

## 4.0 OVERALL RAW WATER SUPPLY REQUIREMENTS

### 4.1 Capricorn Coast

Urban water resource planning for a major urban centre such as the Capricorn Coast requires that consideration be given to at least the requirements of the next 50 years.

Since the construction of the Waterpark Creek Water Supply Scheme the overall daily demand of the Capricorn Coast conurbation has not increased in direct relationship to population increases and expansion of the area serviced. The lack of increase in overall water usage from 1969 to 2004 is primarily due to the installation of meters and the successful implementation of demand management policies by Livingstone Shire Council.

Over the last ten years the population increase on the Capricorn Coast has averaged three percent per annum. This rate of increase is to some extent related to the relatively low population base and represents about 500 to 600 additional persons per annum.

In the longer term, as the overall population increases, it can be expected that the annual population increase will reduce in annual percentage terms. A three percent annual growth rate is unlikely to be consistently maintained over the next 50 years. However, it is likely that there will be rapid increases in population probably exceeding 3.5 percent per annum over relatively short timeframes, which may impact on the water source if adequate allowance is not made for increasing the overall capacity of the source.

In considering the reliability of a source of water supply it is necessary to adopt a conservative approach to the determination of future water supply demands. This report examines the existing Waterpark and Sandy Creeks source on the basis of future water supply requirements, which are considered to be slightly higher than what might reasonably be expected to be the actual demands. Water conservation based on an inadequate source is a high risk scenario and an inappropriate means of reducing water consumption.

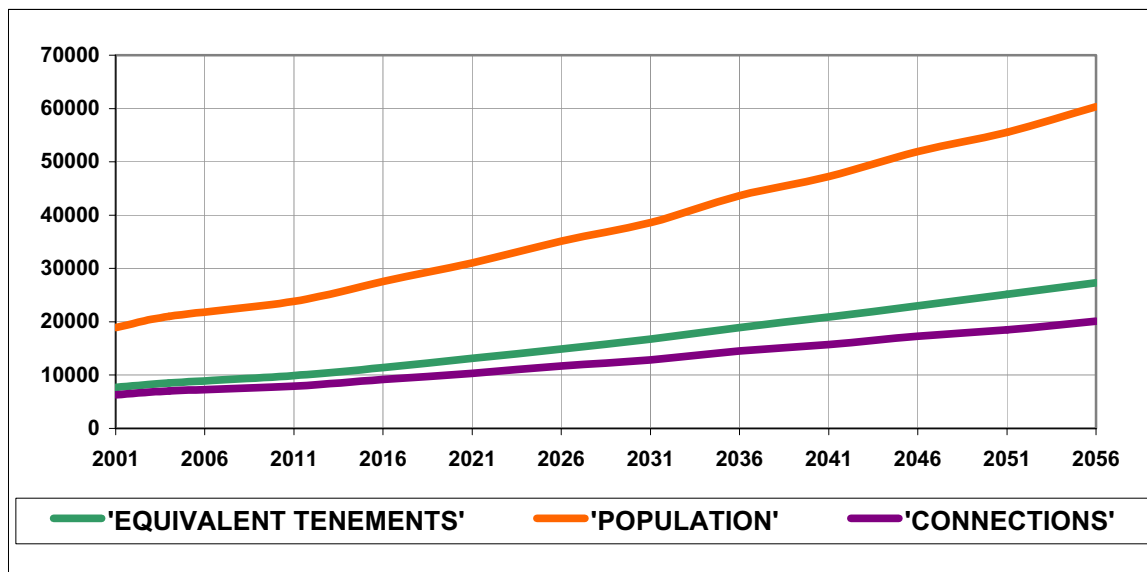
Overall the Capricorn Coast's water consumption, in recent years, has not been high. This is probably due to the implementation of effective demand management strategies and accordingly, it is believed that there is little scope to reduce the demand further. Currently, without augmentation of the existing source, it is conceivable that direct major intervention would be necessary to limit supply should a severe long term local drought occur within the Waterpark and Sandy Creeks' catchment.

In considering the reliability of the existing source consideration also needs to be given to the formulation of a Drought Management Plan (DMP) based on the implementation of restrictions. While it is considered that a DMP is a necessary requirement for the management of the existing source such a plan must be regarded as a 'short term management practise' and not a long term solution to the overall question of supply and the reliability of that supply.

#### 4.1.1 Population, Connections and Equivalent Tenements

The assessment of future water needs is normally quantified on the basis of the expected increase in 'equivalent tenements' (ETs) which relate to the population, land use and approximate the number of connections.

Graph 4.1 provides details of the increase expected in population, water supply connections and ETs. This projection has been based on the historic growth pattern and an assessment of the likely long term demographic changes expected to take place in similar coastal tourist areas within Queensland.



**Graph 4.1**

It is anticipated that the following increases, given in Table 4.1, will occur in relation to population, water supply connections and equivalent tenements from the year 2004 to the year 2056. These increases represent an average annual increase of 2 percent per annum.

**Table 4.1**  
**Population, Connections and Equivalent Tenements**  
**50 year Increases**

Parameter	Number	
	Year 2004	Year 2056
Population	21,020	60,300
Connections	7,000	20,100
Equivalent Tenements	8,545	27,290

#### 4.1.2 Historic Water Consumption

Since 1990, the quantity of water pumped annually to the Capricorn Coast conurbation has ranged from 2,560ML to 3,650ML. During this period the annual rainfall for the Waterpark Creek catchment has shown a gradual decline from some 1,800mm to less than 500mm in the last few years. Over this period there is no evidence of a relationship or correlation between rainfall and annual consumption.

In the last fifteen years the water consumption on the Capricorn Coast has shown a pronounced reduction in per capita consumption. This is primarily due to increased awareness of the need to conserve water and the increased use of reclaimed water. It is believed that there is some further scope for reducing demand. However, in terms of assessing future needs and the long term reliability of the existing supply, it is considered that the per capita consumptions recorded in recent years provide a reasonable basis for the determination of future water consumption.

Table 4.2 shows the annual consumption of water pumped from the Woodbury Pump Station and the average consumption per ET for the period from 1999 to 2003.

**Table 4.2  
Water Consumption**

<b>Year</b>	<b>Annual Consumption (ML)</b>	<b>Average Consumption per ET (L/ET/d)</b>
1999	3,014	1,110
2000	2,824	1,005
2001	3,708	1,275
2002	3,012	1,000
2003	3,240	1,075

### 4.1.3 Projected Water Consumption

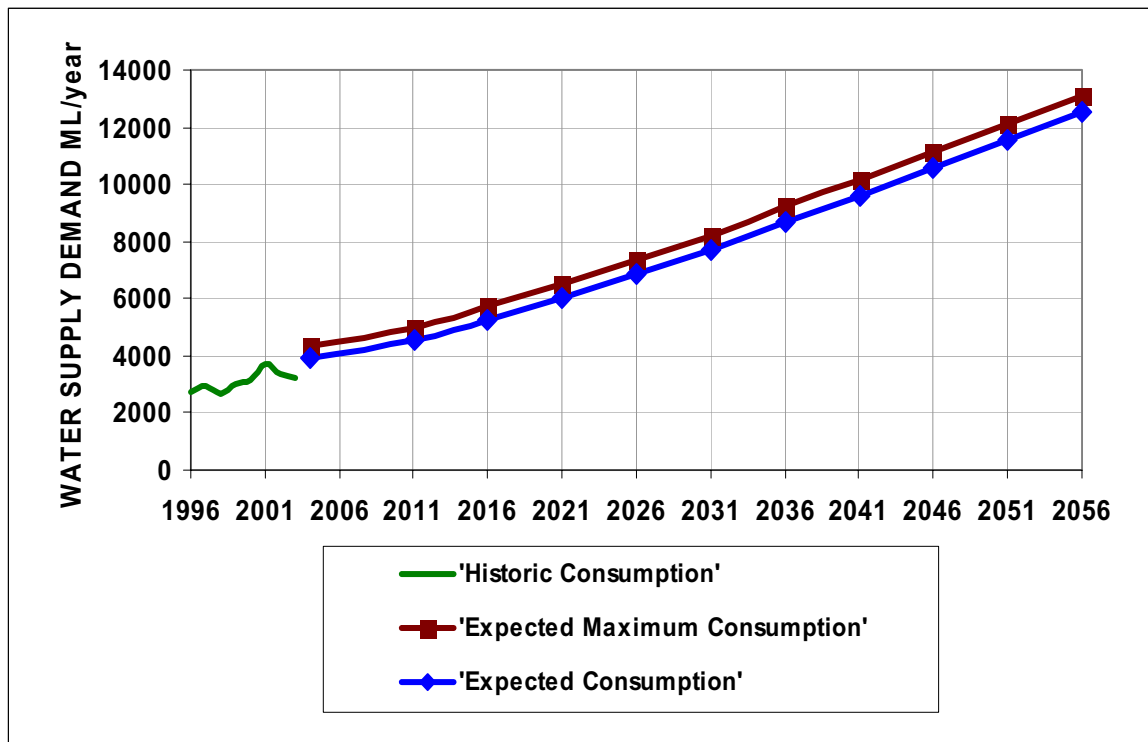
The historic water consumption record shows that annual consumption can vary by about 500ML in any given year. The Capricorn Coast can be expected to see considerable fluctuation in growth and to some extent water demands.

From the historic consumption pattern 1,200L/ET/d has been adopted as the basis for assessing future water consumption requirements until the year 2056 in terms of sourcing requirements. This equates to about 480L/capita/d. Accordingly, it is believed, that future water source needs should be assessed on the basis of an 'Expected Consumption' (EC), where  $EC = ET \text{ for a particular year } \times 1,200$ . In addition consideration should be given to the 'Expected Maximum Consumption' (EMH) which represents a 500ML/annum above the EC in any given year.

Graph 4.2 and Table 4.3 show details of the existing water consumption and the future water requirements of the Capricorn Coast. Both the EC and EMC projections include five percent system losses (ie. pumping, conveyance and treatment plant losses).

Five percent losses is at the lower end of the scale of overall water supply system losses. Currently no detailed assessment has been made of losses and it is not possible to quantify actual losses with any precision at this time. However, given the source is some considerable distance from the areas of demand and the overall linear shape of the areas of demand it is conceivable that losses are in fact greater than five percent.

From these projections it can be seen that the Capricorn Coast water supply will need to have a capacity to supply some 12,500ML/annum and possibly 13,100ML of raw water available by the year 2056.



**Graph 4.2**

**Table 4.3  
Projected Raw Water Requirements**

Year	Expected Consumption (ML)	Expected Maximum Consumption (ML)
2006	4,125	4,565
2011	4,550	4,990
2016	5,255	5,715
2021	6,050	6,530
2026	6,850	7,345
2031	7,690	8,200
2036	8,685	9,205
2046	10,565	11,105
2056	12,550	13,110

## 4.2 The Caves

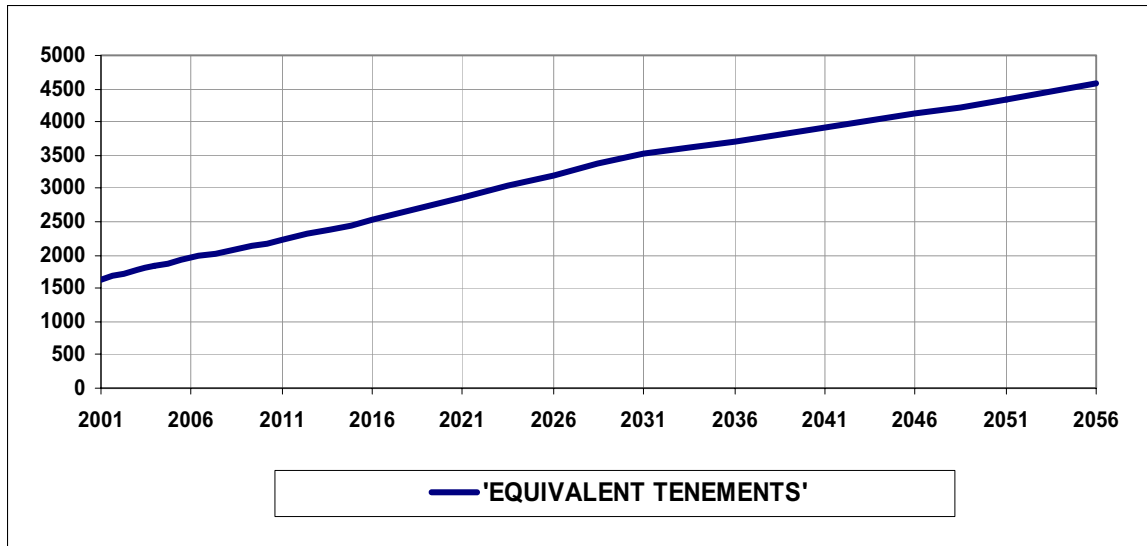
A common pipeline could be used to serve both 'The Caves' water supply area and the Capricorn Coast water supply area, should the Fitzroy River be used as an alternative or secondary source of supply to the Capricorn Coast.

To some extent population increases at 'The Caves' will be influenced by development that takes place within the northern undeveloped areas of Rockhampton City. It is therefore somewhat difficult to predict the likely population of 'The Cave's' area and to some extent consideration must be given to treating 'The Cave's' area and the northern portion of Rockhampton City as a single entity in terms of water supply requirements.

### 4.2.1 Equivalent Tenements

An assessment has been made of the ET applying to 'The Caves' for the period from year 2001 to 2056 based on an initial annual growth rate of 2.5 percent until the year 2031 followed by an annual growth rate of 1.1 percent.

Graph 4.3 shows the expected increase in ET's within 'The Caves'.

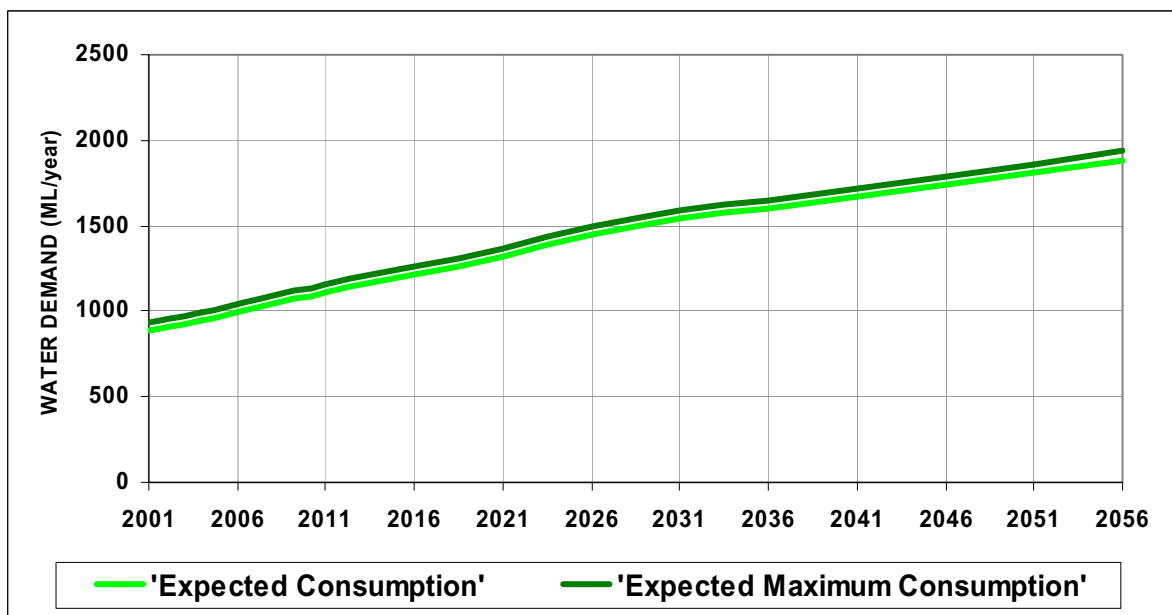


Graph 4.3

### 4.2.2 Projected Water Consumption

Future water demands have been determined having regard for historic consumption and the expected increase in ET's. Graph 4.4 shows the EC and EMC.

The EC has been based on a demand of 1,250L/ET/d.



Graph 4.4

Table 4.4 provides details of the annual water requirements for 'The Caves'.

**Table 4.4**  
**'The Caves' Projected Water Requirements**

<b>Year</b>	<b>Expected Consumption (ML)</b>	<b>Expected Maximum Consumption (ML)</b>
2006	1,030	1,070
2011	1,120	1,160
2016	1,215	1,260
2021	1,320	1,365
2026	1,435	1,495
2031	1,540	1,590
2036	1,600	1,650
2046	1,735	1,785
2056	1,880	1,935

### **4.3 Water Demands along the Pipeline Route**

#### **4.3.1 Within Livingstone Shire**

The construction of a pipeline from the Fitzroy River to the Capricorn Coast raises the possibility that Livingstone Shire Council may agree to water supplies being provided to small communities along the route of the pipeline. For the purposes of this investigation it has been assumed that a population of 1,000ET located along the pipeline route could be served with a water supply by the year 2056.

A population of 1,000ET located within Livingstone Shire along the route of the pipeline would require an annual water supply of 440ML.

#### **4.3.2 Within Rockhampton City**

Fitzroy River Water has advised that some 2,100 connections (say 2,300ET) within the local government area of Rockhampton City could be expected to draw supplies from a pipeline constructed to the Capricorn Coast from the Fitzroy River Barrage.

Based on a water supply demand of 1,700L/ET/d the expected annual demand drawn from a pipeline to serve Rockhampton City residents will be 1,425ML. However, whether or not this demand or a lesser demand will be drawn from the pipeline will depend on the route of the pipeline. For instance, should the pipeline not follow the alignment of the Rockhampton Yeppoon Road the overall water supply requirement within Rockhampton City will reduce to 680ML/a.

### **4.4 Overall Water Supply Requirements**

The Capricorn Coast's future water supplies can be obtained from the following sources.

1. Waterpark Creek and Desalination;
2. Waterpark Creek, Sandy Creek and Desalination;
3. Waterpark Creek and the Fitzroy River;
4. Waterpark Creek, Sandy Creek and the Fitzroy River; and
5. Waterpark Creek, Sandy Creek, the Fitzroy River and Desalination.

#### 4.4.1 Capricorn Coast Sources Only

If supplies are obtained from 1 and 2 above the maximum annual quantity of water required will be as given in Table 4.5.

**Table 4.5  
Capricorn Coast Only  
Projected Raw Water Requirements**

Year	Expected Maximum Consumption (ML)
2006	4,565
2011	4,990
2016	5,715
2021	6,530
2026	7,345
2031	8,200
2036	9,205
2046	11,105
2056	13,110

#### 4.4.2 Capricorn Coast and Fitzroy River Sources

For water supplies obtained from 3, 4 and 5 above the option exists to service urban areas within Rockhampton City, 'The Caves' and small communities within Livingstone Shire located along the route of the pipeline. Table 4.6 details the annual volume of water required to serve the Capricorn Coast, 'The Caves', Rockhampton City and communities within Livingstone Shire along the route of the pipeline.

**Table 4.6  
Pipeline from Fitzroy River Barrage  
Projected Raw Water Requirements**

Year	Expected Maximum Annual Consumption (ML)					Totals
	Rockhampton City		Livingstone Shire			
	Parkhurst Only	Total	The Caves	Along Route of Pipeline	Capricorn Coast	
2006	-		1,070	-	4,565	5,635
2011	150	250	1,160	150	4,990	6,550
2016	350	550	1,260	300	5,715	7,825
2021	520	900	1,365	360	6,530	9,155
2026	680	1,250	1,495	380	7,345	10,470
2031	680	1,425	1,590	400	8,200	11,615
2036	680	1,425	1,650	420	9,205	12,700
2046	680	1,425	1,785	430	11,105	14,745
2056	680	1,425	1,935	440	13,110	16,910