

## 1.0 Rolleston Sewage Scheme

### 1.1 Executive Summary

Description		Quantity
Population Served		3900 (estimate)
Deprivation Index		1
Physical Statistics	Reticulation Length (km)	32.4
	Manholes	478
	Pump Stations	3
Value (\$)	Replacement	\$11,914,757
	Depreciated Replacement	\$10,574,572
Flows	Annual average over last 4 years	175,590 m <sup>3</sup> /yr
	Average daily	480 m <sup>3</sup> /day
	Peak daily	- m <sup>3</sup> /day
	Minimum daily	- m <sup>3</sup> /day
Treatment	Helpet WWTP - Extended aeration with nitrogen removal	To be installed to 6,000 p.e. initially
	Pines WWTP- Activated sludge plant with nitrogen removal	
Disposal	Helpet - Spray Irrigation	
	Pines - Spray Irrigation	
Infiltration		Low
Properties	Connected (March 2005)	1265
	Not connected	715

Pipework Replacement Dates	Operating and Maintenance Financial Requirements

Renewals Financial Requirements	New Capital Financial Requirements
<p>High costs in 2011 &amp; 2012 are associated with Helpet WWTP, should the plant be operational</p>	
<p>The key issues for the Rolleston wastewater services are:</p> <ul style="list-style-type: none"> <li>Ensuring treatment, disposal and reticulation expansion proceed in a manner that does not impede development</li> </ul>	

## 1.2 Introduction

### 1.2.1 Overview and History

Scheme Plan 10 that allowed the development of the area surrounding Rolleston township to a population of about 4400 was adopted by Council in 1994. The development required the installation of a sewerage system to serve the residential and rural residential areas created. A treatment plant (Helpet WWTP) and trunk mains were installed by private developers with a sell back provision in 1996.

The reticulation was installed in the original Township area in 1999/2000 and again extended to service Stage I of the Izone Drive Industrial Area in 2002.

Plan Change 60, which when combined with Scheme Change 10 gives a population projection of 14,000 population equivalents (p.e.) was approved in 2003 by the Selwyn District Council. This increase in population required a new sewage treatment plant and disposal area (Pines wastewater treatment site) that will be in operation in late 2006 along with additional mains (gravity and pressure) and pump stations.

### Wastewater Map



### 1.2.2 Knowledge of Assets

The following table details the confidence in information for facilities and reticulation.

**Table 1-1: Data Confidence**

	Reticulation				Pump Station				Treatment				Disposal			
	Age	Condition	Performance	Location	Age	Condition	Performance	Location	Age	Condition	Performance	Location	Age	Condition	Performance	Location
Highly Reliable																
Reliable																
Uncertain																
Very Uncertain																

### 1.2.3 Criticality

The following is a preliminary assessment of the critical assets within the scheme.

**Table 1-2: Critical Assets**

Facility or Main	Location	Reason
Rising main from Jones Rd pump station	Under SH1 and main trunk rail line	Singe main serving large industrial area
Pressure main	Under SH1 and main trunk rail line	Singe main serving West Melton and potentially CYFS, Department of Corrections and

### 1.2.4 Design

#### Scheme Change 10 Area – Helpet WWTP

Sewage treatment plant and disposal area designed for 4,400 pe. The sewage treatment plant was de-rated to 3,500 in early 2003 but with an additional clarifier to be installed in 2004 this will bring the capacity back to 4,400 pe. The disposal area has shown to have a capacity of 4,400 pe utilising a pasture cut and carry process ie removal of nitrogen via vegetation. Additional treatment capacity will be provided at the Pines site from September 2006 onwards.

#### Plan Change 60 -Pines WWTP

This proposal has a design population as shown in Table 1-3 below.

**Table 1-3 Pines Disposal Area**

Waste Water Source	Population Equivalent (pe)
Rolleston Township population	14,000
Rolleston Industrial Park (Stage 1)	2,300
Rolleston Industrial Park (additional road)	2,700
Rolleston Prison*	640
Rolleston Youth Justice Centre*	44

Waste Water Source	Population Equivalent (pe)
Burnham Military Camp*	2,500
West Melton (600 lots)	1800
<b>Total</b>	<b>23,984</b>

\*Note: No agreement has been made regarding Council providing waste water services to these, however they have been included to enable Selwyn District Council the ability to consider accepting these discharges in the future. In the case of the Rolleston Prison and Youth justice facility, discussions in March 2006 may result in both connecting.

### 1.3 Treatment and Disposal

#### 1.3.1 Overview

There are two treatment and disposal systems for Rolleston township:

- Existing – Helpet Plant and Disposal area
- Future - Pines Treatment and Disposal area

The Helpet Plant is sited between Springston Rolleston Rd and Lincoln Road south of Lowes Road on a 13.75 ha site. The plant is an Activated Sludge Plant with the following:

- Incoming wastewater screened
- Anoxic tanks for nitrogen removal
- Two Boat Clarifiers
- Disinfection via UV
- Treated Wastewater holding pond
- Irrigation pumping system
- Irrigation of four paddocks using a fixed sprinkler system

The Pines WWTP is sited on the south side of Burnham School Rd, between Dunns Crossing Rd and Burnham RD on an 84 ha site and is now referred to as the Pines site. The plant will be an Activated Sludge Plant with the following:

- External clarifiers
- Nitrogen reduction
- UV disinfection
- Sludge processing to produce biosolids
- Land irrigation using central pivot irrigators

#### 1.3.2 Treatment and Disposal

The following table is an overview of the Helpet site treatment and disposal components.

Treatment Area	Description	Year installed or Upgraded	Condition	Performance	Criticality
Anoxic tanks for nitrogen removal	Two 260m <sup>3</sup> tanks for nitrogen removal	2002	1	2	Medium
Two Boat Clarifiers	Two 600m <sup>3</sup>	1997 & 2003	1	2	Medium
Disinfection via UV	2 units rated at 15l/sec each	1997 & 2003	1	2	Medium
Treated Wastewater holding pond	550m <sup>3</sup>	1997	1	2	Medium
Irrigation pumping system	Duty standby system	1997	1	2	Medium

Treatment Area	Description	Year installed or Upgraded	Condition	Performance	Criticality
Irrigation of four paddocks	Four paddock – 4 x 2.6 Ha	1997	1	2	Medium
1 = Very Good (Industry Standard)    2 = Good    3 = Moderate    4 = Poor    5 = Very Poor					

### 1.3.3 Issues

Testing of the Helpet treatment plant and disposal area in 2000 to 2002 showed:

- Disposal area had a reduced capacity (4400 p.e. reduced to 3,500 p.e.)
- Treatment plant that was originally designed for 28 L/sec could only cope with 22 L/sec (equivalent to 3,500 pe).
- When loadings on Boat clarifiers are reaching the design limits, operation of the boats require significant operator input to ensure wastewater quality is not compromised

This has been reconfirmed via a 2005 assessment of the sludge volumes and therefore the boat clarifier capacities.

## 1.4 Pump Stations

### 1.4.1 Overview

The majority of the PC60 area has gravity reticulation (in some parts very deep) with the main pump station at the treatment plant. There are two other pump stations, required for servicing of small areas unable to be served by gravity mains.

### 1.4.2 Pump Station Details

The following table is an overview of the three pump stations.

**Table 1-4: Schedule of Pump Stations**

Pump Station	Description	Year installed	Capacity (m <sup>3</sup> /day)	Condition	Performance	Criticality
Treatment Plant	Lift sewage up into treatment plant	1997	-	1	1	High
Goulds Road pump station	Service eastern end of Goulds Rd	1997	-	1	1	Low
Jones Rd pump station	Service industrial area – has capacity to service Izone industrial area.	2003	-	1	1	Medium
1 = Very Good (Industry Standard)    2 = Good    3 = Moderate    4 = Poor    5 = Very Poor						

### 1.4.3 Pump Station Issues

There are no issues with the pumping stations.

## 1.5 Supply Reticulation

### 1.5.1 Overview

A schedule of the pipe asset statistics is shown in Table 1-5 below.

**Table 1-5: Schedule of Pipework Length (m)**

Diameter mm	MPVC	PE-MD	UPVC	Total
50	0	0	105	105
90	0	247	0	247
100	0	0	86	86
150	0	0	23,185	23,185
160	0	0	798	798
175	165	0	917	1,083
200	0	0	4,339	4,339
225	0	0	1,802	1,802
250	0	0	169	169
300	611	0	1,326	1,937
400	0	0	938	938
<b>Total</b>	<b>776</b>	<b>247</b>	<b>33,665</b>	<b>34,688</b>

### 1.5.2 Condition

The condition of reticulation installed from 1997 is considered to be very good.

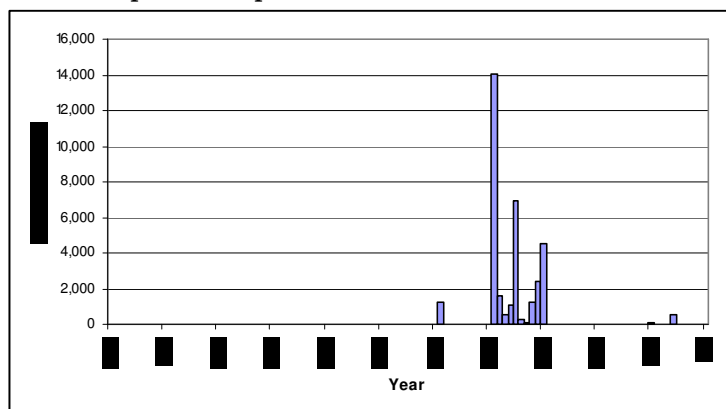
### 1.5.3 Performance

The performance of reticulation is considered by Council engineers to be very good<sup>1</sup>.

### 1.5.4 Pipe Network Replacement Date

Table 1-6 details the expected year of mains replacement.

**Table 1-6 Pipework Replacement Dates**



### 1.5.5 Infiltration

It is considered that the level of infiltration is very low due to reticulation being located above ground water. Inflow via stormwater will be managed by regular maintenance inspections and subdivision approval inspections.

### 1.5.6 Property Inspections

Property inspections were to be carried out in 2003/04 but due to constraints in resources these inspections have now been programmed for 2006/07.

<sup>1</sup> Infrastructure Asset Guidelines 1999

### 1.5.7 CCTV

No CCTV is required in the foreseeable future due to new network.

## 1.6 Environmental Management

### 1.6.1 Rights to Take and Discharge Permits

**Table 1-7: Schedule of Resource Consents**

Location	Consent Number	Description	Date Issued	Expiry Date	Quantities		Compliance (last 12 months )	Comments
					I (Lts/sec)	Daily (m <sup>3</sup> /day)		
Pines Site	CRC040099	To discharge treated sewage effluent and treated sewage sludge onto land at the Pines site	15-Dec-03	15-Dec-38		7760	Not in operation	Not in operation
	CRC040100	To discharge contaminants to air from the treatment of sewage and then discharge of treated effluent onto land	15-Dec-03	15-Dec-38				
	CRC041489	To discharge contaminants to air	27-Apr-04	27-Apr-39				
Helpet Site	CRC950310.1	To discharge contaminants (including odours and aerosols into the air from spray and trickle irrigation of treated domestic sewer effluent	31-Mar-95	31-Mar-30	0	0	-	
	CRC950310.1a	To discharge sewage effluent treated in an extended aeration plant servicing the Rolleston Area onto 13.8 hectares of land between Springston Rolleston Rd and Lincoln Rolleston Rd.	31-Aug-98	31-Mar-30	0	0	-	
	CRC950310.2	To discharge contaminants to land	31-Mar-97	31-Mar-30	0	1100	-	
	CRC950311	To discharge contaminants (including odours and aerosols) into the air from spray and trickle irrigation of treated domestic sewage effluent	31-Mar-95	31-Mar-30	0	0	-	

### 1.6.2 Consenting Issues

Testing of the Helpet treatment plant in 2001 showed that the anoxic tank was inadequate and a new tank to cope with flows up to 5,900pe was installed in 2002. This has resulted in the nitrogen levels in the wastewater now complying with design requirements (7g/m<sup>3</sup> or less).

Testing of the treatment plant and disposal area in 2000 to 2002 showed that the disposal area had a reduced capacity (3,500 pe). A variation to the existing consent, approved in 2005 has provided for disposal to 4,400 p.e.

### **Comments from Environment Canterbury**

The following are comments from Environment Canterbury<sup>2</sup> regarding compliance of wastewater disposal resource consents.

“SDC generally has an acceptable level of compliance with the consents it holds to operate its community wastewater treatment plants. The Council usually provides monitoring information within the required timeframes and SDC staff are responsive to requests for further information or clarification. Information provided is in a useful and clear format.”

## **1.7 Maintenance and Operating**

### **1.7.1 Maintenance Contract**

Maintenance of the reticulation and general work around the treatment plant is carried out by SICON Ltd under Maintenance Contract 849. The Rolleston sewerage system (including the treatment plant) Operation Manual has been assessed as moderate. Enhancement of the existing manual is programmed with the development work now underway.

### **1.7.2 Maintenance Issues**

The issues for the maintenance of the Rolleston Wastewater Services are

- Operating the Helpet WWTP
- Sludge treatment & disposal
- Future requirement to provide additional qualified staff for the Pines plant operation.

### **1.7.3 SCADA**

The treatment plant and all pump stations is monitored by Council’s SCADA system and has the following alarm and monitoring capacity:

Site Name	Phase Failure	Pump Operation	Well Level and High Alarm	Total Outflow	Generator Operation	Dissolved Oxygen
WWTP Pump Station	Y	Y	Y	Y	-	Y
Goulds Rd Pump Station	Y	Y	Y	Y	-	-
Jones Rd Pump Station	Y	Y	Y	Y	Y	-

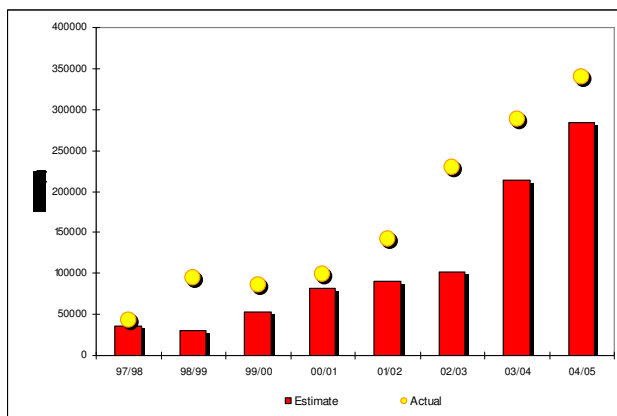
### **1.7.4 Actual Operating versus Estimated Costs**

The following table details the comparison between annual estimates and actual annual costs.

<sup>2</sup> CRC Memorandum of 20th October 2005



**Table 1-8: Actual Costs versus Estimates 1997/98 – 2004/05**



- As peak loadings occur on the Helpet plant, increased maintenance may be required.

### 1.7.5 Future Maintenance Financial Programme

Table 1-9 details the maintenance and operating costs (excluding depreciation).

## 1.8 Renewals Capital Expenditure

Table 1-10 details the renewals programme for period 2006/07 to 2026/27. This programme includes renewals associated with the Helpet WWTP. Some of these renewals may not be required with an assessment on replacement requirements being undertaken closer to the time that the Helpet plant is closed down.

**Table 1-9: Future Operating and Maintenance Financial Requirements 2006/15**

Excluding: Depreciation and Loan Interest

	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16
<b>Expenses</b>										
Support Services	105981	75152	83201	90568	95627	99967	107209	112014	115817	120769
Consultants Fees	23134	26072	28880	31687	33319	34952	36584	38216	39849	41481
Consultants Fees - other	5783	6518	7220	7922	8330	8738	9146	9554	9962	10370
Insurance and Rates	4315	8000	8000	8000	8000	8000	8000	8000	8000	8000
Electricity	40484	45626	50539	55452	58309	61165	64022	66878	69735	72591
Mtce - Pump Station	10297	13805	17491	21392	24693	28103	31616	35226	38931	42726
Mtce - Reticulation	10097	11379	12605	13830	14542	15255	15967	16680	17392	18104
Mtce - Treatment Helpet (plant & irrig)	52051	52051	52051	52051	52051	52051	52051	52051	52051	52051
Sludge Treatment & Disposal (helpet)	69402	69402	69402	69402	69402	69402	69402	69402	69402	69402
Mtce - Treatment Pines (plant & irrigation & sludge treatment/disposal)	243480	259270	259270	244270	244270	244270	244270	244270	324765	335113
Routine Checks	12724	14340	15884	17428	18326	19223	20121	21019	21917	22814
Monitoring Water Quality(Helpet)	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Monitoring Water Quality(Pines)	10000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Water Right Fees	10000	15000	15000	15000	15000	15000	15000	15000	15000	15000
<b>Total Expenses</b>	<b>612749</b>	<b>631615</b>	<b>654543</b>	<b>662002</b>	<b>676870</b>	<b>691127</b>	<b>708388</b>	<b>723311</b>	<b>817820</b>	<b>843423</b>

**Scheme Improvements**

SC60 Design Internal Retic	25,000	25,000	25,000							
Master Plan Updates	8,250	8,250	8,250							
Demand Management, I&I, Planning & Allocation	15,000	5,000	5,000							
Operations Manuals & Procedures	2,500									
Extraordinary Connection / Subdivision Impact Review	5,000	5,000	5,000							
Improvement Plan items	33,500									
Property Inspections				5,000					5,000	
<b>Total Scheme Improvements</b>	<b>64,250</b>	<b>18,250</b>	<b>18,250</b>	<b>5,000</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>5,000</b>	<b>0</b>

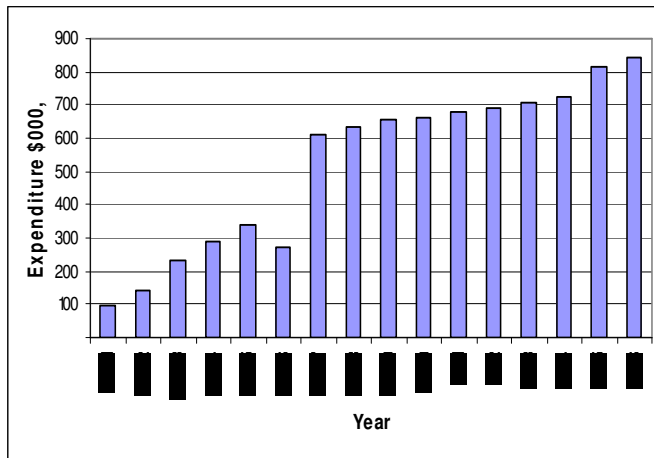
Table 1-10: Future Renewals 2006/07 to 2026/27 (\$000,)

		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Pump Station	PUMP UNIT SUBMERSIBLE 2							12													
	HIGH LEVEL ALARM FLOAT		1										1								
	LEVEL PROBE		1										1								
	SCADA SYSTEM							10													
	SCADA RT							1													
	BACK FLOW PREVENTER							1													
	ELECTRICAL SWITCHBOARD												37								
	PUMP UNIT SUBMERSIBLE 1							12													
Jones RD PS	SUBMERSIBLE PUMP 1												6								
	SUBMERSIBLE PUMP 2												6								
	SWITCHBOARD																	18			
	GENERATOR CONNECTION																	2			
	SCADA EQUIPMENT												10								
	SCADA RT												1								
	LEVEL TRANSDUCER							3										3			
	FLOW METER												7								
Treatment Plant PS	FLOAT - HIGH LEVEL							3										3			
	PUMP UNIT SUBMERSIBLE 1						6														
	PUMP UNIT SUBMERSIBLE 2						6														
	ELECTRICAL SWITCHBOARD											37									
	SCADA SYSTEM 1						10														
	SCADA RT 1						1														
	ULTRA SONIC PROBE	1										1									
	PUMP UNIT SUBMERSIBLE 3						6														
Treatment Plant	HIGH LEVEL ALARM FLOAT	1																			
	DITCH AERATOR 1						45														
	DITCH AERATOR 2						45														
	MIXER 1																				
	UV CHAMBER						20														
	DISSOLVED OXYGEN PROBE 1	1					1														
	IRRIGATION PUMP UNIT 1	15																			
	IRRIGATION PUMP MOTOR 1						15														
	IRRIGATION PUMP UNIT 2	20																			
	IRRIGATION PUMP MOTOR 2						15														
	IRRIGATION SUMP PUMP						6														
	SURFACE WATER PUMP						6														

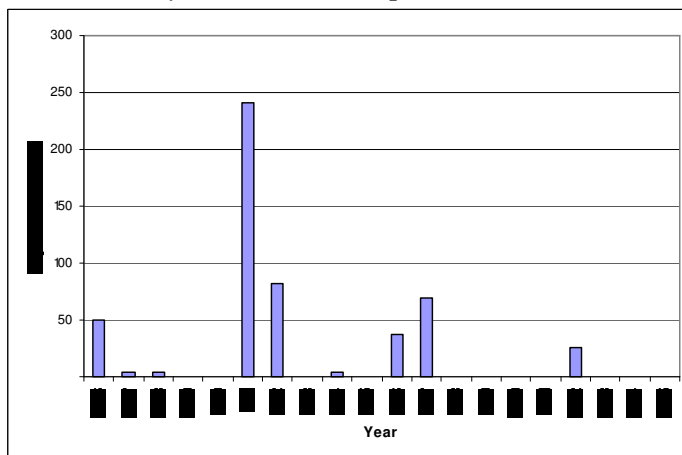
		2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
	SCREEN																				
	FLOW METER						5														
	UV INTENSITY METER 1	6																			
	UV SLEEVE SET 1	2		2						2											
	FILTER FOR EFFLUENT GOING TO DR																				
	BOAT SCUM PUMP 1						6														
	BOAT SCUM PUMP 2						6														
	ELECTRICAL SWITCHBOARD																				
	HIGH PRESSURE WATER PUMP	4																			
	WAS PUMP 1																				
	WAS PUMP 2																				
	FLOW METER 1																				
	FLOW METER 2																				
	AERATOR 3 (IN BOAT 2)																				
	AERATOR 4 (IN BOAT 2)																				
	MIXER 2							11													
	DISSOLVED OXYGEN PROBE 2		2					2													
	BOAT SCUM PUMP 3																				
	BOAT SCUM PUMP 4																				
	ANOXIC MIXER 1 IN TANK 1						11														
	ANOXIC MIXER 2 IN TANK 1						11														
	ANOXIC MIXER 1 IN TANK 2							11													
	ANOXIC MIXER 2 IN TANK 2							11													
	FILTER FOR BLOCK 5																				
	UV INTENSITY METER 2							6													
	UV SLEEVE SET 2			2						2											
	RECIRCULATOR 1						11														
	RECIRCULATOR 2						11														
	TOTAL	50	3	4			241	82		4		38	69					26			

**Table 1-11: Future Operating, Maintenance Forecasted Cost Trends**

Excluding: Depreciation and Loan Interest



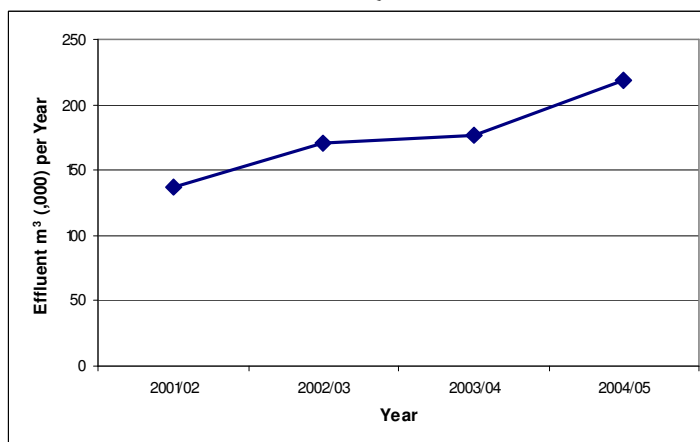
**Table 1-12: Projected Renewals Expenditure Trends**



## 1.9 Annual Wastewater Quantities

The following table details the annual wastewater quantities for the Rolleston sewerage scheme.

**Table 1-13: Annual Wastewater Quantities**

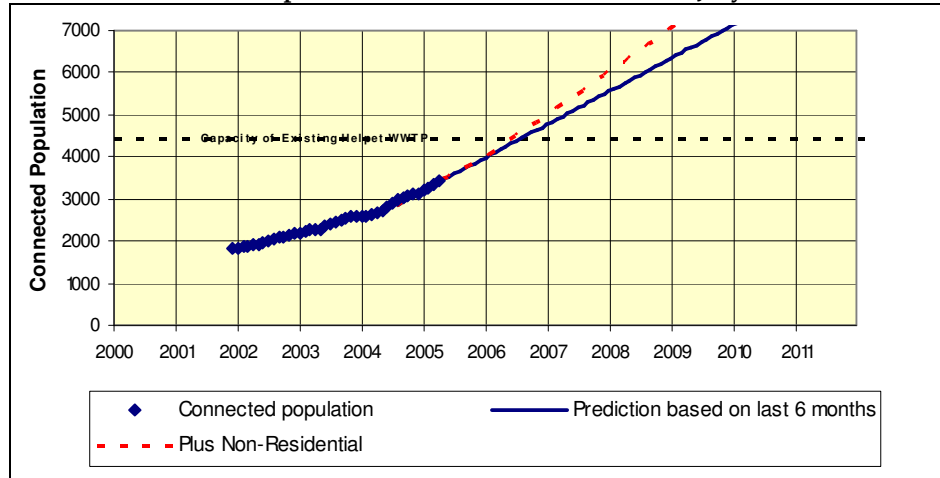


## 1.10 Future Demand and New Capital Expenditure

### 1.10.1 Future Demand

Predicted demand for Rolleston and the timing for the requirement of the Pines Development are detailed in Table 1-14 below.

**Table 1-14: Predicted Population Growth in Rolleston (as of July 2005)**



### 1.10.2 Capacity and Future Asset Development Requirements

#### Wastewater Conveyance

A network model of the existing system was developed in the hydraulic modelling package MOUSE 2000 (DHI). A dry weather profile for residential flow was developed from recorded flows at the Rolleston WWTP was applied to the model for the sewer catchments. An industrial component of flow from the Jones Road sewer pump station was incorporated into the model for future scenario simulations (PC60).

In general, the modelling investigation identified that the existing sewer network was sufficient to service the SC10 population but was insufficient to convey flows for the proposed PC60 future population.

A master plan for the servicing of the scheme was proposed to firstly convey the future flows and to secondly transfer all future flows to the Pines site. The timing of the change in treatment location (from the existing Helpet Plant to the new Pines Wastewater Treatment Site) is connected directly to:

- The rate of growth in the community
- Rate of growth in the Izone Industrial Park development, and
- The capacity of the existing plant and disposal field

The options presented in the Rolleston Sewer Network Options Investigation were considered by Selwyn Central Area Board in December 2003. The board's preferred option for bulk conveyance of flows to the new treatment site was a combination of "Option C" and "Option B". This was based upon a two-stage process.

The construction of the infrastructure to convey sewage from the Helpet WWTP and Industrial Park to the Pines plant is to be developed in two stages. The works association with each stage is as follows:

#### Stage One:

- Installing new pumps and controls in the existing Helpet Pump Station for use over a transitional period until a new pump station is built at the same site
- Construction of the Main Pump Station in the vicinity of the intersection of East Maddisons / Brookside / Burnham School Road
- Construction of a rising main from the Main Pump Station to the new Pines WWTP (approximate length 2,800m)
- Construction of a rising main from the Helpet Pump Station to the new Main Pump

#### Stage Two:

- Construction of a second rising main down Brookside Road from the connection with the Industrial Park to the Main Pump Station
- Upgrading of the pumps and controls in the Main Pump Station
- Construction of a second rising main along Burnham School Road from the Main Pump Station to the Pines WWTP

#### Wastewater Treatment

The existing Helpet Plant has a capacity of 4,400 population equivalents, less than the requirement to meet future growth.

At the present growth rate, the 4,400 population capacity of the Helpet plant will be reached in September 2006. The predicted timing of this capacity exceedence is shown in Table 1-14; therefore commissioning of the Pines treatment facility is required by September 2006.

The target date for the Pines rising main and treatment plant completion is by mid-2006. The design and tendering of the Pines treatment and disposal system has been completed in April 2006.

### 1.11 Capital Expenditure

Table 1-15 details the capital expenditure required for increased demand for the period 2006/15.

**Table 1-15: Capital Expenditure Requirements (\$000,)**

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Reticulation Design	15									
Pines Treatment Plant (STP/Irrigation)	4000									
Pines Pumpstations and rising mains (Main PS and Helpet PS)	2563							1209		
Internal Reticulation (Public mains/Pump Stations)	644	644	644	644	644					
Pines treatment Plant and Irrigation Extension								4600		
<b>Total</b>	<b>7222</b>	<b>644</b>	<b>644</b>	<b>644</b>	<b>644</b>			<b>5809</b>		

### 1.12 Disposal Programme

No disposal of assets is considered necessary over the next 10 years. This is however dependant on the timing of the Helpet plant shutdown.