
12.0 EXISTING WATER SUPPLY SYSTEM AUGMENTATION

In this Section designations have been given to the different augmentation options to identify the each options. These designations are determined based on the primary source of water supply (eg Waterpark Creek with a diversion of 17ML/d = **WP17**), the stage of development of Kellys Offstream Storage (eg Stage 2 = **2**) and the secondary source of water supply (eg pipeline route 3A = **3A** or Desalination = **D**)

12.1 Waterpark Creek and Desalination

Option Designations :

Waterpark Creek with a diversion of 17ML/d, Kellys Offstream Storage at Stage 1 augmented by Desalination is designated **WP17-1-D**; and

Waterpark Creek with a diversion of 17ML/d, Kellys Offstream Storage at Stage 2 augmented by Desalination is designated **WP17-2-D**;

The option of maintaining the maximum diversion rate at 17ML/d and increasing Kellys Offstream Storage to Stage 3 has not been considered as the allocation would need to be increased and if this was to be considered an increase in the safe yield from 5,850ML/a to 7,770ML/a could be achieved by increasing the maximum diversion to 34ML/d.

An options based on increasing the maximum diversion to 34ML/d and raising Kellys Offstream Storage to Stage 3 has been considered in Appendix E.

One of the problems with not accessing water supplies from Sandy Creek and augmenting the existing Waterpark Creek supply with the construction of a desalination plant only is that, with continued development and population increases on the Capricorn Coast, the desalination plant will become the dominant supply (except for **WP34-3-D** – Refer Appendix E). Desalination plants and particularly reverse osmosis plants tend to be best run as 'base load supplies'. This means that reserve osmosis plants are not suited to directly meeting variations in demand.

In addition, once the desalination plant supplies a high percentage of the overall demand it will be somewhat difficult to operate the Waterpark Creek system and the distribution system (at least in the early years) so as to maximise the volume of water able to be sourced from the less expensive Waterpark Creek system.

To operate the distribution system successfully it will be necessary to provide a number of desalination units. This will allow units to be progressively brought online as required based on the supply able to be provided from Waterpark Creek.

Further it will be necessary to provide trunk mains from the desalination plant to distribution reservoirs rather than feed desalinated water directly to the distribution system.

To meet the year 2016 water supply demands of the Capricorn Coast it will be necessary to provide in the year 2006 a desalination plant having a capacities as listed in Table 10.3 (ie. 3,500ML/a for **WP17-1-D** and 2,000ML/a for **WP17-2-D**).

From the year 2006 the desalination plant will need to be progressively augmented from a capacity of 3,500ML/a to 11,500ML/a or 2,000ML/a to 10,000ML/a. This will mean that the desalination plant will supply from 58 percent to 88 percent or from 33 percent to 72 percent of the Capricorn Coast's total annual water requirement between the year 2016 and the year 2056.

The existing capacity of the infrastructure associated with the supply from Waterpark Creek to St Faiths Reservoir is approximately 5,250ML/a which can be compared with the safe yield of 2,400ML/a (Kellys Offstream Storage Stage 1) and 4,100ML/a (Kellys Offstream Storage Stage 2).

12.1.1 Options WP17-1-D and WP17-2-D

Options **WP17-1-D**, and **WP17-2-D** would not require the existing supply from Waterpark Creek to be augmented.

Under Option **WP17-1-D** where the existing supply from Waterpark Creek is not augmented and Kellys Offstream storage is not raised the desalination plant will be required to service the following zones progressively in the period from the year 2016 to year 2056. In the year 2016 the maximum demand of these zones is some 3,400ML/a.

- € Keppel Sands;
- € Emu Park;
- € Mulambin Beach and Kinka Beach;
- € Cooee Beach, Lammermore Beach and Statute Bay;
- € Tanby Heights and
- € Tanby South.

Under Option **WP17-2-D** where the existing supply from Waterpark Creek is not augmented and Kellys Offstream storage is not raised the desalination plant will be required to service the following zones progressively in the period from the year 2016 to the year 2056. In the year 2016 the maximum demand of these zones is some 2,100ML/a.

- € Keppel Sands;
- € Emu Park;
- € Mulambin Beach and Kinka Beach; and
- € Statute Bay;

The infrastructure augmentation associated with the provision of a desalination plant to meet the future water supply demands of the Capricorn Coast are listed in Tables C.1 and C.2 of Appendix C for **WP17-1-D** and **WP17-2-D** respectively.

12.2 Waterpark Creek and Fitzroy River Barrage

Option Designations

Options examined include Waterpark Creek with a diversion of 17ML/d (or 34ML/d – refer Appendix E), Kellys Offstream Storage at Stage 1, Stage 2 or Stage 3 and five different routes for a pipeline from Rockhampton City's distribution system of direct from the Fitzroy River Barrage by means of a separate Livingstone Shire operated water treatment plant. Designations for each of the options examined are listed in Table 12.1.

Table 12.1
Options Based on Supplies Obtained from Waterpark Creek and the Fitzroy River Barrage

Waterpark Ck Diversion (ML/d)	Kellys Offstream Storage (Stage)	From RCC System or Barrage	Route					Designation
			1A	2A or 2B	3A or 3B	4A	5A or 5B	
17	1	RCC	1A					WP17 – 1 – 1A
17	1	RCC		2A				WP17 – 1 – 2A
17	1	RCC			3A			WP17 – 1 – 3A
17	1	RCC				4A		WP17 – 1 – 4A
17	1	RCC					5A	WP17 – 1 – 5A
17	1	Barrage		2B				WP17 – 1 – 2B
17	1	Barrage			3B			WP17 – 1 – 3B
17	1	Barrage					5B	WP17 – 1 – 5B
17	2	RCC	1A					WP17 – 2 – 1A
17	2	RCC		2A				WP17 – 2 – 2A
17	2	RCC			3A			WP17 – 2 – 3A
17	2	RCC				4A		WP17 – 2 – 4A
17	2	RCC					5A	WP17 – 2 – 5A
17	2	Barrage		2B				WP17 – 2 – 2B
17	2	Barrage			3B			WP17 – 2 – 3B
17	2	Barrage					5B	WP17 – 2 – 5B

12.2.1 Waterpark Creek to St Faiths Reservoir

Maintaining a maximum diversion of 17ML/d will not require the system to be augmented. However, increasing the diversion rate to 34ML/d (refer Appendix E) will require the augmentation of the system to accommodate the increased diversion and the increased yield able to be obtained from the raising of Kellys Offstream Storage to Stage 2 or Stage 3.

12.2.2 Pipeline Routes from the Fitzroy River Barrage

Route 1A

This option involves the construction of a pipeline from Yaamba Road Reservoir along the Rockhampton Yeppoon Road to a new bulk reservoir site (designated New Yeppoon West Reservoir) located immediately south of the Rockhampton Yeppoon Road and some 7kms inland from the coast at Yeppoon. The overall length of the main is 27.2kms. A new main pumping station will need to be constructed some 1,500m from the Yaamba Road Reservoir.

To overcome the problem of the water from the barrage having a different taste to that of the existing Waterpark Creek supply supplies from Waterpark Creek will be pumped from St Faiths Reservoirs to New Yeppoon West Reservoir prior to being conveyed to the existing distribution system and Taranganba Reservoir via a new trunk main along the southern alignment of the Rockhampton Yeppoon Road.

Route 2A

This route involves utilising the existing 600mm pipeline serving 'The Cave' for the initial 8,500m from the Yaamba Road Reservoir and construction of a new trunk main which skirts the hills immediately north of Rockhampton City before following the same alignment as Route 1a to A New Yeppoon West Reservoir. Adoption of this route will require the upgrading of the existing Ramsay Creek Pump Station. Also the initial 8,500m of 'The Caves' existing main will need to be replaced with a 750mm main by the year 2026.

Flow to St Faiths Reservoirs from Waterpark Creek will be pumped to the New Yeppoon West Reservoir before being conveyed to the distribution system and the Taranganba Reservoir.

Route 3A

This route involves making use of the existing 600mm main to Mt Charlton, construction of a new 750mm main from the existing 600mm main to a new buffer storage reservoir east of the Bruce Highway and Mt Carlton and the construction of a new trunk main eastward across lands of low elevation to a new reservoir immediately west of the existing St Faiths Reservoirs. This new reservoir will be at an elevation slightly greater than the existing St Faiths Reservoirs.

This route will require the upgrading of the existing Ramsay Creek Pump Station and construction of a new pump station west of Yeppoon. Also it will be necessary to replace the existing 600mm to 'The Caves' by the year 2026. For most options the main diameter will need to be increased to 750mm.

Route 4A

The alignment of the initial section of this option will be similar to the Route 1A option. However after initially traversing the Rockhampton Yeppoon Road the alignment will be directed towards Emu Park. The pipeline will terminate at a new reservoir to be located at an elevation of at least 85m AHD immediately west of Emu Park.

A disadvantage of this alignment is that it does not allow the different source waters to be mixed prior to distribution and hence it maybe necessary to separate the areas of the Capricorn Coast receiving each water.

Route 5A

This alignment is a combination of Routes 2A and 4A and requires upgrading of the Ramsey Creek Pump Station and the eventual replacement of the initial 8,500m of 'The Caves' existing 600mm main. Termination of the pipeline is similar to that of Route 4A.

Routes 2B, 3B and 5B

Each of these routes are similar to Routes 2A, 3A and 5A respectively except that the initial source of water will be drawn directly from the Fitzroy River Barrage. A pipeline and new Water Treatment Plant will need to be constructed to the Ramsey Creek Pump Station. The length of main required from the intake to the Ramsey Creek Pump Station is 9,275m.

12.3 Waterpark Creek, Sandy Creek and Desalination

Option Designations :

Waterpark Creek and Sandy Creek with a combined diversion of 35ML/d, Kellys Offstream Storage at Stage 1 (safe yield = 2,620ML/a) augmented by Desalination is designated **WPS35-1-D**;

Waterpark Creek and Sandy Creek with a combined diversion of 35ML/d, Kellys Offstream Storage at Stage 2 (safe yield = 4,790ML/a) augmented by Desalination is designated **WPS35-2-D**; and

Waterpark Creek and Sandy Creek with a combined diversion of 35ML/d, Kellys Offstream Storage at Stage 3 (safe yield = 8,630ML/a) augmented by Desalination is designated **WPS35-3-D**;

Under these each of the above options it will be necessary to construct a desalination plant in the following years.

- € **WPS35-1-D**: Year 2006;
- € **WPS35-2-D**: Year 2006;
- € **WPS35-3-D**: Year 2031;

Under Option **WPS35-1-D** (and **WPS70-1-D** – refer Appendix E) there is not a significant difference in the supply able to be derived from Waterpark Creek and Sandy Creek the desalination plant will be required to service the following zones progressively in the period from the year 2006 to year 2056. In the year 2006 the maximum demand of these zones is some 2,150ML/a.

- € Keppel Sands;
- € Emu Park;
- € Mulambin Beach and Kinka Beach;
- € Cooee Beach, Lammermore Beach and Statute Bay;
- € Tanby Heights and
- € Tanby South.

Under Option **WPS35-2-D** (and **WPS70-2-D** – refer Appendix E) the respective safe yields from the Waterpark Creek and Sandy Creek system are 4,790ML/a and 4,950ML/a. Under both these options a desalination plant will need to be constructed in the year 2006 to service the following zones progressively in the period from the year 2006 to the year 2056. In the year 2006 the maximum demand of these zones is some 1,500ML/a.

- € Keppel Sands;
- € Emu Park;
- € Mulambin Beach and Kinka Beach; and
- € Statute Bay;

For Option **WPS35-3-D** the existing supply from Waterpark Creek will be augmented (provided the allocation can be increased), Kellys Offstream storage raised to Stage 3 and a desalination plant constructed to augment supplies by the year 2026.

The desalination plant will be required to service the following zones progressively from the year 2026 to the year 2056. In the year 2026 the maximum demand of these zones is some 2,200ML/a.

- € Keppel Sands;
- € Emu Park; and
- € Part of Mulambin Beach and Kinka Beach

12.4 Waterpark Creek, Sandy Creek and Fitzroy River Barrage

Option Designations

Options examined include a combined Waterpark Creek and Sandy Creek diversion of 17ML/d and 18ML/d (ie 35ML/d), Kellys Offstream Storage at Stage 1, Stage 2 or Stage 3 and five different routes for a pipeline from either Rockhampton City's distribution system of direct from the Fitzroy River Barrage by means of a separate Livingstone Shire operated water treatment plant. Designations for each of the options examined are listed in Table 12.2.

Table 12.2
Options Based on Supplies Obtained from Waterpark Creek and Sandy Creek and from the Fitzroy River Barrage

Waterpark & Sandy Creeks Diversion (ML/d)	Kellys Offstream Storage (Stage)	From RCC System or Barrage	Route					Designation
			1A	2A or 2B	3A or 3B	4A	5A or 5B	
35	1	RCC	1A					WPS35 – 1 – 1A
35	1	RCC		2A				WPS35 – 1 – 2A
35	1	RCC			3A			WPS35 – 1 – 3A
35	1	RCC				4A		WPS35 – 1 – 4A
35	1	RCC					5A	WPS35 – 1 – 5A
35	1	Barrage		2B				WPS35 – 1 – 2B
35	1	Barrage			3B			WPS35 – 1 – 3B
35	1	Barrage					5B	WPS35 – 1 – 5B
35	2	RCC	1A					WPS35 – 2 – 1A
35	2	RCC		2A				WPS35 – 2 – 2A
35	2	RCC			3A			WPS35 – 2 – 3A
35	2	RCC				4A		WPS35 – 2 – 4A
35	2	RCC					5A	WPS35 – 2 – 5A
35	2	Barrage		2B				WPS35 – 2 – 2B
35	2	Barrage			3B			WPS35 – 2 – 3B
35	2	Barrage					5B	WPS35 – 2 – 5B
35	3	RCC	1A					WPS35 – 3 – 1A
35	3	RCC		2A				WPS35 – 3 – 2A
35	3	RCC			3A			WPS35 – 3 – 3A
35	3	RCC				4A		WPS35 – 3 – 4A
35	3	RCC					5A	WPS35 – 3 – 5A
35	3	Barrage		2B				WPS35 – 3 – 2B
35	3	Barrage			3B			WPS35 – 3 – 3B
35	3	Barrage					5B	WPS35 – 3 – 5B

12.4.1 Waterpark Creek to St Faiths Reservoir

Providing a maximum diversion of 35ML/d will require the supply system from Waterpark Creek and Sandy Creek to be augmented. Details of the augmentation required are detailed in Appendix C.

12.4.2 Pipeline Routes from the Fitzroy River Barrage

For supplementary supplies derived from the Fitzroy River Barrage the various pipeline route options considered; based on a combined Waterpark Creek and Sandy Creek source; are similar to those discussed in Section 12.2.2 except in relation to the flows pumped.

12.5 Waterpark Creek, Sandy Creek, Pipeline from Fitzroy River Barrage and Desalination

This option has been designated **WPS35-2-1A-D**. Only Pipeline Route 1A has been examined as this is considered the most appropriate route for the construction of a pipeline having a relatively small diameter.