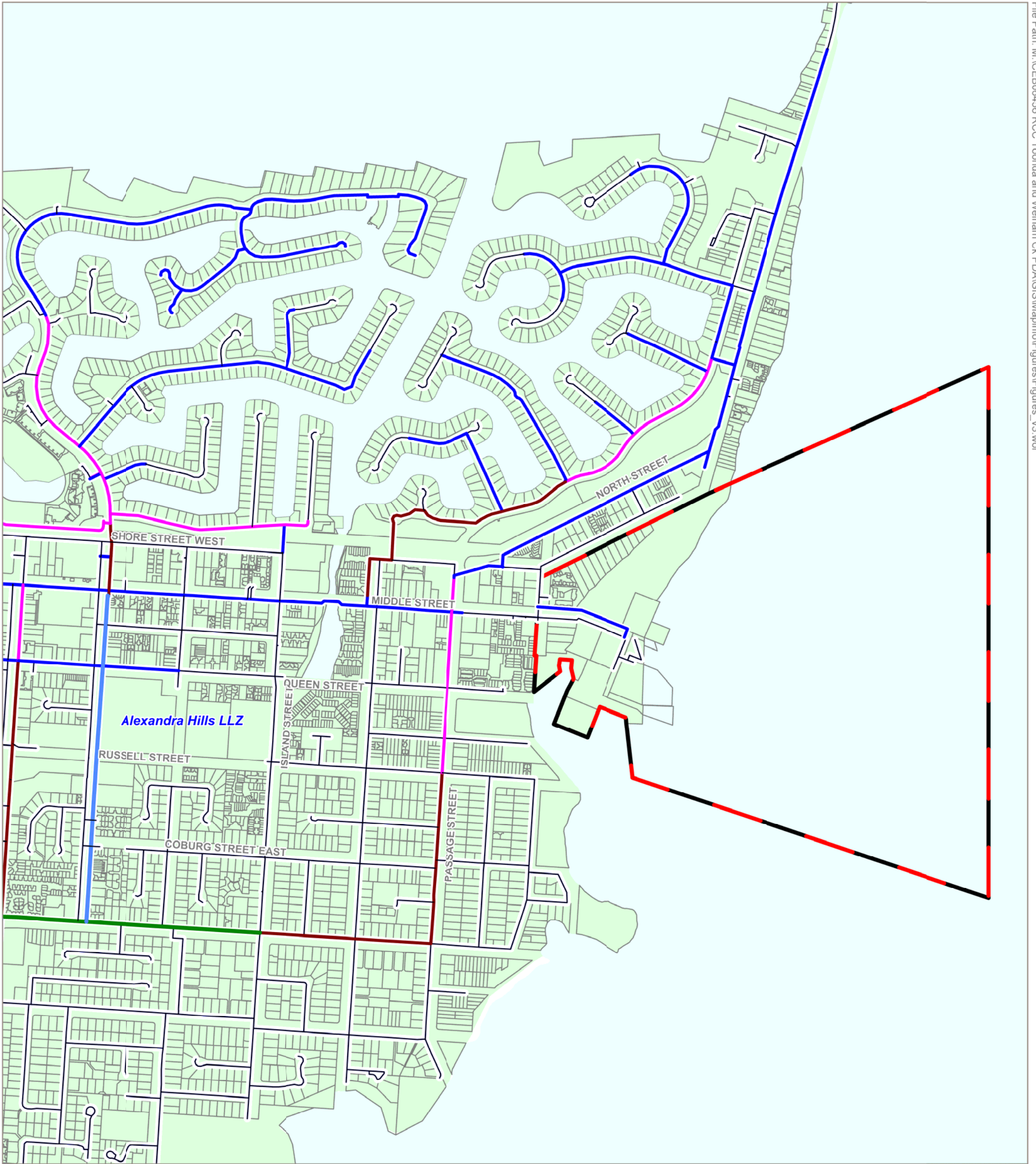
Based on the assessments completed in this report it is recommended that:

- For each PDA; the augmentations identified within the report are adopted for planning purposes, and revised with the new IDM and resulting hydraulic models, for the 2014 PIP;
- For each PDA, development servicing requirements are revised and developer contribution costs defined when detailed development layouts are identified;
- The licencing and servicing issues at Victoria Point WWTP are resolved whether the Weinam Creek PDA is pursued or not;
- Revisit SPS4 gravity main upgrade/ SPS 2 rising main extension to ensure the optimal, potentially staged, solution is adopted;
- SPS 132 and its rising main have significant available capacity for development in the area and should be utilised where possible; and
- Upon connection of the new rising mains for SPS 6 and 128, the increase of pump performance should be measured, and the new SPS 6 pump upgrade rescheduled in light of this and the new IDM.

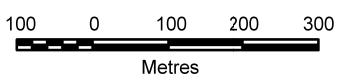
Toondah Harbour and Weinam Creek  
PDAs Structure Plan Development

**APPENDIX A**  
WATER AND SEWER NETWORK PLANS





Scale: 1:10,000



SHEET A3  
 Project No: CEB6456  
 Date: 13/01/2014  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council

**LEGEND**

- Water Supply Mains (Diam)**
- <=100
  - 150
  - 200
  - 250
  - 300
  - 375
  - >=500

- PRV
- DMA Boundary Valve

Water Supply Zone

Priority Development Area

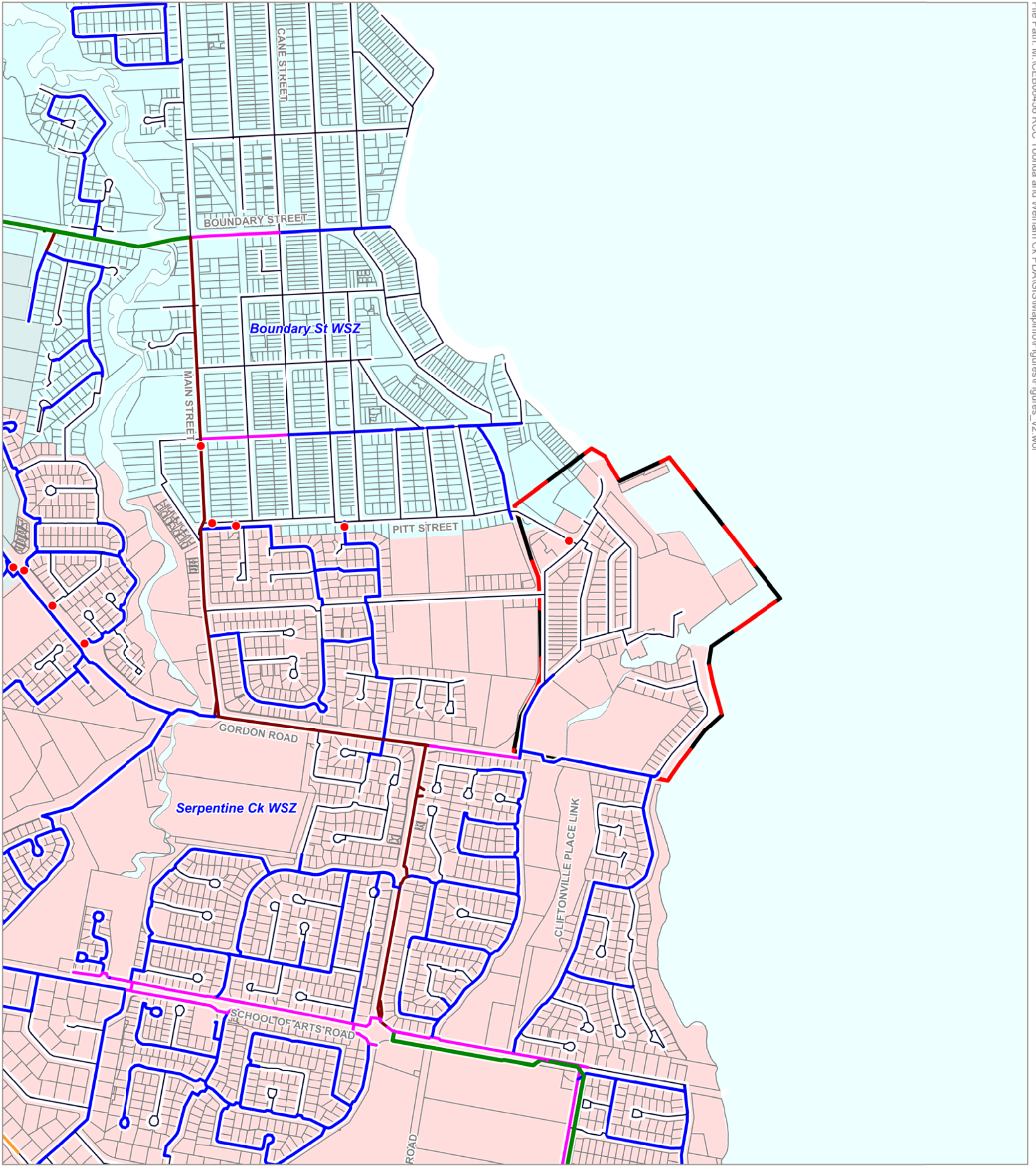
**Figure 1**

**Toonda Harbour PDA**

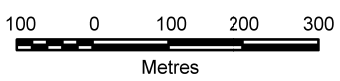
**Existing Infrastructure**







Scale: 1:10,000



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Project No: CEB6456  
Date: 02/12/2013  
Revision Number:  
Designed by:  
Client Name: Redland City Council

**LEGEND**

Water Supply Mains (Diam)

- <=100
- 150
- 200
- 225
- 250
- 300
- 375

- PRV
- DMA Boundary Valve

Water Supply Zone

Priority Development Area

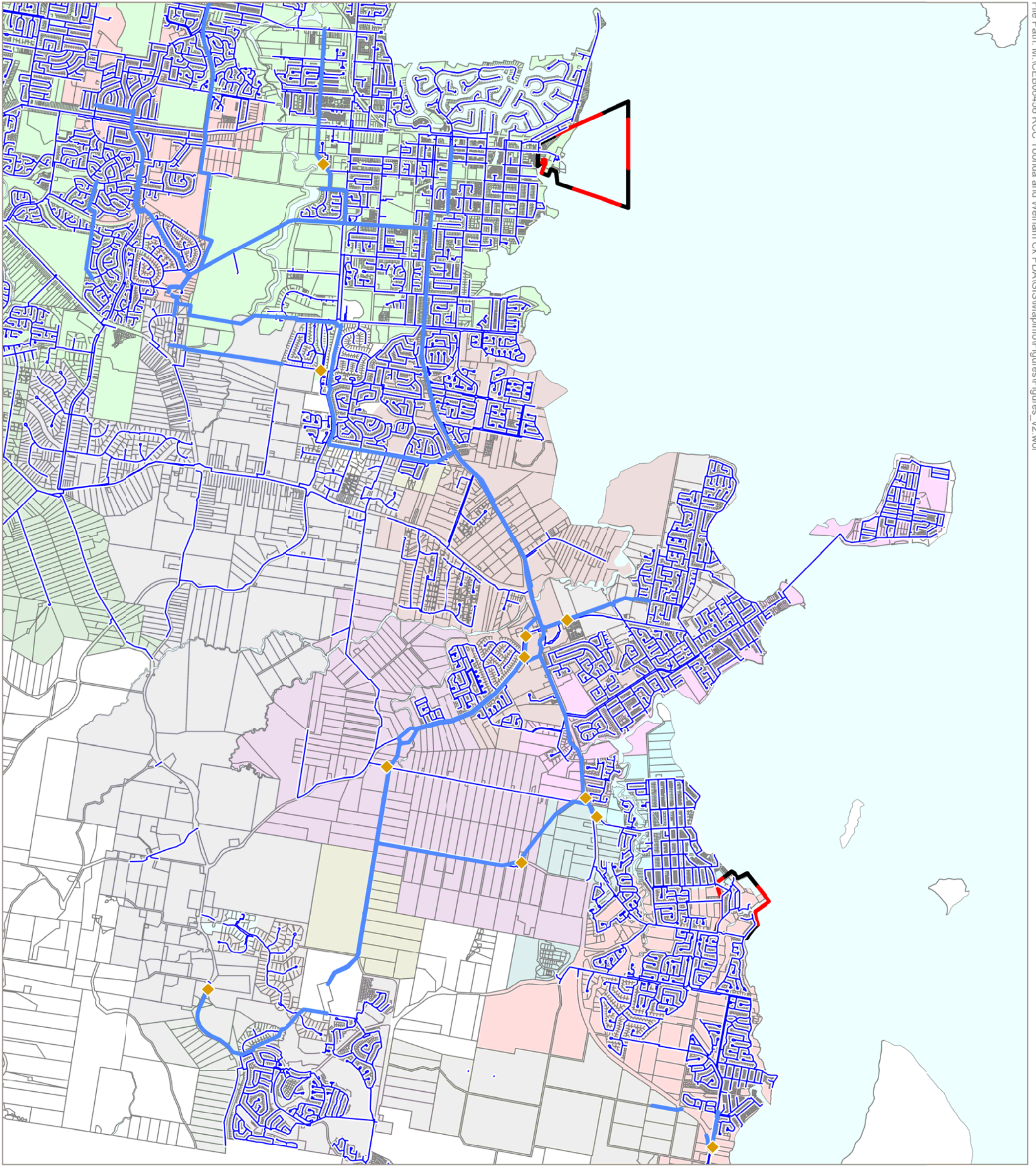
**Figure 2**

**Weinam Creek PDA**

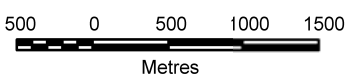
**Existing Infrastructure**












Scale: 1:50,000



**LEGEND**

-  Water Supply Main  $\geq 375$
-  Water Supply Main  $< 375$
-  PRV
-  Water Supply Zone
-  Priority Development Area

**Figure 3**

**Toonda Harbour and Weinam Creek PDA's**

**Existing Infrastructure**

SHEET A3  
 Project No: CEB6456  
 Date: 02/12/2013  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council



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 Level 11, North Tower, 515 St Pauls Terrace  
 Locked Bag 4006, Fortitude Valley QLD 4006  
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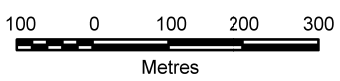
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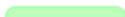





Scale: 1:10,000



**LEGEND**

-  Sewer Pump Station
-  Sewer Rising Main
-  Sewer Gravity Main
-  Sewer Transfer Route
-  Property Development Area

**Figure 4**

**Toonda Harbour PDA**

**Existing Infrastructure**

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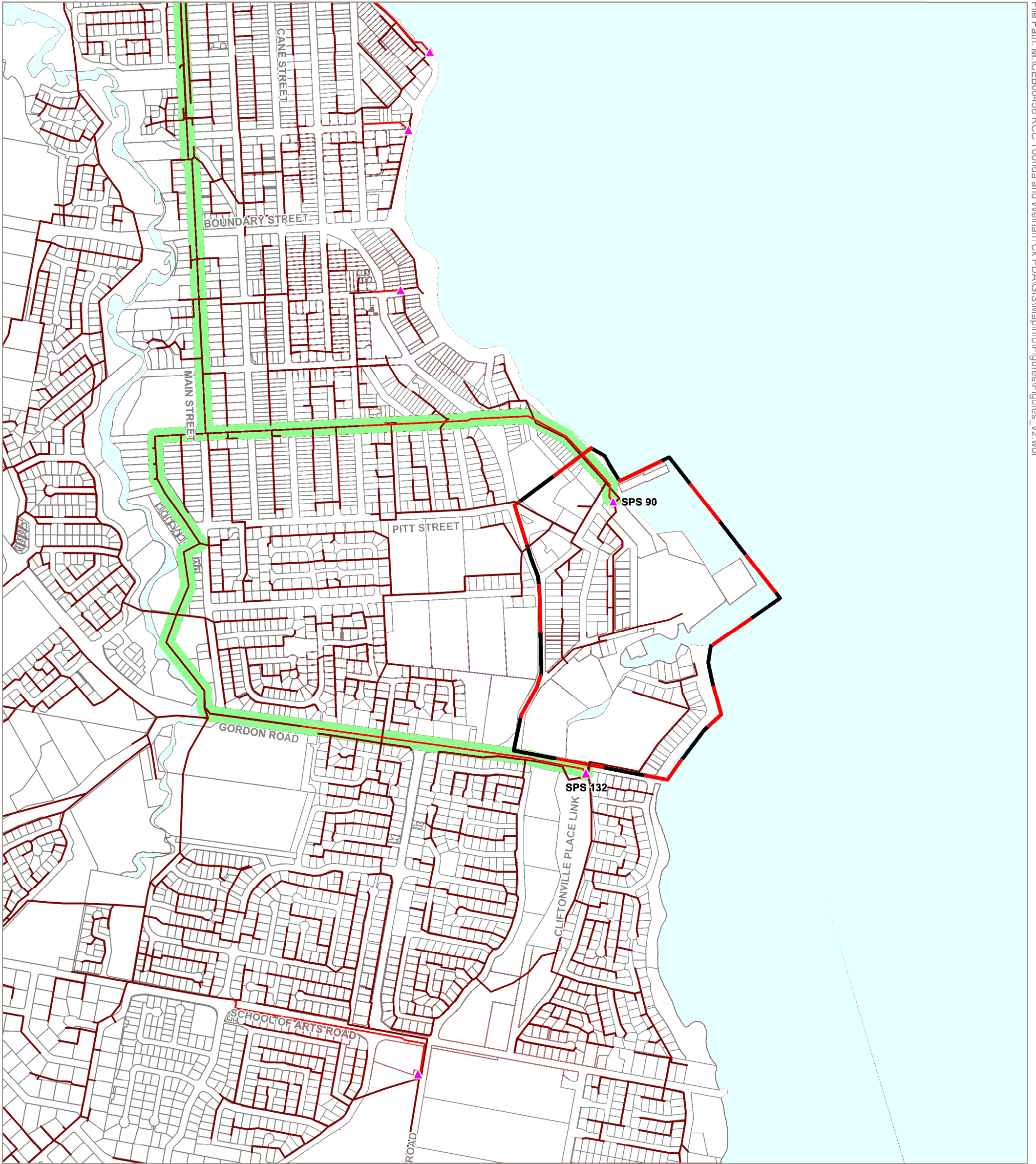
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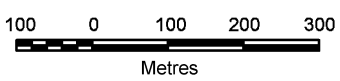
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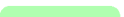




Scale: 1:10,000



### LEGEND

-  Sewer Pump Station
-  Sewer Rising Main
-  Sewer Gravity Main
-  Property Development Area
-  Sewer Transfer Route

## Figure 5

### Weinam Creek PDA

### Existing Infrastructure

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 Date: 02/12/2013  
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 Client Name: Redland City Council

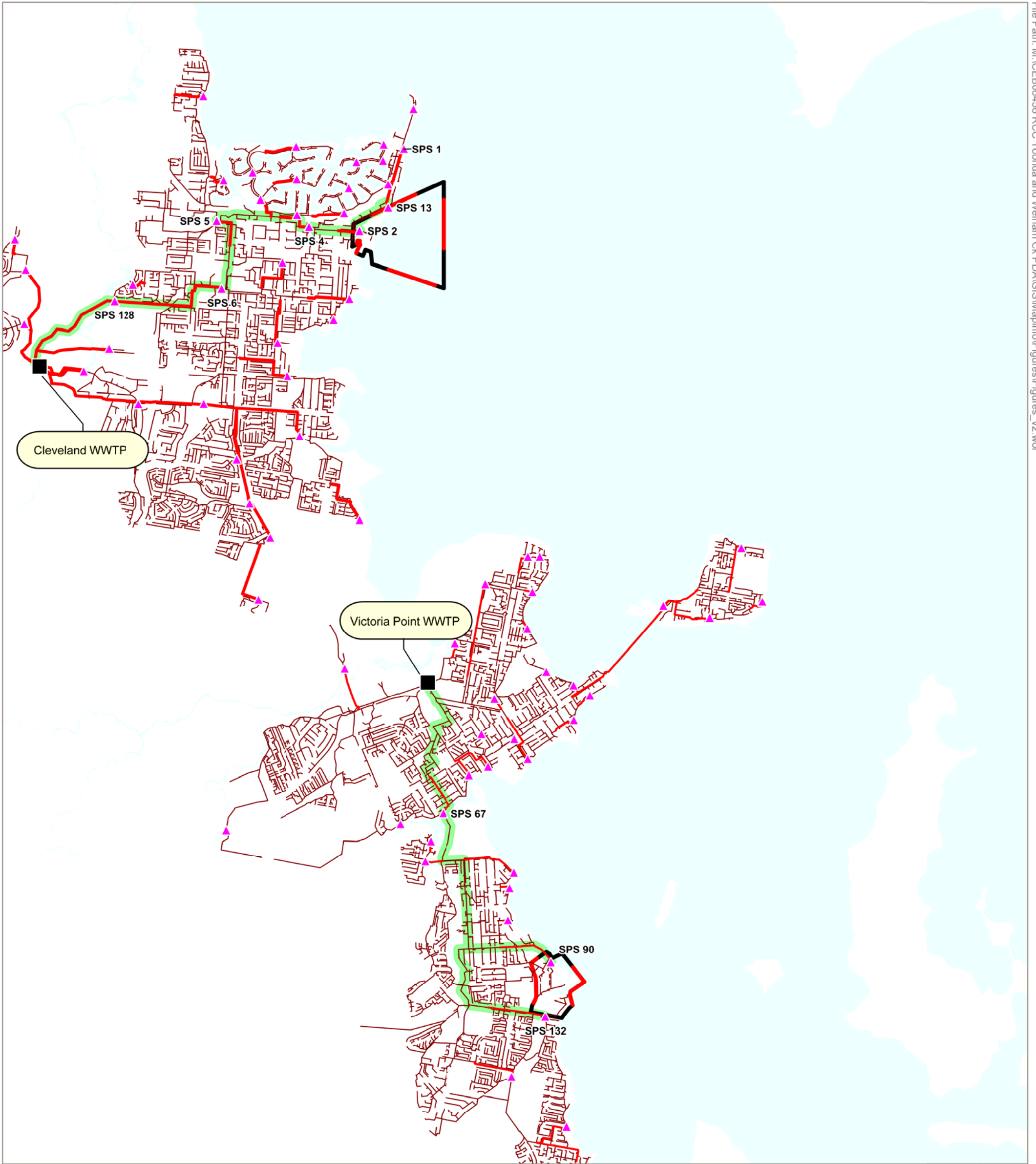


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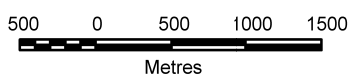
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Scale: 1:50,000



**LEGEND**

- Sewer Pump Station
- Sewer Rising Main
- Sewer Gravity Main
- Property Development Area
- Wastewater Treatment Plant (WWTP)
- Sewer Transfer Route

**Figure 6**

**Toonda Harbour and Weinam Creek PDA's**

**Existing Infrastructure**

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 Project No: CEB6456  
 Date: 02/12/2013  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council



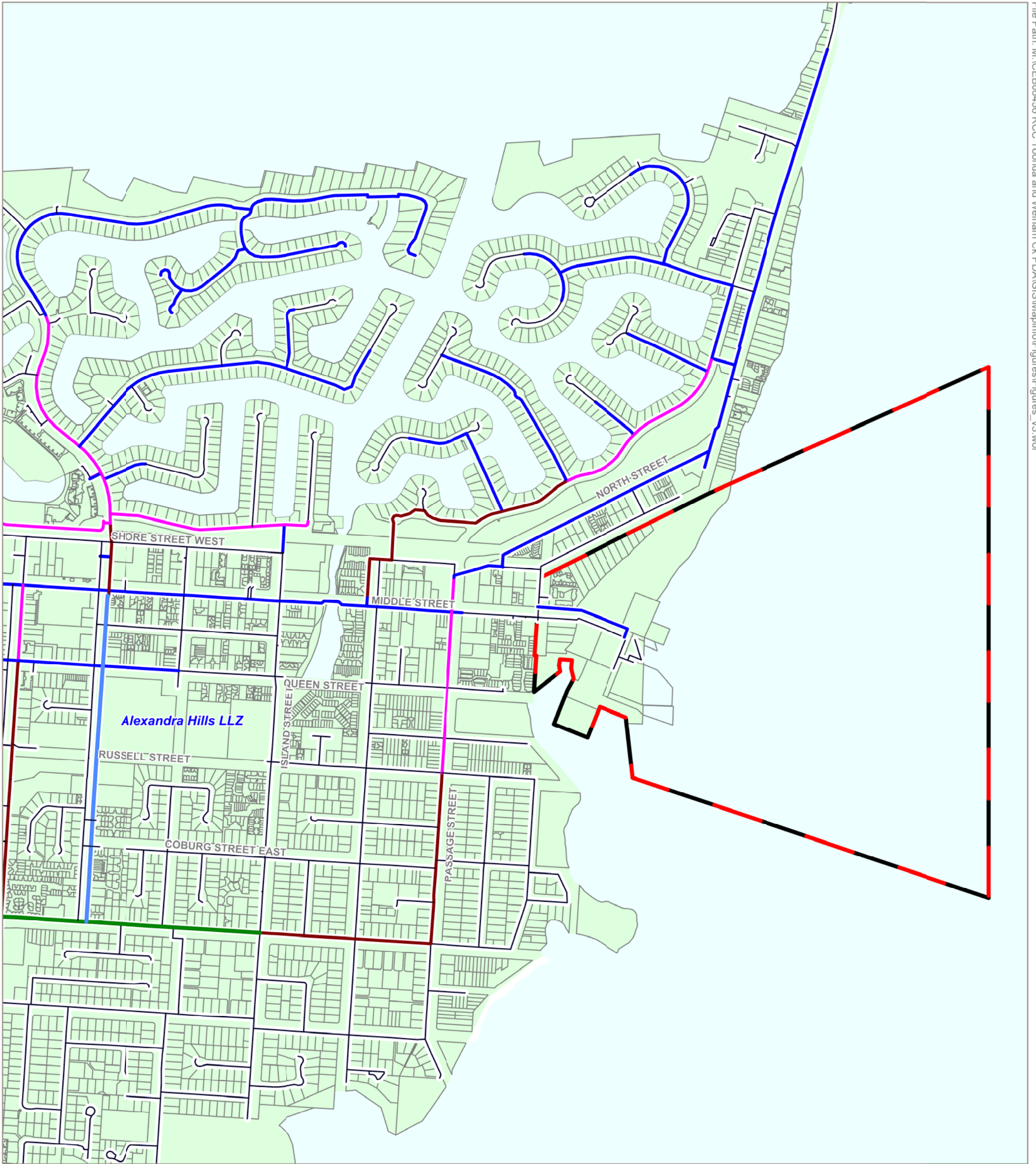
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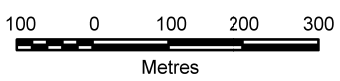
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 Date: 13/01/2014  
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**LEGEND**

**Water Supply Mains (Diam)**

- <=100
- 150
- 200
- 250
- 300
- 375
- >=500

- PRV
- DMA Boundary Valve

Water Supply Zone

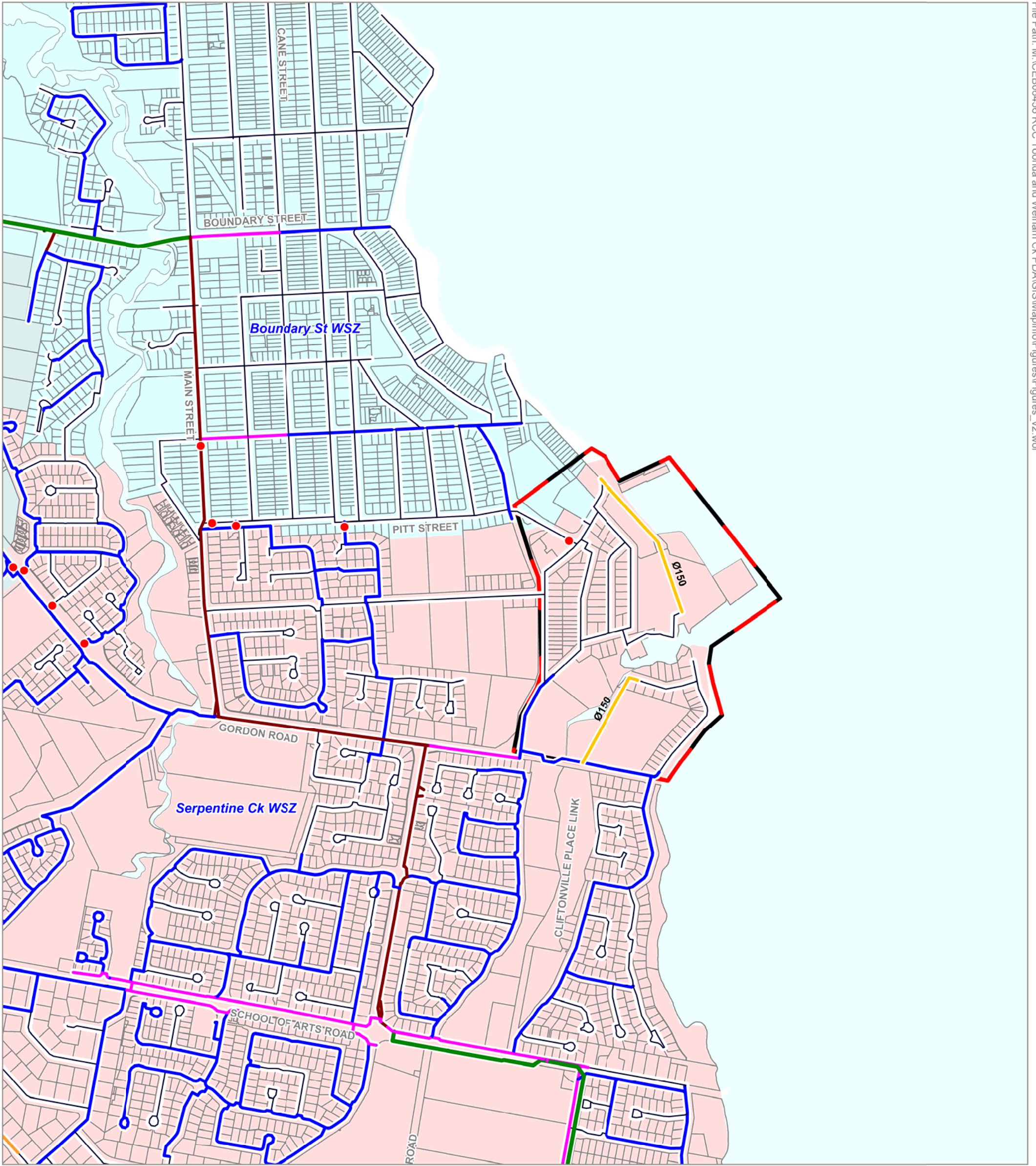
Priority Development Area

**Figure 7**

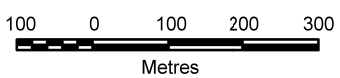
**Toondah Harbour PDA  
 Proposed Infrastructure**







Scale: 1:10,000



SHEET A3  
 Project No: CEB6456  
 Date: 02/12/2013  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council

**LEGEND**

Water Supply Mains (Diam)

- <=100
- 150
- 200
- 250
- 300
- 375
- >=500

- PRV
- DMA Boundary Valve

Water Supply Zone

Priority Development Area

Proposed Water Supply Main

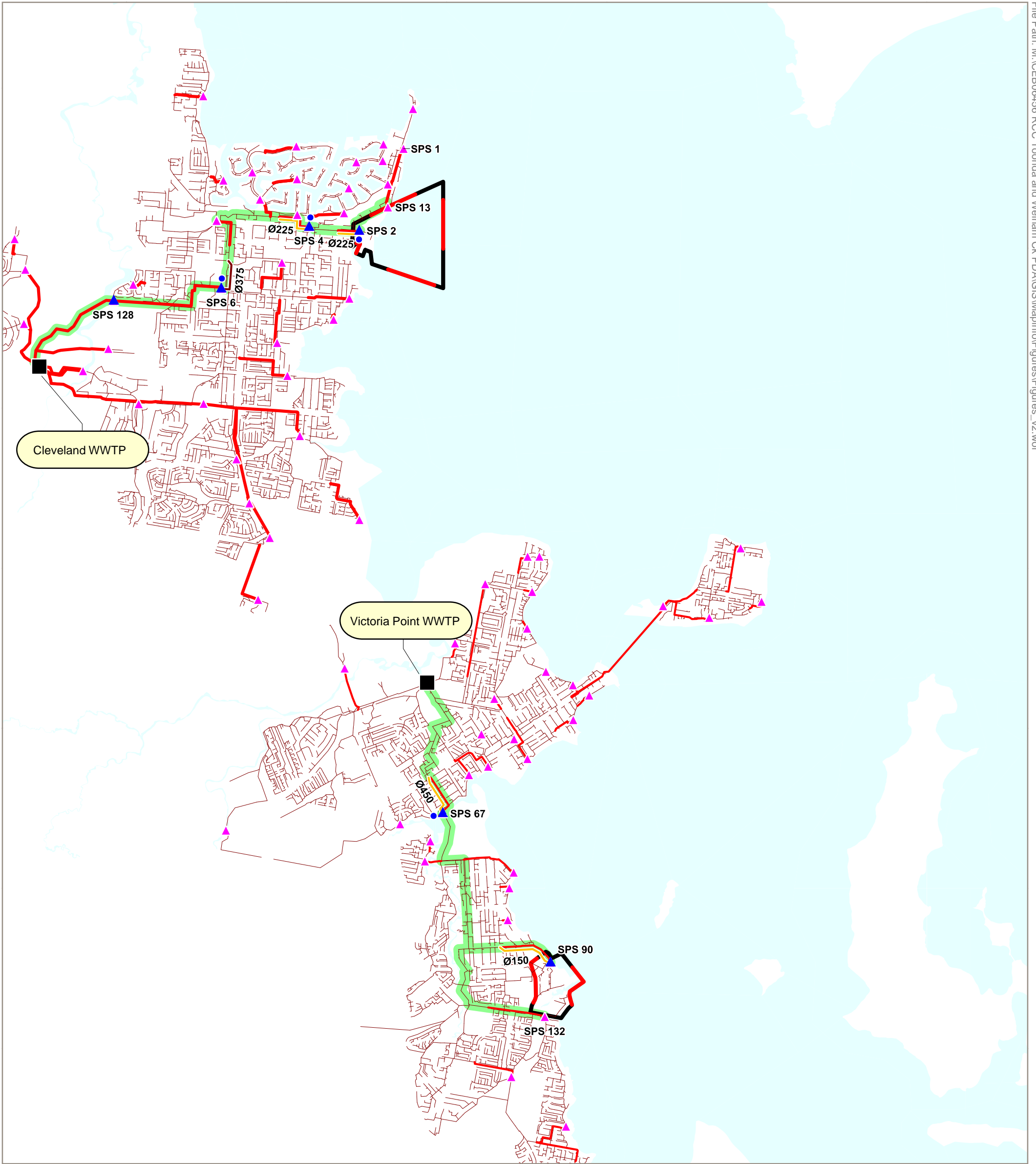
**Figure 8**

**Weinam Creek PDA**

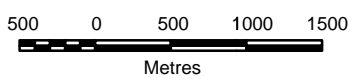
**Proposed Infrastructure**







Scale: 1:50,000



SHEET A3  
 Project No: CEB6456  
 Date: 02/12/2013  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council

**LEGEND**

- ▲ Sewer Pump Station
- Wastewater Treatment Plant (WWTP)
- Sewer Rising Main
- Sewer Gravity Main
- Property Development Area
- Sewer Transfer Route
- ▲ Sewer Pump Station Upgrade
- Emergency Storage Upgrade
- Rising Main Upgrade
- Gravity Main Upgrade

**Figure 9**

**Toonda Harbour and Weinam Creek PDA's**  
**Proposed Infrastructure**  
**(Changes to current planning)**





Toondah Harbour and Weinam Creek  
PDAs Structure Plan Development

**APPENDIX B**  
PREFERRED DEVELOPMENT – LAND  
USE AND EQUIVALENT POPULATION

**Toondah Harbour PDA – Land use and demand calculations**

Preferred Option from Scott email 23/10/13

No.	description	% of total area	Area (m2)	Residential (Dwelling Units)	Residential Population (2.0pp/dwelling)	Residential GFA (120m2/unit)	Retail (GFA)	Commercial (GFA)	Community Use (GFA)	Townhouse (lots)	Marine Service (GFA)	Marina Berths (No.)	Total GFA	Total GFA/Area (Plot Ratio)	Staging (2015-20, 2020-35, 2035-40)	Water EP	Sewerage EP	Water Demand PH (L/s)	Sewerage Flows PWWF (L/s)
1	public streets	8	55225										0	0.00	2015	0	0	0.0	0.0
2	recreational parkland and plazas	6	37596						50				50	0.00	2015	1	2	0.0	0.0
3	environment - vegetation	4	27227										0	0.00	2015	0	0	0.0	0.0
4	environment - water	27	183076										0	0.00	2015	0	0	0.0	0.0
5	marina	28	192182										0	0.00	2015	0	0	0.0	0.0
6	mixed-use	3	21496	295	590	35400	2000	800					38200	1.78	2015	443	567	4.2	6.6
7	mixed-use	3	18994	230	460	27600	2000	700					30300	1.60	2020	350	447	3.3	5.2
8	mixed-use	2	10927	70	140	8400	1000	1000					10400	0.95	2020	113	144	1.1	1.7
9	mixed-use & ferry terminal	1	5282	50	100	6000			1000				7000	1.33	2020	100	127	0.9	1.5
10	residential	4	29920	250	500	30000							30000	1.00	2020	358	459	3.5	5.3
11	residential	1	5790	140	280	16800							16800	2.90	2020	200	257	1.9	3.0
12	residential	0	2270		80	4800				40			4800	2.11	2020	108	108	1.2	1.3
13	residential	0	2161		180	10800				90			10800	5.00	2020	243	243	2.7	2.8
14	car park & vehicle ferry	3	19409					300					300	0.02	2020	1	1	0.0	0.0
15	car park	1	7429										0	0.00	2020	0	0	0.0	0.0
16	maritime services	2	16730								6000		6000	0.36	2035	16	11	0.1	0.1
17	long term land reclamation	7	46374		1080	64800		3000				540	67800	1.46	2035	594	597	4.6	6.9
		<b>100</b>	<b>682088</b>	<b>1035</b>	<b>3410</b>	<b>204600</b>	<b>5000</b>	<b>5800</b>	<b>1050</b>	<b>130</b>	<b>6000</b>	<b>540</b>	<b>222450</b>			<b>2528</b>	<b>2963</b>	<b>23.6</b>	<b>34.3</b>

Note: grey cells indicate where supplied data has been separated for demand calculations

### Weinam Creek PDA – Land use and demand calculations

Preferred Option from RCC Scott H email 23/10/13

No.	Description	% of Total Area	Area (m2)	Residential (dwelling units)	Residential Population (2pp/dwelling)	Residential GFA (120m2/unit)	Retail (GFA)	Commercial (GFA)	Community (GFA)	Townhouse (lots)	Marine Service (GFA)	Marina Berths (No.)	Total GFA	Total GFA/ Area (Plot Ratio)	Staging (2015-20, 2020-35, 2035-40)	Water EP	Sewerage EP	Water Demand PH (L/s)	Sewerage Flows PWWF (L/s)
1	public streets	20	97161	0	0	0							0	0	2015	0	0	0.0	0.0
2	recreational parkland and plazas	15	69996	0	0	0			200				200	0	2015	6	7	0.0	0.1
3	environment - vegetation	10	48550	0	0	0							0	0	2015	0	0	0.0	0.0
4	environment - water	9	42917	0	0	0							0	0	2015	0	0	0.0	0.0
5	marina	4	17734	0	0	0							0	0	2015	0	0	0.0	0.0
6	retail	1	2974	0	0	0	500						500	0	2015	5	5	0.0	0.1
7	mixed-use	6	26773	114	228	13680	2500	2000	0				18180	1	2015	193	245	1.8	2.8
8	mixed-use	2	7740	59	118	7080	1500	1500	500				10580	1	2020	118	149	1.1	1.7
9	mixed-use	2	7678	50	100	6000		1000	1000				8000	1	2020	104	131	0.9	1.5
10	community	1	2957	0	0	0			1800				1800	1	2020	52	63	0.4	0.7
11	residential	2	7358	100	200	12000							12000	2	2020	143	184	1.4	2.1
12	residential	2	10393	130	260	15600							15600	2	2020	186	239	1.8	2.8
13	residential	5	24588	200	400	24000							24000	1	2020	286	367	2.8	4.3
14	residential	1	6920		110	6600				55			6600	1	2020	149	149	1.6	1.7
15	residential	1	3762		120	7200				60			7200	2	2020	162	162	1.8	1.9
16	residential	5	25583		152	9120				76			9120	0	2020	205	205	2.3	2.4
17	maritime services	1	5541	0	0	0					2500		2500	0	2035	7	5	0.1	0.1
	marina	0	0	0	0	0						200	0	0	2035	216	216	1.7	2.5
18	car park, boat ramp & vehicle ferry	13	61366	0	0	0		300					300	0	2020	1	1	0.0	0.0
19	Boat Club	1	4965	0	0	0		0	2000				2000	0	2020	57	70	0.4	0.8
		<b>100</b>	<b>474956</b>	<b>653</b>	<b>1688</b>	<b>101280</b>	<b>4500</b>	<b>4800</b>	<b>5500</b>	<b>191</b>	<b>2500</b>	<b>200</b>	<b>118580</b>			<b>1888</b>	<b>2199</b>	<b>18.1</b>	<b>25.5</b>

Note: grey cells indicate where supplied data has been separated for demand calculations

Toondah Harbour and Weinam Creek  
PDAs Structure Plan Development

**APPENDIX C**  
SEWER HYDRAULIC OUTPUTS

## Sewer Hydraulic Calculations -Toondah Harbour PDA

### Existing Infrastructure

SPS #	Pump flowrate (L/s)	Rising Main Dia. (mm)	Wet Well volume (kL)
2	21	150	3
4	22	200	3
5	243	375	15
6	146	450	24
128	190	450	3

### Current Planning

SPS #	Total EP						PWWF					C1 Factored Flow						ADWF						
	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038
2	1522	1948	2373	2373	2373	2727	22	28	34	34	34	39	20	25	29	29	29	33	380	487	593	593	593	682
4	3311	4035	4753	4753	4753	5243	48	58	69	69	69	76	39	46	52	52	52	57	828	1009	1188	1188	1188	1311
5	12099	14319	16513	16513	16513	17303	175	207	239	239	239	250	114	131	147	147	147	153	3025	3580	4128	4128	4128	4326
6	22830	26320	29752	29752	29752	30147	330	381	430	430	430	436	192	216	239	239	239	242	5707	6580	7438	7438	7438	7537
128	22831	26321	29753	29753	29753	30148	330	381	430	430	430	436	192	216	239	239	239	242	5708	6580	7438	7438	7438	7537

### Current Planning +1500 EP

SPS #	Total EP						PWWF					C1 Factored Flow						ADWF						
	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038
2	3022	3448	3873	3873	3873	4227	39	46	52	52	52	57	38	42	47	47	47	50	680	787	893	893	893	982
4	4811	5535	6253	6253	6253	6743	65	76	86	86	86	93	56	63	70	70	70	74	1128	1309	1488	1488	1488	1611
5	13599	15819	18013	18013	18013	18803	192	225	256	256	256	268	131	148	164	164	164	170	3325	3880	4428	4428	4428	4626
6	24330	27820	31252	31252	31252	31647	348	398	448	448	448	454	209	234	257	257	257	259	6007	6880	7738	7738	7738	7837
128	24331	27821	31253	31253	31253	31648	348	398	448	448	448	454	209	234	257	257	257	259	6008	6880	7738	7738	7738	7837

### Current Planning + Revised PDA EPs

SPS #	Total EP						PWWF					C1 Factored Flow						ADWF						
	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038
2	2090	3112	4133	4728	5336	5690	29	42	55	62	69	74	27	38	50	57	64	67	494	720	945	1064	1186	1274
4	3880	5199	6513	7108	7717	8206	54	72	89	96	103	110	45	59	73	80	87	91	942	1242	1540	1659	1781	1903
5	12668	15483	18272	18868	19476	20266	182	221	259	266	273	285	120	144	167	174	181	187	3139	3813	4480	4599	4721	4918
6	23399	27484	31512	32107	32715	33110	337	394	451	458	465	470	199	230	260	267	274	276	5821	6813	7790	7909	8031	8129
128	23399	27485	31513	32108	32716	33111	337	394	451	458	465	470	199	230	260	267	274	276	5821	6813	7790	7909	8031	8130

### Development as % of Total EP - Toondah Harbour

SPS #	Total EP					
	2013	2018	2023	2028	2033	2038
Dev EP	569	1164	1760	2355	2963	2963
2	27.2%	37.4%	42.6%	49.8%	55.5%	52.1%
4	14.7%	22.4%	27.0%	33.1%	38.4%	36.1%
5	4.5%	7.5%	9.6%	12.5%	15.2%	14.6%
6	2.4%	4.2%	5.6%	7.3%	9.1%	8.9%
128	2.4%	4.2%	5.6%	7.3%	9.1%	8.9%

## Sewer Hydraulic Calculations - Weinam Creek PDA

### Existing Infrastructure

SPS #	Pump flowrate (L/s)	Rising Main Dia. (mm)	Wet Well volume (kL)
67	275	295	37
90	38	150	2
132	82	250	4

### Current Planning

SPS #	Total EP						PWWF						C1 Factored Flow						ADWF					
	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038
67	14848	17210	19955	19955	19955	19955	215	249	289	289	289	289	215	249	289	289	289	289	3712	4302	4989	4989	4989	4989
90	1843	2321	2608	2608	2608	2608	27	34	38	38	38	38	27	34	38	38	38	38	461	580	652	652	652	652
132	1411	1468	1501	1501	1501	1501	20	21	22	22	22	22	20	21	22	22	22	22	353	367	375	375	375	375

### Current Planning +1500 EP

SPS #	Total EP						PWWF						C1 Factored Flow						ADWF					
	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038
67	16348	18710	21455	21455	21455	21455	232	266	306	306	306	306	232	266	306	306	306	306	4012	4602	5289	5289	5289	5289
90	3343	3821	4108	4108	4108	4108	44	51	55	55	55	55	44	51	55	55	55	55	761	880	952	952	952	952
132	1411	1468	1501	1501	1501	1501	38	39	39	39	39	39	38	39	39	39	39	39	653	667	675	675	675	675

### Current Planning + Revised PDA EPs

SPS #	Total EP						PWWF						C1 Factored Flow						ADWF					
	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038	2013	2018	2023	2028	2033	2038
67	14848	17210	20031	20031	20031	20031	218	259	305	312	314	314	218	259	305	312	314	314	3764	4469	5270	5384	5428	5428
90	1843	2321	2684	2684	2684	2684	30	43	52	58	61	61	30	43	52	58	61	61	512	747	892	1007	1051	1051
132	1411	1468	1577	1577	1577	1577	20	21	24	24	24	24	20	21	24	24	24	24	353	367	416	416	416	416

### Development as % of Total EP - Weinam Creek

SPS #	Total EP					
	2013	2018	2023	2028	2033	2038
Dev EP	258	831	1405	1978	2199	2199
PS 67	1.7%	4.6%	6.6%	9.0%	9.9%	9.9%
PS 90	12.3%	12.3%	12.3%	12.3%	12.3%	12.3%
PS 132	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Toondah Harbour and Weinam Creek  
PDAs Structure Plan Development

**APPENDIX D**  
TECHNICAL MEMORANDUMS



<b>Project Title</b>	Toondah Harbour and Weinam Creek PDA, Workshop 1		
<b>Project No:</b>	CEB06456		
<b>Date</b>	12 July 2013	<b>Technical Memo No#</b>	2
<b>Issued By;</b>	Belinda Maxwell		
<b>Issued To:</b>	Scott Hutchinson, Redland City Council - for distribution to Workshop 1 attendees		

## Sewerage Servicing Assessment

The focus of the preliminary assessment for Sewerage Servicing is on the external network, which includes the existing reticulation and trunk mains, pumping stations and waste water treatment plants. This is because, to service any proposed development at either Priority Development Area (PDA), the major impacts and costs are likely to be from upgrades to the existing sewer infrastructure to accommodate the increased flows, rather than new pipe infrastructure to connect the development to existing services.

### Toondah Harbour PDA

#### Sewerage Servicing Infrastructure

The Toondah Harbour PDA is serviced by two pump stations, SPS 'north' and SPS 2, as shown in Figure 4.

SPS north services a small residential area north of the PDA (and a public toilet block within the PDA), and pumps into the gravity main upstream of SPS 2, which in turn pumps into the downstream gravity sewer on Middle Street. From this point pump stations 4, 5, 6 and 128 (7), and their associated gravity networks transport the sewerage to the Cleveland WWTP (refer to Figure 6).

#### Priority Infrastructure Plan

Planned upgrades for the Sewerage network, and proposed year of commissioning, from the current Priority Infrastructure Plan (PIP) include:

- > Upgrade pumps within the SPS 2 (SPS002) and rising main extension to Channel St in 2013, (currently underway)
- > Upgrade SPS 4 in 2013
- > Wet well at SPS 2 (SPS002) and SPS 4 (SPS004) in 2018
- > Upgrade gravity main from Ross Creek to SPS 4 (SPS004) in 2013/14
- > Upgrade gravity main from Wynyard St to SPS 5 (SPS005), and pump station SPS005 in 2025

SPS 6 and 128 have recently received upgrades.



# Technical Memo: Sewerage Servicing

The Cleveland Waste Water Treatment Plant (WWTP) has one growth driven upgrade that may be affected by additional flows from development, and is scheduled for 2012 in the PIP, though currently postponed.

## Preliminary Hydraulic Assessment

Sewerage flows were calculated based on Toondah Harbour potential land use (GHD report 2011) and the SEQ D&C Guidelines 2013. Toondah Harbour may gain 1500 Equivalent Persons (EP) when the full 400 berth marina is included.

As no previous studies were provided, Weinam Creek PDA was assumed to gain 1500 EP after development.

**Table 1 Design flows for 1500 EPs**

EPs	Sewer Flow	
	ADWF (kL/d)	PWWF (L/s)
1500	300	17.4

Hydraulic assessment of the additional demands from development identified the following changes to the PIP:

- > new SPS 2 pump capacity is exceeded in approximately 2014,
- > SPS 4 pump and wet well capacity is exceeded in approximately 2014
- > SPS 6 wet well capacity is exceeded in 2018
- > SPS 5, 6 and 128 pump capacities are exceeded in 2018

Cleveland WWTP is also approaching capacity, and additional flows need to be considered in the sizing and timing of the upgrades.

## Potential Infrastructure Requirements

The potential changes to the PIP to resolve the identified issues includes:

- > Upgrade SPS 2 and rising main upon completion of development (or sooner, if external growth absorbs capacity first)
- > Increase capacity of SPS 4 and rising main upgrade to accommodate new flows
- > Bring forward upgrade of SPS 4 wet well from 2018 to 2014
- > Upgrade SPS 6 wet well in 2018
- > Upgrade SPS 5, 6 and 128 pumps and rising mains in 2018
- > Include additional flows in Cleveland WWTP upgrades.

## Weinam Creek PDA

### Sewerage Servicing Infrastructure

The Weinam Creek PDA is serviced by two pump stations, SPS 90 and SPS 132, which service north and south of Weinam Creek respectively and pump into the gravity sewer along Moogurrapum Creek (refer Figure 5). The sewage is transported to and treated at the Victoria Point WWTP from this point via SPS 67, and the associated gravity networks, as shown in Figure 6.

### Priority Infrastructure Plan

Planned upgrades for the Sewerage network (and proposed year of commissioning) from the PIP include:

- > Upgrade SPS 90 in 2018
- > Emergency Storage at SPS 132 in 2018
- > Emergency Storage at SPS67 in 2018
- > Upgrade SPS67 in 2023, and downstream gravity main to Link Road (at YMCA) in 2018

Additionally the Victoria Point WWTP has one growth driven upgrade that may be affected by additional flows from development, and is scheduled for 2013 in the PIP.

### Preliminary Hydraulic Assessment

As no previous studies were provided, Weinam Creek PDA was assumed to gain 1500 EP after development.

**Table 2 Design flows for 1500 EPs**

EPs	Sewer Flow	
	ADWF (kL/d)	PWWF (L/s)
1500	300	17.4

Hydraulic assessment of the additional demands from development identified the following changes to the PIP:

- > SPS 90 pump capacity is exceeded in approximately 2014,
- > SPS 90 wet well capacity is exceeded in approximately 2014

Victoria Point WWTP is also approaching capacity, and additional flows need to be considered in the sizing and timing of the upgrades.

# Technical Memo: Sewerage Servicing

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## Potential Infrastructure Requirements

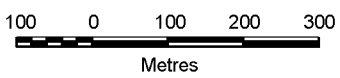
The potential changes to the PIP to resolve the identified issues includes:

- > Increase capacity for SPS 90 and rising main upgrade to accommodate new flows
- > Bring forward upgrade of SPS 90 wet well from 2018 to 2014
- > Include additional flows in Victoria Point WWTP upgrades.




Please note this high level basic assessment is for guidance only. Once the preferred development is defined a detailed assessment is required and will be completed to confirm expected impacts on the current planning schemes to the ultimate development horizon.



Scale: 1:10,000



**LEGEND**

-  Sewer Pump Station
-  Sewer Rising Main
-  Sewer Gravity Main
-  Sewer Transfer Route
-  Property Development Area

**Figure 4**

**Toonda Harbour PDA**

SHEET A3  
 Project No: CEB6456  
 Date: 11/11/2013  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council



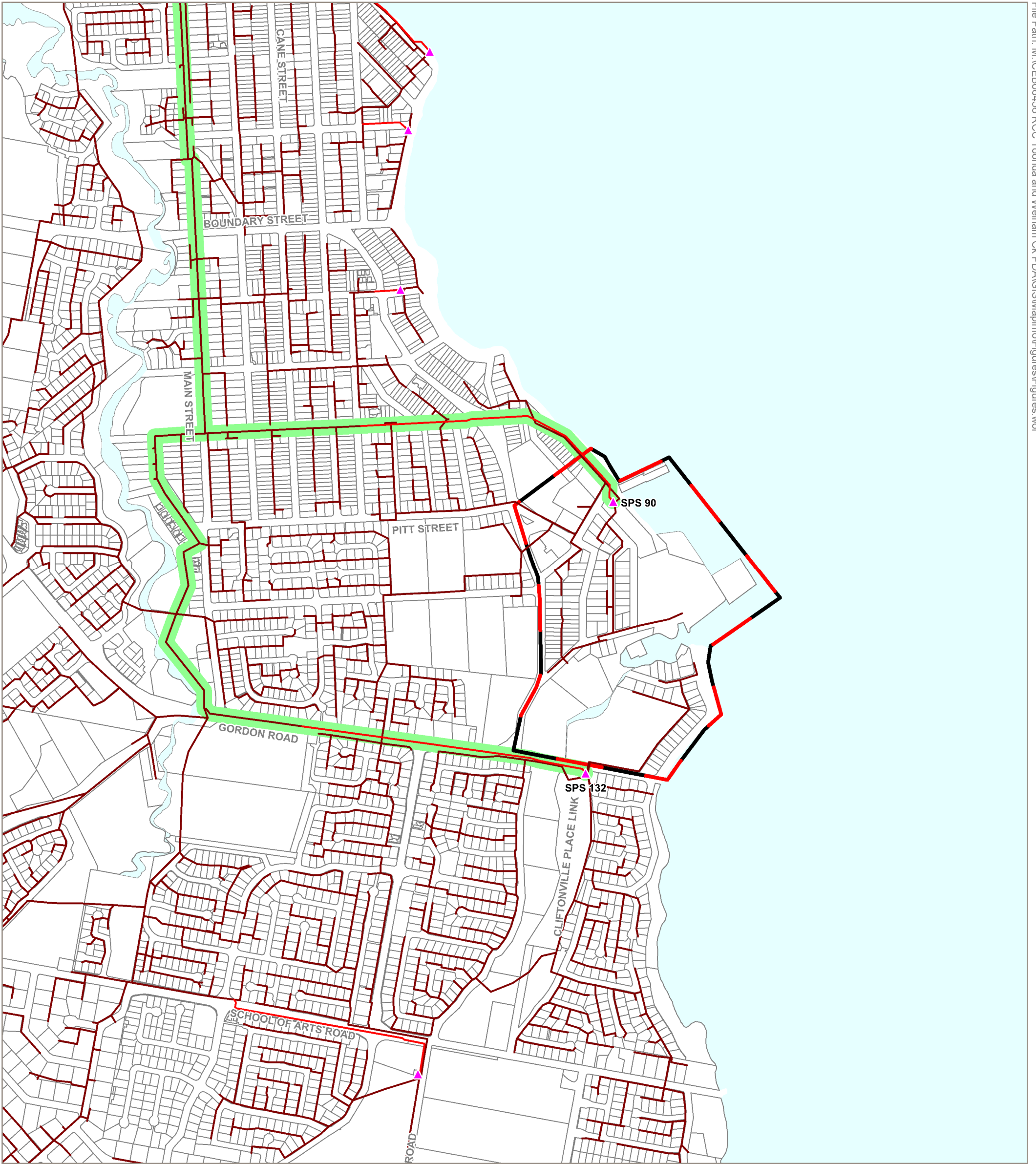
Cardno (QLD) Pty Ltd | ABN 57 051 074 992  
 Level 11, North Tower, 515 St Pauls Terrace  
 Locked Bag 4006, Fortitude Valley QLD 4006  
 Tel: 07 3369 9822 Fax: 07 3369 9722

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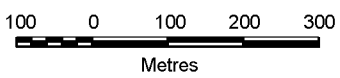
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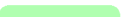




Scale: 1:10,000



**LEGEND**

-  Sewer Pump Station
-  Sewer Rising Main
-  Sewer Gravity Main
-  Property Development Area
-  Sewer Transfer Route

**Figure 5**

**Weinam Creek PDA**

SHEET A3  
 Project No: CEB6456  
 Date: 11/07/2013  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council

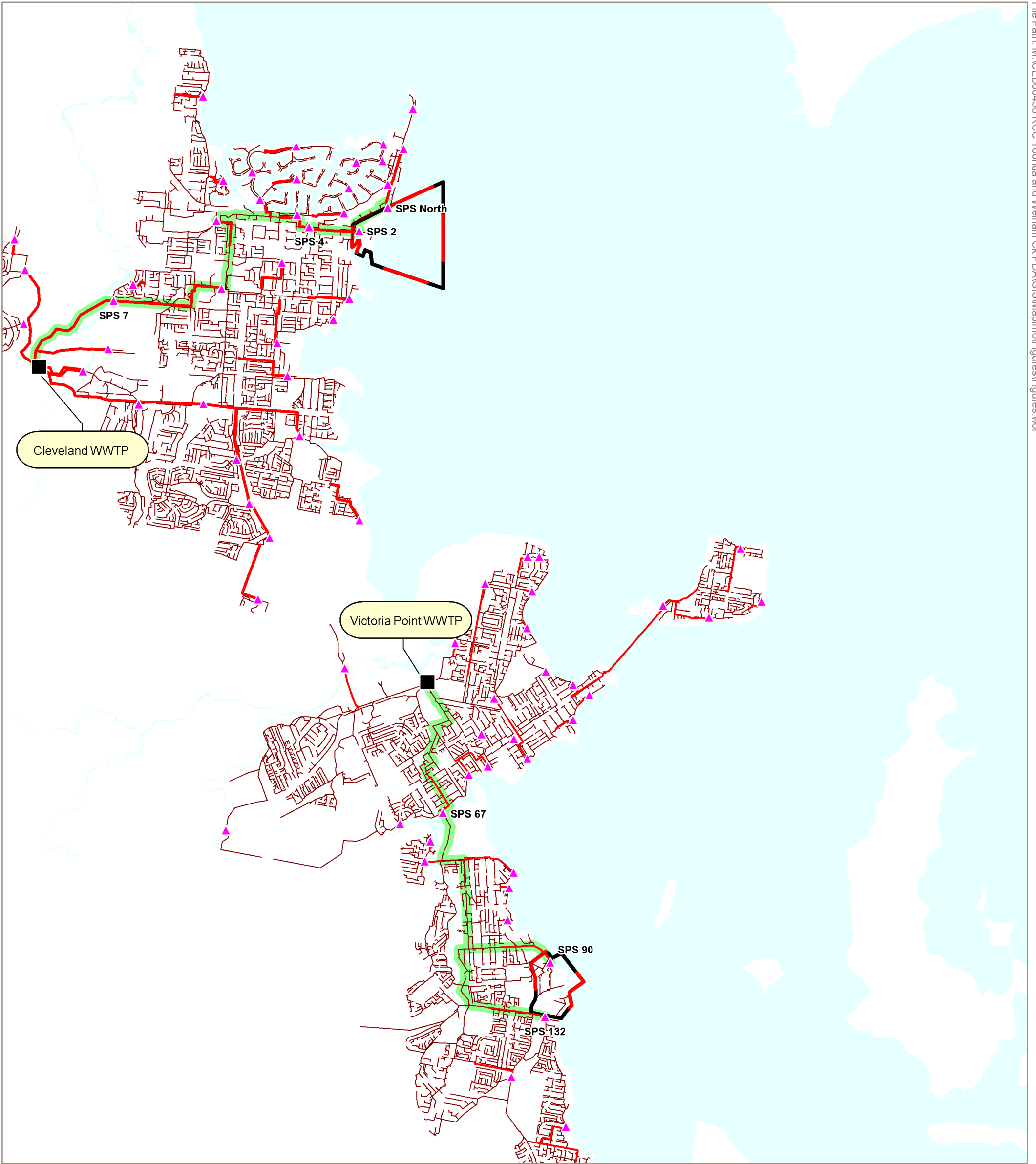


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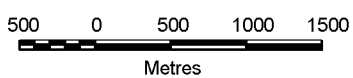
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Scale: 1:50,000



**LEGEND**

- Sewer Pump Station
- Sewer Rising Main
- Sewer Gravity Main
- Property Development Area
- Wastewater Treatment Plant (WWTP)
- Sewer Transfer Route

**Figure 6**

**Toonda Harbour and Weinam Creek PDA's**

SHEET A3  
 Project No: CEB6456  
 Date: 11/07/2013  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council



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<b>Project Title</b>	Toondah Harbour and Weinam Creek PDA, Workshop 1	
<b>Project No:</b>	CEB06456	
<b>Date</b>	12 July 2013	<b>Technical Memo No# 1</b>
<b>Issued By;</b>	Belinda Maxwell	
<b>Issued To:</b>	Scott Hutchinson, Redland City Council - for distribution to Workshop 1 attendees	

## Water Supply Assessment

The focus of the preliminary assessment for Water Supply Servicing is on the external network, which includes the existing reticulation and trunk mains, pumping stations and pressure reducing valves. This is because, to service any proposed development at either Priority Development Area (PDA), the major impacts and costs are likely to be from upgrades to the existing water supply infrastructure to accommodate the increased flows, rather than new pipe infrastructure to connect the development to existing services.

### Toondah Harbour PDA

#### Existing Water Supply Infrastructure

The Toondah Harbour PDA is in the Alexandra Hills Low Level Zone (refer Figure 3), which is sourced from Seqwater’s Alexandra Hills Reservoir Complex.

As shown in Figure 1, local infrastructure surrounding the site includes 100mm and 150mm diameter reticulation mains. The site is serviced from a 100mm reticulation main along Middle Street.

#### Priority Infrastructure Plan

The current Priority Infrastructure Plan (PIP) indicates no upgrades are scheduled for this zone prior to 2025.

#### Preliminary Hydraulic Assessment

A preliminary hydraulic assessment was undertaken using hydraulic software models supplied by Redland Water for existing and future development scenarios as follows:

##### Existing without Development

Hydraulic modelling of the existing system found:

- > Minimum pressures at the development and surrounding network are above those required by Redland Water (RCC);
- > Maximum pressures at the development and surrounding network are greater than stipulated by Redland Water (RCC);
- > Commercial fire flows (30 L/s) cannot be delivered at the development site at the end of Middle Street; and
- > Fire flows can be delivered in the remainder of the surrounding network.



# Technical Memo: Water Supply Servicing

## Existing with Development

Water supply demands for the proposed development were calculated based on Toondah Harbour potential land use (GHD report 2011) and the SEQ D&C Guidelines 2013. Toondah Harbour may gain around 1000 people for land based development or 1500 persons when the full 400 berth marina is included. The total of 1500 Equivalent Persons (EP) was adopted for water supply assessment.

**Table 1 Water supply demand for 1500 EP**

EPs	Water Demand	
	Average Day (kL/d)	Peak Hour (L/s)
1500	390	14.5

Hydraulic modelling of the existing system plus development found:

- > Minimum pressures at the development and surrounding network are above those required by Redland Water;
- > Maximum pressures at the development and surrounding network are within those required by Redland Water;
- > Commercial fire flows (30 L/s) cannot be delivered at the development along Middle Street and Emmet Drive; and
- > Commercial fire flows can be delivered in the remainder of the surrounding network.

## Ultimate with Development

Development water supply demands were added in the ultimate planning horizon with the following results:

- > Minimum pressures at the development and surrounding network are above those required by Redland Water;
- > Maximum pressures at the development and surrounding network are within those required by Redland Water;
- > Commercial fire flows (30 L/s) cannot be delivered at the development along Middle Street and Emmet Drive;
- > Fire flows can be delivered in the remainder of the surrounding network.

## **Potential Infrastructure Requirements**

Based on the preliminary assessment the following new infrastructure would be required to resolve the identified issues:

- > Additional 150mm dia. main along Middle Street, from Wharf Street to Emmet Drive.

## Weinam Creek PDA

### Existing Water Supply Infrastructure

The Weinam Creek PDA is supplied by the Serpentine Creek Demand Management Area (DMA), which is sourced from Seqwater's Heinemann Road Reservoirs.

As shown in Figure 1, local infrastructure surrounding the site includes 100mm and 150mm diameter reticulation mains. The site is serviced primarily by a 200mm main along Gordon Street.

### Priority Infrastructure Plan

Planned upgrades for the Water Supply network (and proposed year of commissioning) from the PIP include:

- > The Serpentine Creek DMA is scheduled to be divided into two DMAs in approximately 2018 (was originally 2013 in PIP), and construction is triggered by growth and subsequent minimum pressure within the existing zone. The division of these zones is along Weinam Creek.

### Preliminary Hydraulic Assessment

#### Existing without Development

Hydraulic modelling of the existing system found:

- > Minimum pressures at the development and surrounding network are above those required by Redland Water;
- > Maximum pressures at the development and surrounding network are greater than stipulated by Redland Water;
- > Commercial fire flows (30 L/s) cannot be delivered at the development site; and
- > Fire flows can be delivered in the remainder of the surrounding network.

#### Existing with Development

As no data was available on the development size for Weinam Creek PDA, it has been assumed that it will be similar to Toondah Harbour at 1500 EP.

**Table 2 Water supply demand for 1500 EP**

EPs	Water Demand	
	Average Day (kL/d)	Peak Hour (L/s)
1500	390	14.5

Hydraulic modelling of the existing system plus development found:

- > Minimum pressures at the development and surrounding network are above those required by Redland Water;
- > Maximum pressures at the development and parts of the surrounding network are greater than stipulated by Redland Water;
- > Commercial fire flows (30 L/s) cannot be delivered at the development site; and
- > Fire flows can be delivered in the remainder of the surrounding network.

# Technical Memo: Water Supply Servicing

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## Ultimate with Development

Development water supply demands were added in the ultimate planning horizon with the following results:

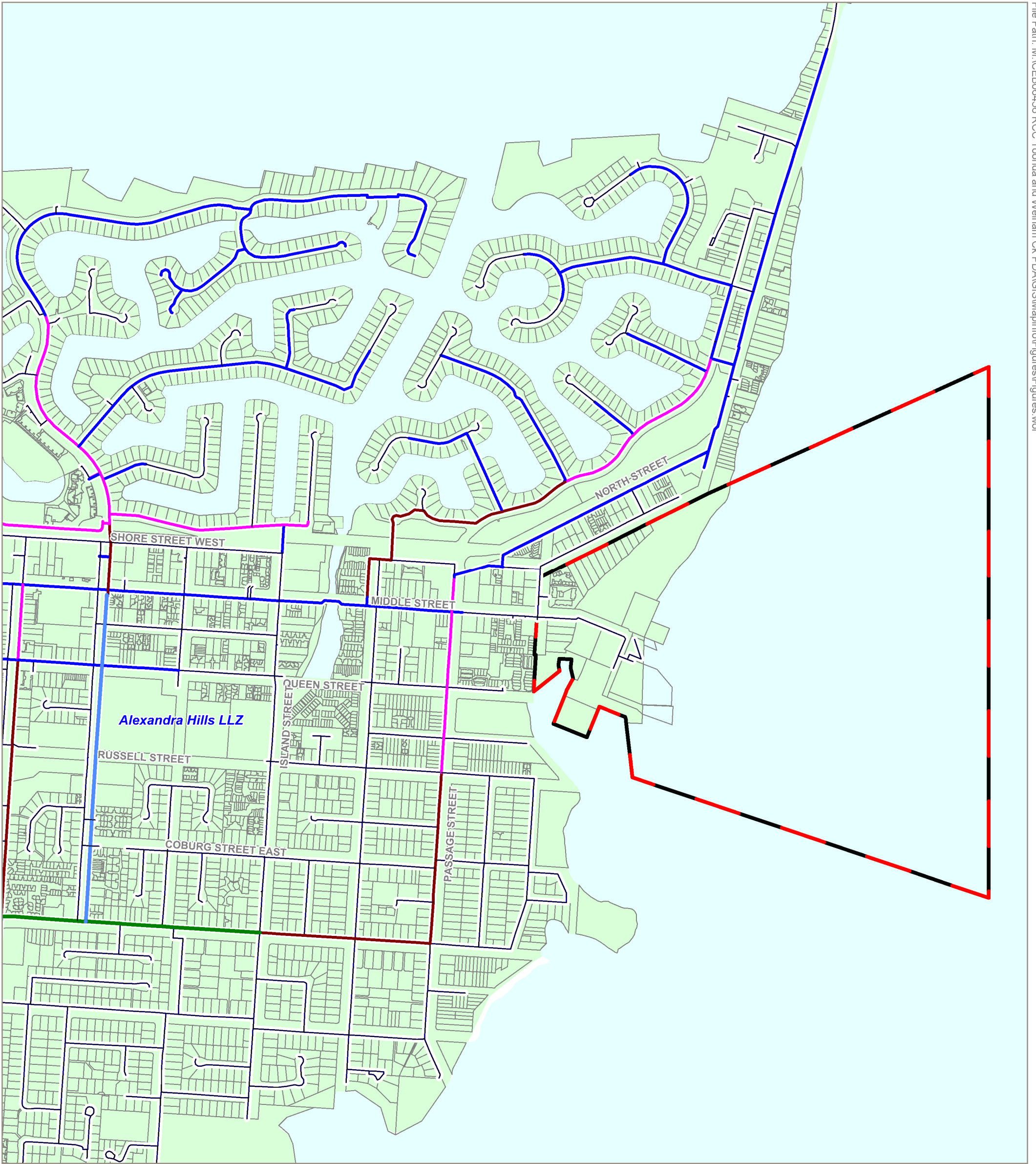
- > Minimum pressures at the development and surrounding network are above those required by Redland Water;
- > Maximum pressures at the development and surrounding network are within those required by Redland Water;
- > Commercial fire flows (30 L/s) cannot be delivered at the development; and
- > Fire flows can be delivered in the remainder of the surrounding network.

## **Potential Infrastructure Requirements**

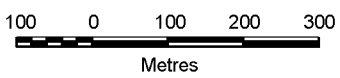
The potential infrastructure required to resolve the identified issues include:

- > Internal link main partially through the development, from Auster Street to Gordon Street;
- > Internal link main through the development from the Esplanade/Weinam Street to Banana Street/ Marina service main connection; and

Please note this high level basic assessment is for guidance only. Once the preferred development is defined a detailed assessment is required and will be completed to confirm expected impacts on the current planning schemes to the ultimate development horizon.



Scale: 1:10,000



SHEET A3  
 Project No: CEB6456  
 Date: 11/07/2013  
 Revision Number:  
 Designed by:  
 Client Name: Redland City Council

**LEGEND**

Water Supply Mains (Diam)

- <=100
- 150
- 200
- 250
- 300
- 375
- >=500

- PRV
- DMA Boundary Valve

Water Supply Zone

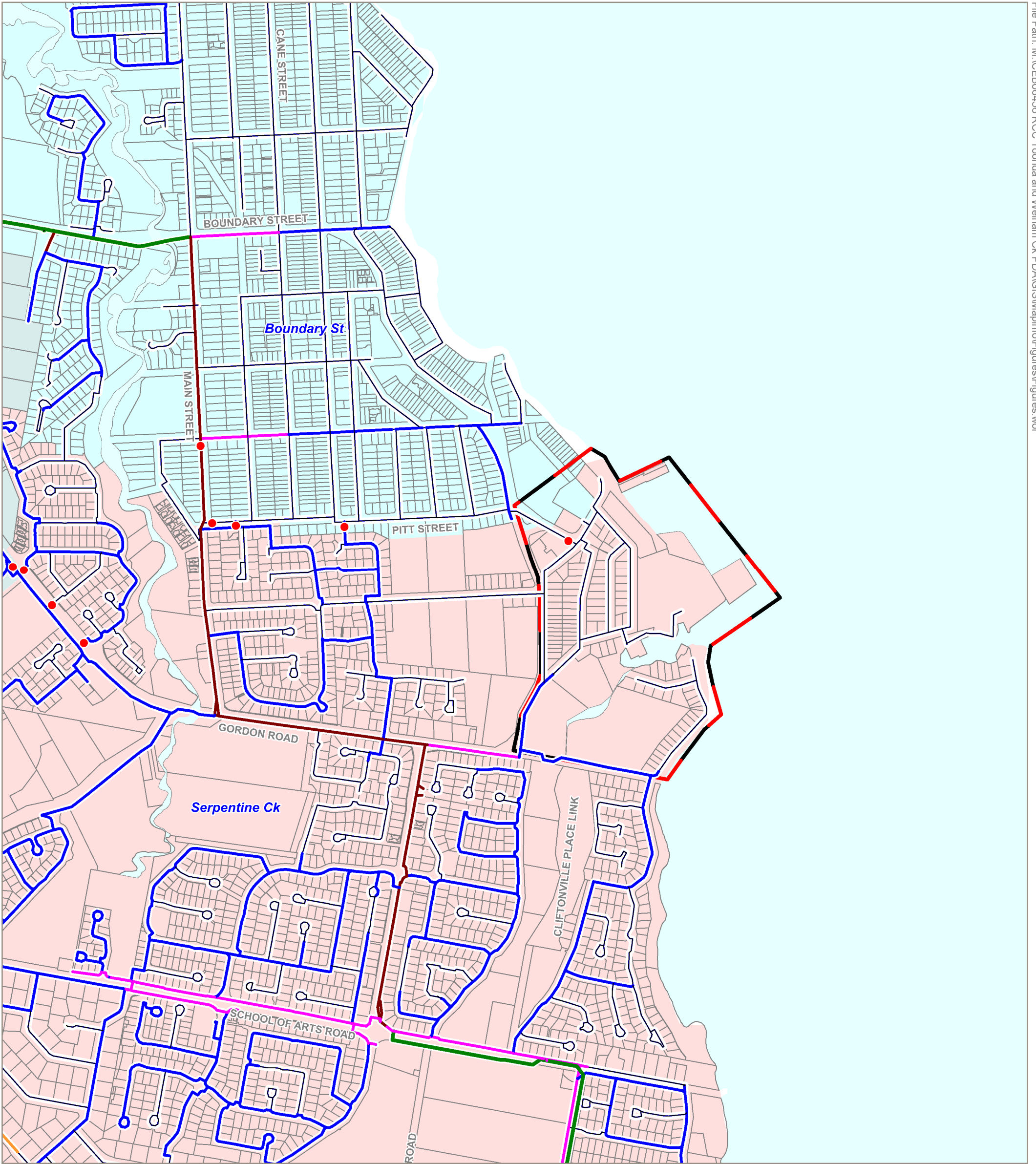
Priority Development Area

**Figure 1**

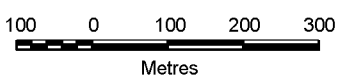
**Toondah Harbour PDA**







Scale: 1:10,000



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**LEGEND**

Water Supply Mains (Diam)

- <=100
- 150
- 200
- 225
- 250
- 300
- 375

- ◆ PRV
- DMA Boundary Valve

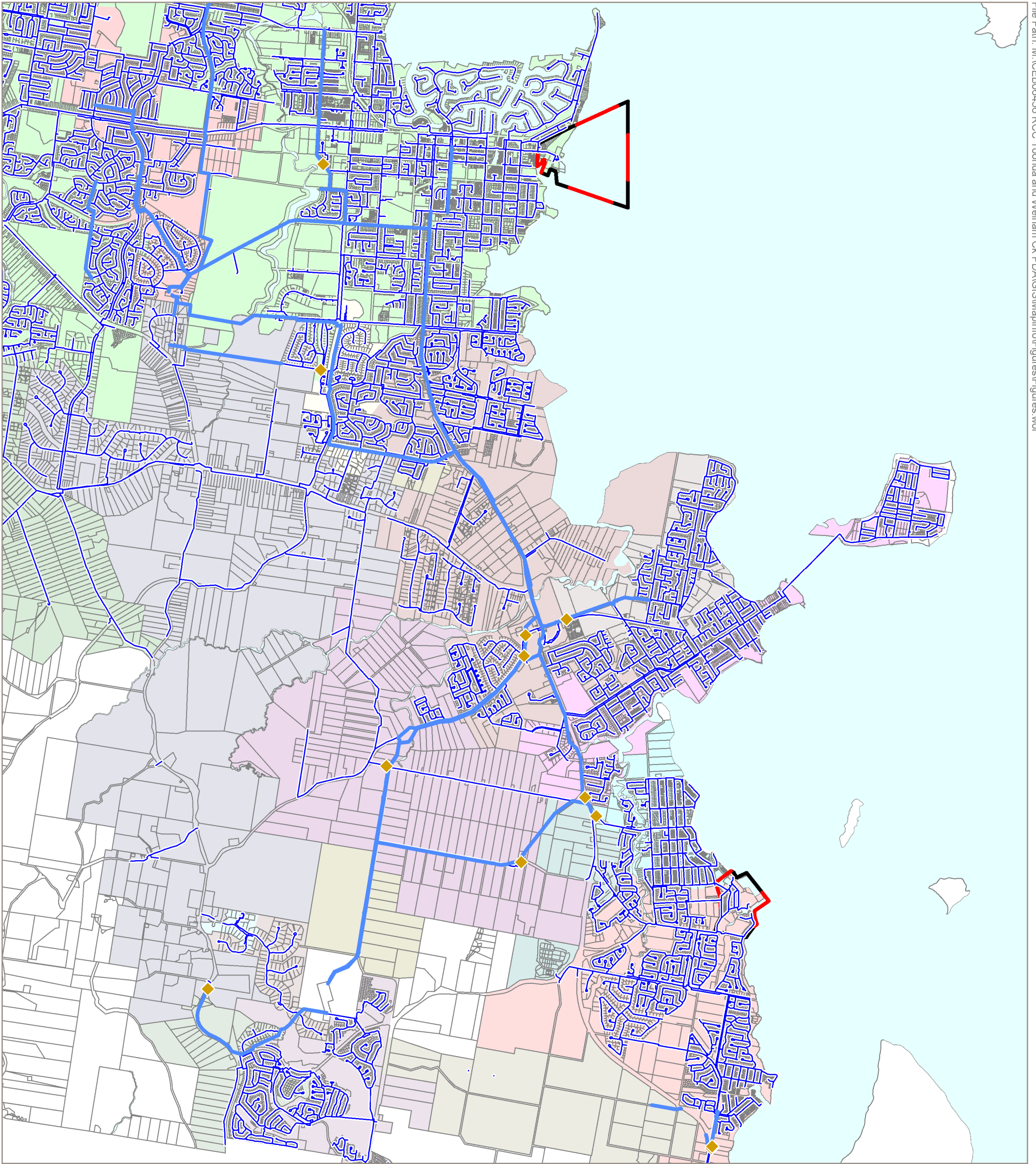
- Water Supply Zone
- Priority Development Area

**Figure 2**

**Weinam Creek PDA**







Scale: 1:50,000

500 0 500 1000 1500

Metres



### LEGEND

Water Supply Main  $\geq 375$

PRV

Water Supply Main  $< 375$

Water Supply Zone

Priority Development Area

### Figure 3

### Toonda Harbour and Weinam Creek PDA's

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