

1.0 EXECUTIVE SUMMARY

The Capricorn Coast has experienced a reduced level of rainfall over its primary water resource catchment of Waterpark Creek in recent years. Should this condition continue the conurbation is threatened with the possibility that failure of the source of supply could occur. The ability of the existing Waterpark Creek system to meet the water supply requirements of the Capricorn Coast urban community during the next twelve months is dependent on consistent rainfall occurring over the Waterpark Creek catchment during the year 2004-05 wet season.

Should the 2004-05 wet season fail and drought condition be experienced in the first 6 months of the year 2005, then even with the application of stringent restrictions the existing offstream storage is likely to fail by August/September, 2005.

Current water consumption of the Capricorn Coast, which on a per capita basis is low by regional standards, is some 3,650ML/a. This volume can be compared with the following yields given in Table A for the existing Waterpark Creek source of supply.

Table A
Yield Assessment of the Existing Waterpark Creek Water Supply

Yield (ML/a)	Yield Description	Comment
2,400	Safe Yield	The safe yield is derived on the basis of the complete historical rainfall record for the area including the drought of year 1902
4,020	Yield from Reduced Rainfall Record	Yield derived from the rainfall record of Byfield only which does not include the drought of year 1902.
2,950	Safe Yield with Restrictions Applied	The safe yield with restrictions is derived on the basis of the complete historical rainfall record for the area including the drought of year 1902. The safe yield assumes that restrictions will reduce normal demand by 25% when the volume of stored water in Kelly Offstream Storage falls below 75% of full capacity.

It is considered that a community, such as that of the Capricorn Coast conurbation, should be provided with a water supply source having a safe yield that exceeds the likely demand. Notwithstanding the fact that, in a majority of years, the existing Waterpark Creek system is capable of providing a supply that exceeds the safe yield by at least 65 percent it is believed that the existing supply should be augmented on the basis of the safe yield in order to ensure an adequate water supply can be maintained for those years of low rainfall and low yield.

The adoption of the safe yield as the basis for planning the water supply serving the Capricorn Coast is an matter which needs to be addressed and confirmed by Council and the community. For instance, while adoption of the safe yield will ensure reliability and mean that the likelihood of failure of the source is negligible, there will be an increased cost associated with bringing forward the need for augmentation of the source. Indeed, it could be argued that the existing supply has adequately met the requirements of the Capricorn Coast for the last 35 years and therefore there is no urgent need to supplement the supply on the basis of a yield which has been exceed for most of that period.

The dilemma facing the community is that while the yield from Waterpark Creek system in most years exceeds or equals consumption, the safe yield of the system is approximately 65 percent of current consumption.

The reasons for urgently augmenting the existing supply are as follows.

1. Livingstone Shire Council has successfully reduced per capita consumption significantly in recent years and a further reduction in demand is likely to be marginal irrespective of the action taken by Council;
2. The supply is currently stressed with flows in Waterpark Creek of less than 100L/s being recorded;
3. The minimum environmental flow needing to be maintained in Waterpark Creek downstream of the pumping intake is 50L/s;
4. Population increases are consistently ranging between 2.5% and 3% per annum;
5. The existing source does not have sufficient capacity to ensure a restricted water supply could cope with failure of a wet season; and
6. Failure of the system would have severe consequences for the economy of the Shire.

Augmentation of the existing system can be achieved in the following ways:

1. Construction of the Sandy Creek diversion and the raising of Kellys Offstream Storage to the planned Stage 2 or 3;
2. Construction of a desalination plant to process sea water; and/or
3. Construction of a pipeline from the Fitzroy River Barrage to the Capricorn Coast.

It is expected that by the year 2056 the water sourcing requirements of the Capricorn Coast will increase to 13,000ML/a. Without increasing the allocation from Waterpark and Sandy Creeks the maximum safe yield able to be obtained from these sources based on the construction of stage 3 of Kelly Offstream Storage is 8,600ML/a assuming the maximum daily diversion from Waterpark and Sandy Creek is limited to 17ML/d and 18ML/d respectively.

Of the alternative means of augmenting the existing supply, it is clear that construction of the Sandy Creek diversion and the raising of Kellys Offstream Storage are not able to fully meet the 13,000ML requirement of the year 2056 and at some stage either a desalination plant or a pipeline from the Fitzroy River will need to be constructed.

The maximum safe yield of the combined Waterpark Creek and Sandy Creek system including Kelly Offstream Storage constructed to Stage 3 is estimated to be 8,600ML/a, provided there is no increase in the existing allocation. This yield would be able to meet the needs of the Capricorn Coast until the year 2033.

In determining the most appropriate approach to ensuring the Capricorn Coast's future water requirements, it is necessary to give careful consideration to the fact that reliance on a single source such as the Waterpark Creek and Sandy Creek system is fraught with some risk. A high level of confidence cannot be ascribed to the determination of the yield because of the difficulties in modelling a catchment of this type and the inherent uncertainties which exist within the modelling and assessment processes.

To ensure the reliability of the Capricorn Coast's water supply the following approach should be adopted.

- a. The possibility that a drought at least as severe as the drought of the year 1902 will occur needs to be considered. In order to meet this situation sufficient water needs to be available within Kellys Offstream Storage to allow a restricted supply to meet the needs of the Capricorn Coast for an extended period of drought conditions. Essentially this means that sufficient storage should be available to accommodate complete failure of a wet season.
- b. The safe yield from the Waterpark Creek and Sandy Creek system should exceed the demand by, at least 25 percent. Accordingly, the current safe yield of this system should be increased to 4,500ML/a (ie. the year 2006 maximum demand).
- c. An alternative supplementary supply needs to be provided when the demand exceeds 6,500ML/a. This is based on a safe yield of 8,600ML/a from a developed Waterpark Creek and Sandy Creek system (ie. Kelly Offstream Storage stage 3) and a requirement that the capacity of the source and supply infrastructure should be capable of meeting a demand based on a ten year planning horizon.
- d. Should it not be possible, for any reason, to substantially increase the capacity of the existing Waterpark Creek and Sandy Creek sources to a level in excess of likely demand, an alternative supplementary supply should be constructed.

Of the two methods of supplementing the existing system, desalination is clearly the most expensive. An examination of the most suitable means of desalinating sea water in the quantities required by the Capricorn Coast indicates that the construction of a modular reverse osmosis plant is appropriate to the Capricorn Coast requirements. Table B summarises the advantages and disadvantages associated with such a plant's construction on the Capricorn Coast.

Table B
Advantages and Disadvantages associated with Desalination

Advantages	Disadvantages
<ul style="list-style-type: none"> ∅ The plant can be constructed in modules based on demand; ∅ There is no requirement to negotiate with other local governments; and ∅ There are no reliability issues in terms of source water. 	<ul style="list-style-type: none"> ∅ High capital and operating costs and short plant life; ∅ High energy demands which, if based on current supplies of electricity generated from coal contribute to the production of 'greenhouse gases'; ∅ A need for considerable operational and management expertise; ∅ Periodic turbidity problems from flood runoff; ∅ Difficulties with disposal of waste brine; and ∅ Difficulties in matching production with demand variations.

In the short term construction of desalination plant modules with a capacity ranging between 1,000ML/a and 3,500ML/a cannot be justified. However, it must be recognised that desalination plants will become a necessity in some parts of Australia and combined with an increase in the value of water resources generally, will result in an improvement in the overall financial viability of such plants.

The least cost method of supplementing the Capricorn Coast's water supply beyond the development of Waterpark Creek and Sandy Creek is by the construction of a pipeline from the Fitzroy River Barrage. The capital cost of the infrastructure required to meet the year 2056 water demands of the Capricorn Coast is some \$70M to \$85M based on the construction of a pipeline to convey water from Fitzroy River Water's Glenmore Treatment Plant.

To be financially viable for Livingstone Shire Council it will be necessary for a subsidy of 80% to be obtained from State and Federal Governments.

Five alternative routes for a pipeline to the Capricorn Coast have been examined. While there is little difference in an economic comparison of the alternative routes, construction along the Rockhampton – Yeppoon Road alignment either through the hills within Rockhampton City Council's area or north of these hills through road reserves controlled by Livingstone Shire Council is considered the less expensive option. Construction through the hills would enable Rockhampton City to eventually utilise some 10 percent of the flow to service future development within its area.

Access to 'high priority' water from the Fitzroy River Barrage is a matter which needs to be addressed with Rockhampton City Council and the State Government. Currently there are a number of issues that need to be resolved before Livingstone Shire Council can be assured of this source. These matters include the actual availability of 'high priority' water, particularly in relation to long term needs, and the costs of obtaining and supplying Livingstone Shire Council's requirements from Fitzroy River Water and Rockhampton City Council.

Actions required to resolve the current water supply problem confronting the Capricorn Coast are as detailed in the following recommendations.

Recommendations

It is recommended that Council:

1. Confirm and adopt this report as a strategy to deal with the sourcing problems related to the existing supply and undertake the following actions:
 - a. Confirm that the existing diversion of 17ML/d from Waterpark Creek can be augmented to 35ML/d by the diversion of an additional 18ML/d from Sandy Creek;
 - b. Based on the results of this investigation and with regard to the findings off the Community Reference Group:
 - i. confirm 100L/s as the minimum environmental flow to be maintained in relation to diversions of flow from Sandy Creek, and
 - ii. subject to a clearly identified need for further investigation confirm the existing minimum environmental flow of 50L/s for Waterpark Creek as the minimum environmental flow for all future diversions from this creek;

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- c. Adopt the safe yield as the basis for water supply planning and construction;
 - d. Prepare a report assessing the necessary increases required in water charges for each class of connection within the Capricorn Coast Water Supply;
 - e. Undertake the planning and construction of the Capricorn Coast's water supply on the basis that the adopted yield exceeds the consumption by at least 25 percent and preferably on the basis of a 10 year planning horizon;
 - f. Undertake further discussions regionally and with the State Government in terms of future water supply needs from the Fitzroy River including the availability, cost and conditions applying to the supply of 10,000 to 15,000ML/a of 'high' priority water from the Fitzroy River in order to meet the long term needs of the Capricorn Coast;
 - g. Based on the safe yield able to be obtained from the Waterpark Creek and Sandy Creek system, augment the existing Waterpark Creek supply system by developing the Sandy Creek source including construction of a further stage or stages of Kelly Offstream Storage and determine the timing and supply volume required from the Fitzroy River.
 - h. Investigate and confirm funding sources for the construction of a pipeline from the Fitzroy River and finalise agreement with Rockhampton City Council for an initial supply of water from the Fitzroy River; and
 - i. Proceed with the selection of the most appropriate pipeline route and undertake the construction of a pipeline from the Fitzroy River;
2. Forward copies of the report to relevant State Government Departments for approval and funding consideration.