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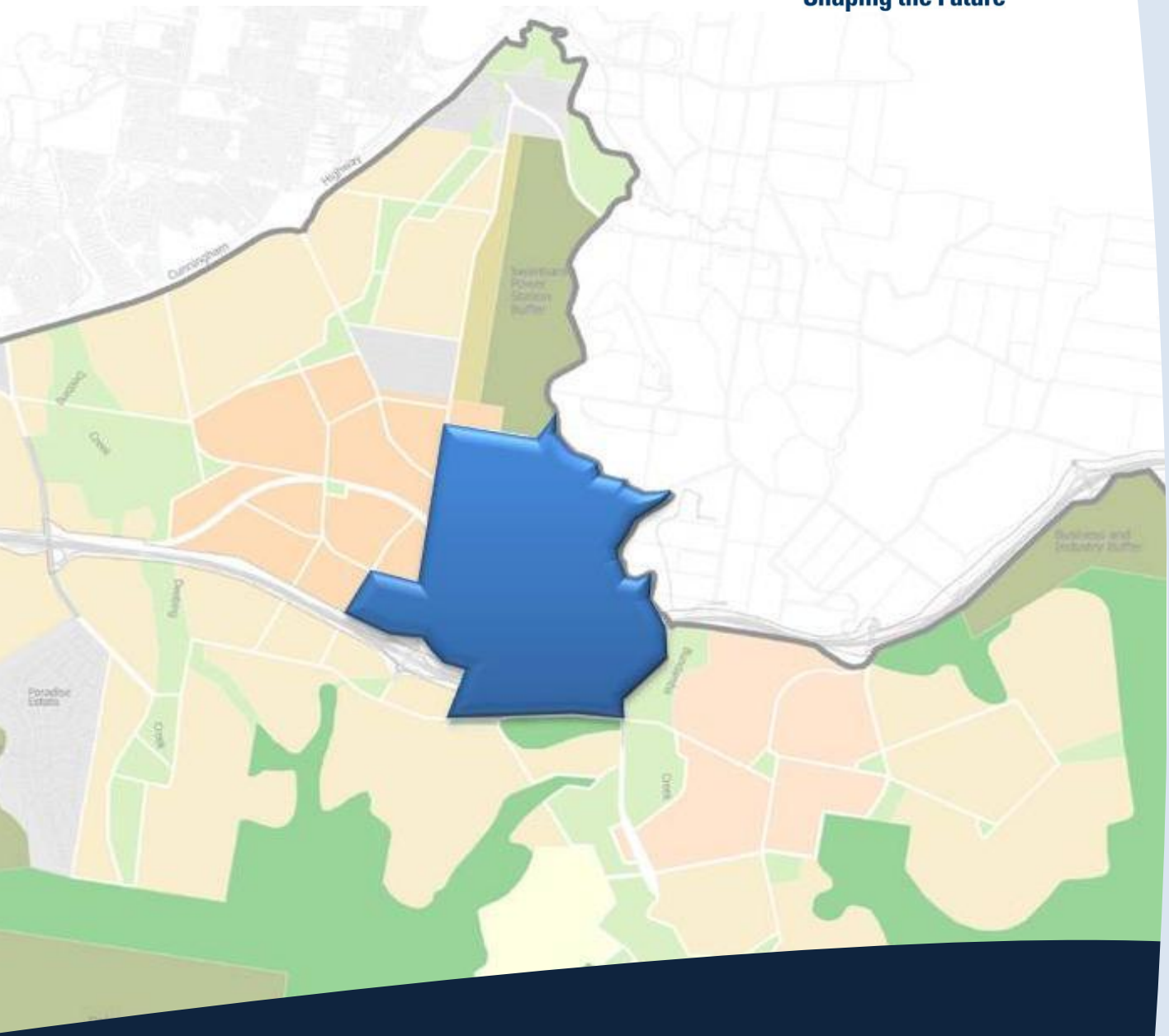

RIPLEY VALLEY: URBAN CORE NEIGHBOURHOOD MASTER PLAN
Water Supply & Sewerage Report

Report No: 790065-025-UC-004

Prepared for Sekisui House Development Services
9 December 2009

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1. INTRODUCTION

Sekisui House Development Services (SHDS) commissioned Cardno to undertake an analysis of the water supply and sewerage infrastructure required to service the proposed Urban Core (UC) development within the Ripley Valley.

The Urban Core development within the Ripley Valley represents the initial stages of a master planned community for the Ripley Valley. It is proposed that the Urban Core will comprise of five (5) main transect zones and significant recreational open space areas. The total development area of the Urban Core considered in this report is approximately 136 hectares.

Ripley Valley development had previously been analysed in terms of water supply and sewerage infrastructure for the preparation of the Ripley Valley Structure Plan prepared for Ipswich City Council (ICC). Additionally, Section 15 of the Ipswich City Council Planning Scheme details the requirements for servicing Ripley Valley for both water and sewer.

This report utilises the previous work undertaken for Ripley Valley development as the basis for the analysis of the Urban Core development.

2. URBAN CORE PROFILE

The Urban Core represents the initial stages of the Ripley Valley master planned development and is located to the north of the Centenary Highway Extension (CHE). The site varies in elevation from approximately 40m AHD to 90m AHD and covers an estimated total area of 136.5 hectares. The location of the Urban Core is included on Figure 1, Appendix A.

The development within the site is proposed to comprise of five (5) transect development zones: Special District, Urban Core, Urban Centre, General Urban and Suburban. Open Space areas will constitute a significant portion of the site.

The development densities within the Urban Core are forecast to vary from 20 dwellings per hectare to 75 dwellings per hectare in the first 10 years. The densities for the Urban Core and District transect zone will ultimately be higher in accordance with the planning scheme policy. The population projection for the Urban Core was prepared based on the proposed residential densities and the Equivalent Person (EP) densities for water and sewerage planning adopted by Ipswich City Council in Planning Scheme Policy 5 (PSP 5). A density of 2.7 EP/dwelling has been assumed based on residential lots of less than 450m^2. Non-residential lots are typically calculated as an EP based on gross floor areas (GFA). The breakdown of non residential GFA for the first ten years is currently unknown for the Urban Core development.

The calculated EP for the Urban Core is estimated to reach 11,796EP within the first ten years for land controlled by SHDS, increasing to 14,945EP in the ultimate scenario based on the same proposed density as the first 10 years. With the inclusion of the remaining areas within the Urban Core and densification of the lots proposed to develop in the first 10 years, the ultimate EP is expected to increase by 10,931EP to a total of 25,882EP. Figure 5, Appendix A outlines the Urban Core transect zones identified for development in the first 10 years.

Table 1 on page 3 details the projected water and sewerage population within the Urban Core development for the first ten years.

Table 1 Urban Core Development Density and Forecast Population

Horizon	Transect Zone	Area	Dwelling Density per hectare[1]	Population per Dwelling	Population (EP)
0 -10 Years	T4 - General Urban	50.2	30	2.7	4,067
	T3 - Suburban	10.5	20	2.7	571
	T5 - Urban Centre	13.8	50	2.7	1,864
	T6 - Urban Core	14.7	75	2.7	2,981
	District	11.4	75	2.7	2,312
	Urban Core 0 – 10 Years Sub Total	**100.7**			**11,796**
10+ Years(2)	T4 - General Urban	70.3	30	2.7	5,698
	T3 - Suburban	18.5	20	2.7	1,000
	T5 - Urban Centre	20.8	50	2.7	2,810
	T6 - Urban Core	15.4	75(2)	2.7	3,125
	District	11.4	75(2)	2.7	2,312
Total		**136.5**			**14,945**
Ultimate					**25,882**

Note:
1. The Dwelling Density represents the average density across the whole developable area.
2. The density for the Urban Core and District zones is ultimately forecast to be higher at 100 dwellings/ha and 150 dwellings/ha respectively in accordance with the planning scheme policy. The ultimate planning is based on the ultimate densities under the planning scheme policy;

2.1 Growth Profile

In order to assess the water supply and sewerage infrastructure requirements it has been necessary to assume a growth profile for the Urban Core for the first ten years. An average growth of approximately 422 dwellings per annum has been assumed for the first ten years. The growth per annum and cumulative EP assumed is shown in Table 2 and Figure 1.

The assumed transect zone sequencing for the first ten years is shown on Figure 5, Appendix A.

Table 2 Urban Core Growth Profile

Year	Dwellings	Population (EP)	Cumulative EP
1	437	1180	1,180
2	437	1180	2,359
3	437	1180	3,539
4	437	1180	4,719
5	437	1180	5,898
6	437	1180	7,078
7	437	1180	8,257
8	437	1180	9,437
9	437	1180	10,617
10	437	1180	11,796
10+(1)	1260	3149	14,945
TOTAL	**5,629**		**14,945**
ULTIMATE			**25,882**

1. 10+ EP refers only to the transect zones indentified in the 10+ year horizon of the Urban Core at the density specified in Table 1. The transect zones in the 10+ year horizon are indicated in Figure 5 of Appendix A.

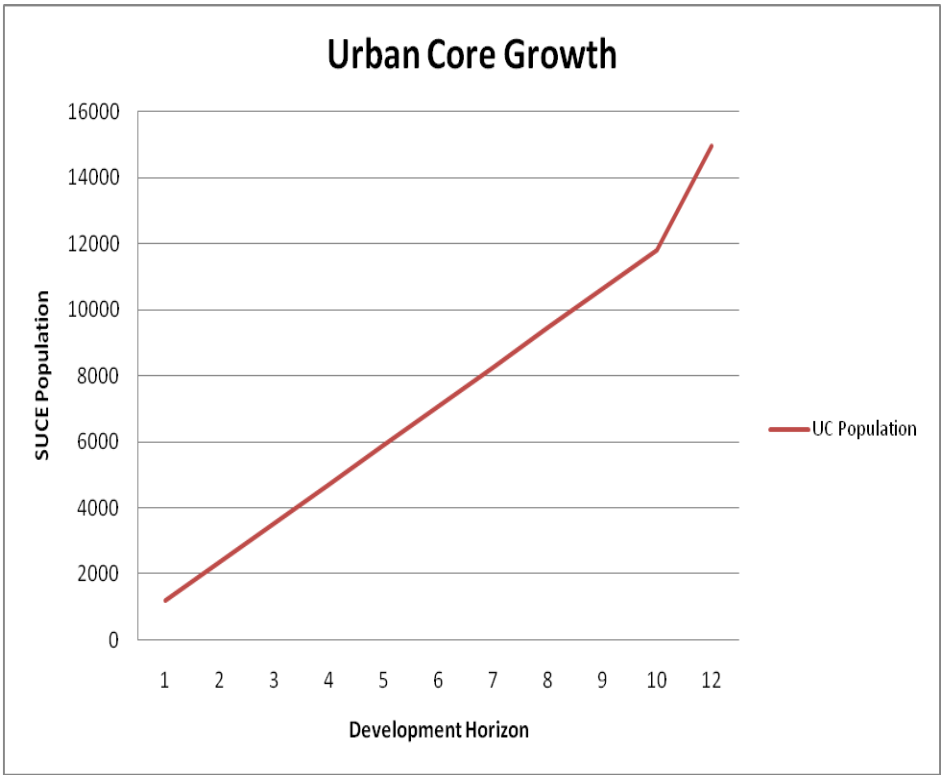


Figure 1 Urban Core Growth Profile

3. DESIGN CRITERIA

The following design criteria were adopted for this study in accordance with the *Ipswich Planning Scheme: Planning Scheme Policy 3 – General Works; Part 4 Water Reticulation* (June 2007).

3.1 Water

3.1.1 Demand and Peaking Factors

- Average Day Consumption (AD) = 320L/EP/day
- Mean Day Maximum Month/Average Day (MDMM:AD) = 1.5
- Maximum Day/Average Day (MD:AD) = 2
- Maximum Hour Demand (MH)
  - Residential = 53.5L/EP/hr

3.1.2 Storage

- Ground Level Storage = 3 × (MD - MDMM)

3.1.3 Fire Fighting

- Fire Flow = 15 L/s at 2 hours (for residential)
  = 30 L/s at 4 hours (for commercial / industrial)
- Minimum Residual Pressure
  = 12 m (for residential, commercial / industrial)

3.1.4 Residual Pressures

- Minimum pressure = 22 m
- Minimum pressure (localised elevated areas) = 16m (subject to approval)
- Maximum pressure = 80 m

3.1.5 Hazen-Williams Coefficient

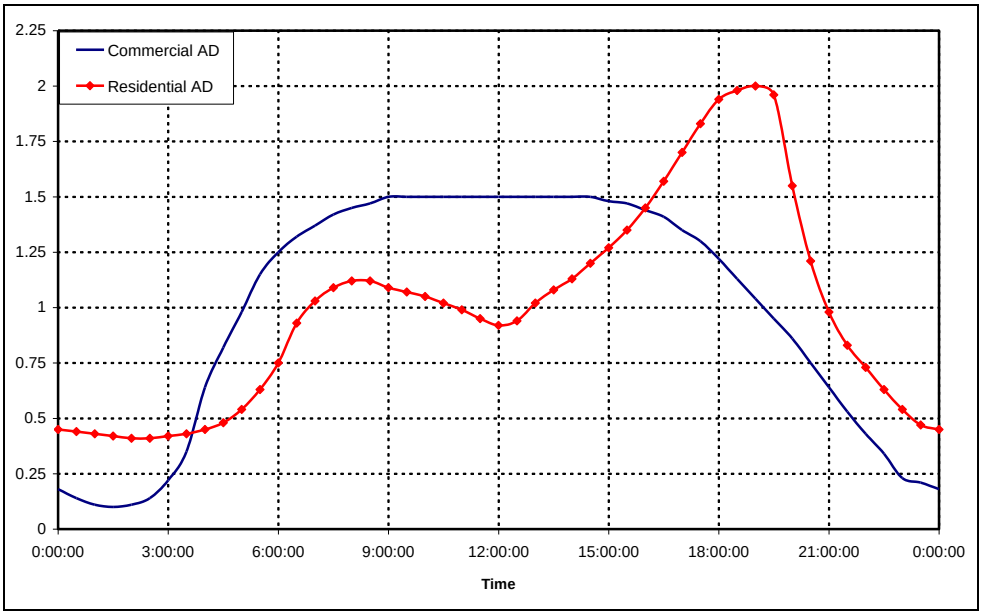
The following Hazen Williams Roughness Coefficients were adopted:

Pipe Diameter (mm)	Adopted Hazen Williams Friction Coefficient "C" for uPVC
<=150	120
200 – 300	125
>375	130

3.1.6 Diurnal Pattern

The diurnal patterns used for various categories of demand are illustrated below.

Diurnal Patterns



3.2 Sewerage

3.2.1 Demand and Peaking Factors

- Average Dry Weather Flow (ADWF) = 230L/EP/day
- Peak Dry Weather Flow (PDWF) = 2 x ADWF
- Peak Wet Weather Flow (PWWF – design flow) = 5 x ADWF

3.2.2 Gravity Sewer Design

- Flow Equation = Manning's
- Manning's Friction Factor (n) = 0.013
- 150mm Sewer Capacity = 0.5 full (1/2 d)
- 225-450mm Sewer Capacity = 0.75 full (3/4 d)
- 450mm and greater Capacity = pipe full

3.2.3 Pump Stations

- Single Pump Operation = PDWF
- Dual Pump Operation = PWWF

- Wet Well Sizing = $\frac{(0.9 \times PDWF)}{N}$

  Where:
  Single pump capacity measured in L/s;
  N= 12 starts/hour for <30 kW motor;
  N= 8 starts/hour for 30 to 50 kW motor; &
  N= 5 starts per hour for > 50 kW motor

- Emergency Storage = 4 Hours ADWF

3.2.4 Rising Main Design

- Minimum Velocity (fixed single speed) = 0.75m/s
- Minimum Velocity (low speed, dual speed pumps) = 0.6m/s
- Maximum Velocity (single pump) = 1.5m/s
- Maximum Velocity (dual pumps) = 2.0m/s

4. URBAN CORE FLOW PROJECTIONS

The projected water supply demand based on the population estimate in section 2 and design criteria in section 3 is detailed in Table 3.

Table 3 Urban Core Projected Water Supply Demand

Horizon	EP	AD (L/s)	MDMM (L/s)	MD		MH (L/s)
				(ML/d)	(L/s)	
0-5 Years	5,898	21.8	32.8	3.8	43.7	87.3
5-10 Years	11,796	43.69	65.53	7.55	87.38	174.65
10+ Years	14,945	55.4	83.0	9.6	110.7	221.3

Supply Zone	EP	AD (L/s)	MDMM (L/s)	MD		MH (L/s)
				(ML/d)	(L/s)	
Low Level	13,145	48.7	73.0	8.4	97.4	194.6
High Level	1,800	6.7	10.0	1.2	13.3	26.7

Zone	EP	AD (L/s)	MDMM (L/s)	MD		MH (L/s)
				(ML/d)	(L/s)	
T4 - General Urban	5,698	21.1	31.7	3.6	42.2	84.4
T3 - Suburban	1,000	3.7	5.6	0.6	7.4	14.8
T5 - Urban Centre	2,810	10.4	15.6	1.8	20.8	41.6
T6 - Urban Core(1)	3,125	11.6	17.4	2.0	23.1	46.3
District(1)	2,312	8.6	12.8	1.5	17.1	34.2
TOTAL 10+ year(2)	14,945	55.4	83.0	9.6	110.7	221.3

1. The density for the Urban Core and District zones is ultimately forecast to be higher at 100 dwellings/ha and 150 dwellings/ha respectively in accordance with the planning scheme policy. The ultimate planning is based on the ultimate densities under the planning scheme policy;
2. Total 10+ year EP refers only to the transect zones identified in the 10+ year horizon of the Urban Core, at the density indicated above.

The projected sewage flow based on the population estimate in section 2 and design criteria in section 3 is detailed in Table 4.

Table 4 Urban Core Projected Sewage Flow

Horizon	EP	ADWF		PWWF	
		(L/s)	(ML/d)	(L/s)	(ML/d)
0-5 Years	5,898	15.7	1.4	78.5	6.8
5-10 Years	11,796	31.4	2.7	157.0	13.6
10+ Years	14,945	39.8	3.4	198.9	17.2

Horizon	EP	ADWF		PWWF	
		(L/s)	(ML/d)	(L/s)	(ML/d)
T4 - General Urban	5,698	15.2	1.3	75.8	6.6
T3 - Suburban	1,000	2.7	0.2	13.3	1.1
T5 - Urban Centre	2,810	7.5	0.6	37.4	3.2
T6 - Urban Core(1)	3,125	8.3	0.7	41.6	3.6
District(1)	2,312	6.2	0.5	30.8	2.7
TOTAL 10+ year(2)	**14,945**	**39.8**	**3.4**	**198.9**	**17.2**

1. The density for the Urban Core and District zones is ultimately forecast to be higher at 100 dwellings/ha and 150 dwellings/ha respectively in accordance with the planning scheme policy. The ultimate planning is based on the ultimate densities under the planning scheme policy;
2. Total 10+ year EP refers only to the transect zones identified in the 10+ year horizon of the Urban Core, at the density indicated above.

5. INFRASTRUCTURE REQUIREMENTS

This section details the water supply infrastructure required for the Urban Core development to meet Ipswich City Council's Desired Standards of Service (DSS) including peak hour and commercial/industrial fire flow events.

The water supply analysis was undertaken using the latest H_20MAP model provided by Ipswich Water on the 1st October 2009. The model supplied by Ipswich Water is their master planning modelling and is setup with:

- Model scenarios for 2006, 2011, 2016, 2021, 2041 and ultimate design horizons;
- Ripley demands occurring in 2041;
- No connection from the Southern Regional Water Pipeline (SRWP) in the model until development in Ripley occurs in 2041 even though an existing 375mm connection has been established as indicated in Figure 1, Appendix A;

For the purposes of this report, the following planning horizons within the supplied hydraulic model have been utilised as the basis for all planning and analysis:

- 2011 for Urban Core development between zero and five years;
- 2016 for Urban Core development between five and ten years;
- 2021 for Urban Core development to ten years plus;

All model scenarios have included the recently constructed 375mm connection from the SRWP.

5.1 Water Supply Infrastructure

5.1.1 Existing Ripley Water Supply Zone

The Ripley area was previously supplied by a pump station (WP35), located at South Station Road. A second supply main, a 375mm diameter offtake from the SRWP has recently been constructed and is in operation supplying the area. A larger diameter main to service Ripley is ultimately proposed as shown on Figure 2, Appendix A. There is also an existing substantial trunk main network within the zone (i.e. water supply mains in excess of diameters over 300mm) delivering flow to the reservoirs and the network.

The area is currently primarily serviced by a 10ML reservoir beyond the southern end of Wensley Road. An additional 16ML reservoir has been constructed at the same location to supply ultimate demands in Ripley Valley. The reservoirs have a bottom water level (BWL) of approximately 102.8mAHD. Therefore, generally, only areas below 75mAHD to 80mAHD are able to be serviced from the existing Reservoirs and meet Council's DSS (e.g. minimum pressure of 22m at maximum hour).

A new DN600mm diameter main along Binnies Road (from Wensley Road to Lakeview Drive) has also recently been installed to improve supply to the area.

In order to provide the Urban Core with a water supply network sufficient to meet the Desired Standards of Service, both the water supply mains external to the site and the internal supply mains have been analysed. Whilst not part of the Urban Core submission, the potential infrastructure needs for the Ripley Valley Secondary Urban Centre East (SUCE) located to the south of the Urban Core development have been considered in the analysis.

5.1.2 External Trunk Infrastructure

The previous supply arrangement with only a supply from the South Station Road pumps could only service minimal development in Ripley (i.e. approximately 1,500 EP). The 375mm diameter offtake from the SRWP as shown on Figure 1, Appendix A together with the existing South Station Road pumps can service development in Ripley of approximately 6,000EP equivalent to more than 5 years growth at an average of 1,000EP or 400ET per annum.

The 2041 planning horizon, in the model supplied by Ipswich Water, indicates a 900mm to 750mm diameter main is ultimately required from the offtake location, travelling along Fischer Road and Wensley Road towards the reservoirs. This is consistent with previous planning as part of the Ripley Valley Structure Plan and the Planning Scheme Policy. However, it is proposed to stage this augmentation subject to physical site considerations (i.e. space constraints). The first stage augmentation from the SRWP to Binnies Road for various growth forecasts for the first 10 years is discussed below.

The existing 375mm diameter offtake and 300mm main on Reif Street connection starts to experience high head losses once development in Ripley Valley exceeds approximately 6,000EP (i.e. currently forecast after approximately 5 years). This triggers a requirement for an augmentation of the offtake/connection from the SRWP as follows and as shown on Figure 2:

- To service development up to the 10 year horizon forecast in this report (i.e. approximately 12,000EP) a 375mm diameter augmentation from the SRWP offtake and along Fischer Road to Binnies Road is required;
- For a demand of approximately 16,000EP a 450mm diameter augmentation from the offtake to Binnies Road would be required; and
- For demand of approximately 25,000EP a 600m diameter augmentation from the SRWP offtake to Reif Street and a 450mm from Reif Street to Binnies Road are required.

Further staging of the SRWP to Ripley Reservoir main (i.e. beyond the 10 years growth forecast in this report) will be considered in future reports as refined growth forecasts become available. However, the ultimate 900mm and 750mm required is likely to be provided by a combination of no more than two pipes given potential physical space constraints and pipe hydraulics. Therefore, future augmentations between the SRWP and Binnies Road (i.e. beyond that proposed for the first ten years in this report) will likely require replacement and upsizing of the existing 375/300mm main to achieve the required equivalent hydraulic diameter. Approximate pipe combinations based on nominal diameters to achieve an equivalent hydraulic diameter of a 900mm and 750mm are shown in Table 5. For example, this indicates the existing 375mm/300mm would require replacement with a nominal diameter of approximately 675mm to achieve a equivalent hydraulic diameter of 750mm if a 450mm was provided in this first stage.

Table 5 Equivalent Hydraulic Pipe Diameter Combinations

Pipe Diameter Combination (mm)	Equivalent Hydraulic Diameter (mm)
DN375 / DN675	726
DN375 / DN750	794
DN450 / DN600	695
DN450 / DN675	755
DN450 / DN750	820
DN450 / ID800	863
DN600 / DN600	781
DN600 / DN750	887

Notes:
Diameter Nominal (DN)
Internal Diameter (ID)

Additionally, three (3) connections to the existing mains along Fischer Road from the trunk main linking the SRWP and the Ripley Reservoirs are planned. Pressure reducing valves (PRVs) located at Reif Street and Montera Road would need to be set to provide a hydraulic grade of 60m to ensure adequate pressures are maintained in the network.

The SRWP to Ripley Reservoir trunk main is proposed to act as a combined inlet/outlet main. To manage turnover in the reservoir the supply from the SRWP into the network will need to be controlled.

The proposed PRV or control valve at Binnies Road on the final section of the existing 450mm trunk main along Wensley Road between Binnies Road and the reservoir will need to be controlled to maintain sufficient hydraulic grade to supply the top water level (TWL) of the Ripley Reservoirs (i.e. 110m AHD) and to also ensure turnover in the reservoirs.

5.1.3 Reservoirs

The existing Ripley Reservoirs have a combined reservoir volume of 26ML. Analysis of the model has indicated that no further storage would be required in the first 10 years to meet the DSS.

The existing high level reservoir (Volume = 0.12ML, TWL = 150m AHD) currently servicing the Deebing Heights area is proposed for future augmentation. This augmentation will not be required for the Urban Core development in the first 10 years based on the current proposed staging. In the Ipswich Water model this is proposed as a 5ML reservoir in 2041. A 250mm main supplied from the high level Ripley Reservoir has been proposed to service the high level zone in the Urban Core once development occurs (currently scheduled to occur after the first 10 years).

The projected water supply demand according to the proposed high (i.e. > 75mAHD) and low level (i.e. < 75mAHD) water supply zones is shown in Table 6. The table also indicates the equivalent storage component attributable to the Urban Core.

Table 6 Urban Core Projected Water Supply Demand by Water Supply Zone

Water Supply Zone	EP	MDMM		MD		Reservoir Storage
		(L/s)	(ML/d)	(L/s)	(ML/d)	(ML)
Low Level	13,145	73.0	6.3	97.4	8.4	6.3
High Level	1,800	10.0	0.9	13.3	1.2	0.9
TOTAL	14,945	83.0	7.2	110.7	9.6	7.2

5.1.4 Internal Supply Infrastructure

An internal network of 300mm to 150mm diameter mains will be required to service the Urban Core development. Due to the location of the development site in relation to the existing and proposed trunk main network and the existing Ripley reservoirs a single trunk main is proposed to deliver supply to some sites in the initial stages (up to 5 years).

Due to the elevations within the development area, both a low level zone and a high level zone will ultimately need to be established with the latter to occur after 10 years. The high level zone will be required to service elevations typically above 75mAHD to 80mAHD because there is insufficient head available from the existing low level Ripley Reservoir (BWL 102.8mAHD) to meet the DSS minimum pressure of 22m.

In the interim, the low level zone is proposed to be supplied from the 300mm diameter mains and consist of a looped trunk network (for the purposes of maintaining commercial fire fighting flows of 30L/s) through the centre of the development whilst radiating outward to a network of 200mm and 150mm diameter mains as shown on Figure 3, Appendix A.

When required (i.e. currently beyond 10 years) the high level zone is proposed to be supplied from an augmentation of the existing Ripley high level reservoir, via a 250mm diameter main.

The proposed network configuration for the Urban Core development is shown on Figures 3 – 5, Appendix A.

5.1.5 Rainwater Tanks

Rainwater tanks have been assumed to be included for each relevant dwelling within the Urban Core area in accordance with the Queensland Development Code (QDC). For the Urban Core this will primarily apply to the Class 1 buildings, which covers detached residential dwellings. The QDC specifies that where rainwater tanks are installed water reduction savings must achieve 70kL/annum. A detailed breakdown of the expected yield from the rainwater tanks can be found within the *Water Cycle Management - Lake and Wetland Feasibility Report* (Cardno, 2009). This report has assumed that the rainwater tanks will be used for toilet flushing, irrigation and any other approved use in accordance with the Water Supply (Safety and Reliability) Act 2008. However, to maintain fire fighting flows and to allow for a worst case scenario (i.e. tank empty for considerable periods), no significant reduction in water main sizing has been assumed.

5.2 Sewerage Infrastructure

5.2.1 External Sewerage Infrastructure

Consideration was previously given to several options regarding the discharge point of the proposed sewerage network. Discharge to the Bundamba Wastewater Treatment Plant (WWTP) via the existing Bundamba trunk sewer is detailed in PSP15. The installation of a local treatment plant was also previously considered. The external sewerage infrastructure requirements are currently under investigation by Ipswich Water. However, in the interim it is likely that the preferred strategy will involve a local pump station and rising main for the Urban Core that will pump to a proposed connection to the Bundamba Creek trunk sewer at Robertson Road. The alignment of the rising main connecting to Roberston Road is yet to be determined. However, proposed alignments have included a route tracing Bundamba Creek or alternatively an alignment along Fischer Road.

5.2.2 Internal Sewerage Infrastructure

An internal sewerage network will be required to transport flow from within the site to the proposed external network. As the final surface levels and layouts have yet to be confirmed an internal sewerage network has not been finalised at this stage. Further detailed planning will be required to develop the internal sewerage network to satisfy ICC's DSS.

However, it is expected that primarily an internal gravity sewer network will be capable of servicing the Urban Core. Based on the projected flows, a network of 150mm to 450mm diameter gravity mains will be required to service the development.

An indicate proposed internal sewer network is shown on Figure 7, Appendix A. This also indicates the approximate location of an external pump station for the Urban Core.

6. CONCLUSIONS

6.1 Water Supply

- The Ripley area was previously supplied by a pump station (WP35), located at South Station Road.
- A second supply main, a 375mm diameter offtake from the SRWP has been recently been constructed and is in operation supplying the area.
- There is also an existing substantial trunk main network within the zone (i.e. water supply mains in excess of diameters over 300mm) delivering flow to the reservoirs and the network. A new DN600mm diameter main along Binnies Road (from Wensley Road to Lakeview Drive) has also recently been installed to improve supply to the area.
- The area is currently primarily serviced by a 10ML reservoir beyond the southern end of Wensley Road. The reservoir has a bottom water level (BWL) of approximately 102.8mAHD. A 16ML reservoir was recently constructed adjacent to the existing 10ML reservoir, creating a combined reservoir capacity of 26ML. Analysis of the model has indicated that no further storage would be required in the first 10 years to meet the DSS.
- Only areas below 75mAHD to 80mAHD are able to be serviced from the existing reservoir and meet Council's DSS (e.g. minimum pressure of 22m at maximum hour).
- The existing supply arrangement as shown on Figure 1, Appendix A can service development in the Ripley Valley up to approximately 6,000EP (i.e. equivalent to more than 5 years growth at an average of 1,000EP or 400ET per annum).
- Beyond the 6,000EP triggers an augmentation of the connection from the SRWP.
- The 2041 planning horizon in the model supplied by Ipswich Water indicates that a 900mm to 750mm diameter main is ultimately required from the offtake location, along Fischer Road and Wensley Road to the reservoirs. This is consistent with previous planning as part of the Ripley Valley Structure Plan and the Planning Scheme Policy. However, it is proposed to stage this augmentation subject to physical site considerations (i.e. space constraints).
- Development up to approximately 12,000EP, representative of the first 10 years of the Urban Core development forecast in this report could be supplied with a 375mm diameter main from the SRWP to Fischer Road. Should development to 16,000EP proceed the 375mm diameter main would need to be upsized to a 450 diameter main.
- For a demand of approximately 25,000EP in the first 10 years, a 600mm diameter main from the SRWP offtake to Reif Street and a 450 diameter main from Reif Street to Binnies Road are required.
- Further staging of the SRWP to Ripley Reservoir main (i.e. beyond the 10 years growth forecast in this report) will be considered in future reports as refined growth forecasts become available. However, the ultimate 900mm and 750mm required is likely to be provided by a combination of no more than two pipes given potential physical space constraints and pipe hydraulics. Therefore, future augmentations between the SRWP and Binnies Road (i.e. beyond that proposed for the first ten years in this report) will likely require replacement and upsizing of the existing 375/300mm main to achieve the required equivalent hydraulic diameter.
- The SRWP to Ripley Reservoir trunk main is proposed to act as a combined inlet/outlet main with connections to the existing network.

- PRVs are proposed at Reif Street and Montera Road. To manage turnover in the reservoir the PRV or control valve at Binnies Road will need to be controlled to maintain sufficient hydraulic grade to supply the top water level (TWL) of the Ripley Reservoirs (i.e. 110m AHD) and to ensure turnover in the reservoirs.
- An internal network of 300mm to 150mm diameter mains will be required to service the Urban Core development.
- Due to the elevations within the development area, both a low level zone and a high level zone will ultimately need to be established. The high level zone will be required to service elevations typically above 75mAHD to 80mAHD.
- The existing high level reservoir (Volume = 0.12ML, TWL = 150m AHD) currently servicing the Deebing Heights area is proposed for future augmentation. This augmentation will not be required for the Urban Core development in the first 10 years based on the current proposed staging. In the Ipswich Water model this is proposed as a 5ML reservoir in 2041. A 250mm main supplied from the augmented high level Ripley Reservoir has been proposed to service the high level zone in the Urban Core once development occurs (currently scheduled to occur after the first 10 years).
- The proposed network configuration for the Urban Core development is shown on Figures 3 – 5, Appendix A.

6.2 Sewerage

- Consideration was previously given to several options regarding the discharge point of the proposed sewerage network. Discharge to the Bundamba Wastewater Treatment Plant (WWTP) via the existing Bundamba trunk sewer is detailed in PSP15. The external sewerage infrastructure requirements are currently under investigation by Ipswich Water. However, in the interim it is likely that the preferred strategy will involve a local pump station and rising main from the Urban Core that will pump to a proposed connection to the Bundamba Creek trunk sewer at Robertson Road.
- The capacity of the external pump station and rising main option could be boosted in the future with a second pump station approximately half way along the 5.5km route once the pumping heads get to high.
- An indicative proposed internal sewer network to service the Urban Core is shown on Figure 7, Appendix A. This also indicates the approximate location of an external pump station for the Urban Core.

Appendix A
Figures