Parkes Mini IWCM Issues and Strategy Summary Report

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Revision History

Revision Number	Date	Issued by
0	06/10/22	RB
1	3/12/22	RB
2	31/01/23	RB
3	8/02/23	RB
4	13/4/23	RB
5	2/6/23	RB
6	16/6/23	RB

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1. Executive Summary

Parkes Shire Council (PSC) has been assessed by DPE as Level 5 risk for water security. The current Parkes Water system is at capacity, experiencing water quality and reliability problems, and cannot accommodate planned major developments of the:

- Special Activation Precinct (SAP),
- the expansion of operations at Northparkes Mines (NPM),
- potential further mining activities coming to the region.

PSC needs to:

1. deliver a continuous and reliable supply residential and commercial customers throughout various climate scenarios; and
2. ensure that supply can be delivered through sustainable management of the water resources.

The critical issue is accessing water entitlements during drought. According to groundwater modelling, during an extreme drought and assuming the Lachlan River would be dry, the current aquifer can only supply 2.5-4GL/year.

As shown in the Table below, there is enough source water in existing entitlements from Zone 3 of the Upper Lachlan Alluvial Groundwater Source. Advice from DPE and historical analysis of water extraction suggests it has more than enough capacity, however, it cannot be all taken at once and during dry periods, neighbouring users including other utilities, irrigators and industry can impact each other.

Table 1: Current water source entitlements, in a dry year, and compared with future demand

	Licenced Entitlements (ML/year)	**Available water during extreme drought (ML/year)**	**2050 Demand (ML/year)**
Parkes Town Water	9,970	2,500 – 4,000	3,900
Northparkes Mines	12,439	0	3,600
SAP	0	0	7,700
TOTAL	**22,409**	**2,500 – 4,000**	**15,200**

The IWCM Options Paper identified a range of Water Security Projects including the Lachlan to Parkes Water Supply Duplication (LPD). This involves:

- building approximately 30km of 600mm diameter raw water transfer pipeline from the Lachlan River Pump Station (LRPS) to the Parkes Water Treatment Plant (WTP);
- the construction and operation of a pre-treatment plant for raw river water; and
- a distribution reservoir at the WTP which will enable Council to service ongoing growth of the Parkes township, as well as a possible expansion of the NPM and other mines establishing in the region, and the SAP to the West.

Extracting water from the Lachlan River and Upper Lachlan Alluvial Groundwater Source Zone 3 groundwater system is limited due to drawdown impacts and the health of the aquifer, so extensive analysis of potential new places to develop bores has been undertaken and will continue. Purchasing new bores, and a connection of Parkes water supply pipelines to regional groundwater sources linked by the CENTROC pipeline (as detailed in the 2015 IWCM and recently in the DPE Lachlan River Regional Strategy) has been analysed for economic feasibility and further investigation is warranted.

Additional financial modelling of the income stream agreement with Northparkes Mines will be required, as will adjusting the SAP demands as they become more certain.

This Mini IWCM summarises the key issues, analysis and a strategy to address these issues.

2. Current State Issues

2.1. Water Supply Infrastructure

The current WTP can supply 16ML/day peak demand to the urban centres of Parkes and Peak Hill. This peak can be reached during the Elvis Festival (normally held in January). The normal daily demand from both towns averages 7ML/day.

NPM demand was 6.5ML/day in 2015, 8.5ML/day in 2021 and in early 2021 they requested a reliable supply of 11ML/day be available at all times through the Parkes water delivery infrastructure. Currently, water use is lower than normal (about 5.7ML/day) because of heavy rain which the mine has captured and stored. The mine's forecast water use in 2025 is 9ML/day with expansion plans currently in concept stage only.

The agreement to supply water to NPM expired in 2015 and ongoing negotiations about price, contributions to capital works on the pipeline and long-term demand are in progress. This is a major risk to Council but also a risk to the mine and both parties need to accommodate each other for the future of the town (given that NPM is a major employer and contributes the bulk of Council's water fund). The current negotiations have NPM setting a minimum take of 3,600ML/year but they still require the capacity to draw a peak of 150L/sec when they need it. This is critical to the sizing of LPD pipeline.

Other mining operations, such as Cleanteq, joined the IWCM PRG and are currently exploring the region for opportunities and will add an unknown extra water demand. They will need to purchase water access licences but most likely will rely on the Lachlan transfer pipeline to access the water.

The recycled water system has a current capacity 2.15ML/day (730ML/year) which is used during the summer months for irrigating Council's parks and ovals. This water can be provided to SAP businesses and new residential developments, which will also increase the sewer load and therefore more recycled water, up to the 3ML/day advanced water recycling facility (AWRF) capacity, beyond which expansion may be required. However, the AWRF also needs topping up with bore water at times of high demand during summer, which can be as much as 1ML/day.

Hydraulic modelling found the STP and bulk sewer do not have capacity issues based on future demand projections.

2.2. Transfer System Capacity

Lachlan River to Parkes WTP

The Parkes WTP was designed to treat mixed water (dam water, bore water and river water) ensuring capacity could be reached by diversifying supply. PSC operates two raw water pipelines to the WTP for the Eugowra Road Pump Station (ERPS); they are interlinked but one conveys mostly bore water and the other is used for the river water. Water pumped from the river is supplied directly to the NPM via the Church St reservoir in the centre of Parkes.

Each pipe has a current capacity to deliver about 10ML/day to the WTP at full operating potential. The 2016 Secure Yield Analysis (NUWS 2016) limited the total transfer capacity from the river and borefield to 17.28ML/day (6,307ML on an annual basis), considering pump and storage capacity issues.

The 2016 NUWS report stated in the executive summary:

"The modelling shows for the operating rules considered that the secure yield is constrained by the raw water delivery system rather than available water."

The variables in the NUWS Report were mainly based on different operating strategies for the Dam water, rather than river and bore, which were limited by the pipeline capacity, see Section 2.3. This is the issue the Lachlan Pipeline Duplication Project aims to address.

Lake Endeavour and Metcalfe Dams to Parkes WTP

Two pipelines deliver water via gravity from Lake Endeavour to the Parkes WTP, with a branch connecting Lake Metcalfe. Lake Metcalfe is no longer used for water supply and Lake Endeavour is only used as an emergency supply as described in the licence entitlements section below.

Lake Metcalfe could provide an additional 0.86GL/year to the supply but requires embankment and spillway repairs and repair of the pipeline connection to the Lake Endeavour Pipeline.

The pipelines from Lake Endeavour were damaged in the 2022 floods and one has been shut off.

There are also no meters on the outlets from the dams, so it is currently impossible to measure water losses along the 36km pipelines, which have had frequent breaks in the past.

Repairing 8km of two 300mm diameter pipelines with one 450mm diameter pipeline replacement and installing a bulk meter system with telemetry connection will reduce future losses along the pipeline. The emergency repairs are being planned.

An assessment of the feasibility of pumping water all the way from the Lachlan River and borefield to the Lake Endeavour Dam to enabled was done with the operations team at the behest of a DPE enquiry. The following issues were identified that preclude the viability of transferring water up to the dam:

- Both pipelines are subject to frequent breakage (as evidenced in the 2022 floods). They could not handle the pressure required to deliver water without full replacement.
- The pipes are not set up at the dam to enable two-way flows and the works required may compromise the dam wall itself.
- The energy required to pump the 65km distance and 400m elevation difference could not be justified when compared to pumping from the River to Parkes and managing demand and storage there.
- The community increasingly wants to use the dam for recreation, so changing the dam levels up and down for water storage would impact on safety and access.

2.3. Pipe and pump condition

The two pipelines from the river and borefield have ongoing issues with leakage and internal corrosion, compromising quality and reliability of supply. One pipe is ductile iron with cement lining and the other is mild steel with cement lining. **Both are 375mm diameter**. The mild steel pipe is older and in poorer condition than the ductile iron one and has experienced breakages over the past 7 years. They can be refurbished to extend their life.

The pipe capacity issues and options are summarised in the table below.

Table 2: Pipe capacity summary

Pipe	Date Installed	Current max capacity	Refurbished capacity	Future potential MSCL pipe replacement capacities (add 120L/sec for retained DICL)
Mild Steel Cement Lined	1960	110L/sec	120L/sec	500mm 300L/sec
Ductile Iron Cement Lined	2000	120L/sec	150L/sec	600mm 400L/sec
DAILY FLOWS		18ML/day	21ML/day	500mm = 33ML/day 600mm = 41ML/day

The ERPS transfers water from two reservoirs,1A and 1B. 1A is filled by Bores 1,2,3 and 4 plus the NPM bores 6,7 and 8 and Forbes Bore 3. 1B is filled by the river and bores 3,4,6,7 and 8. See Appendix 1 for a schematic diagram of the Parkes water supply system.

The pumps from the river and Bores have a capacity of 298L/sec.

There is a booster pump station at Back Yamma which has two reservoirs, 2 is 1.2ML and 2b is 0.5ML. The pumps are duty and standby and have the capacity to transfer up to 120L/sec each.

2.4. Limited Storage

In a worst-case scenario, Parkes has only 48-hours' worth of water supply for the Town water supply. Within the system, there is enough capacity in storage for 2 days if water cannot be sourced due to river flow being unavailable (a reality from November 2020), aquifer being unavailable due to heavy draw down (concerns this could occur when river stops flowing as towns and irrigators using very small borefield) or pump/power failure (concern with storm activity rising with a changing climate).

The SAP 10ML reservoir and the proposed 20ML water storage lagoon at the WTP would increase the water supply capacity but only to the SAP and the town respectively, as these are not on the NPM supply line. NPM however have onsite dams that can buffer their demand with storage.

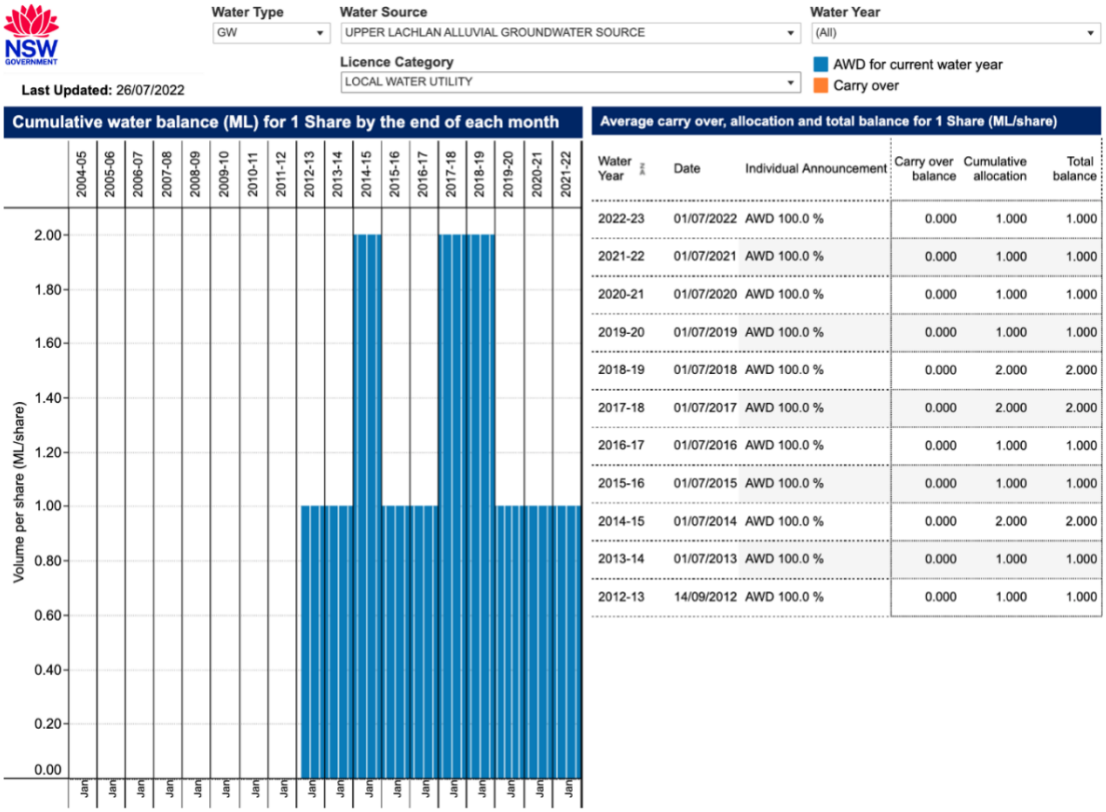
2.5. Source Licence Restrictions

Both the Lachlan River and borefield raw water sources must be available in order to meet the maximum demand from Parkes/Peak Hill and NPM as the maximum extraction rate from either the borefield or the Lachlan River can only meet approximately 50% of that peak demand with the current infrastructure.

Council have experienced issues at their bores such as falling water levels (bores not deep enough to access the water) and poor water quality.

NSW DPE advised the long-term average annual extraction limit (LTAAE) for Zone 3 of the Upper Lachlan Alluvial Groundwater Source is 36,000ML/year, but it is overallocated to 75,835ML/year.

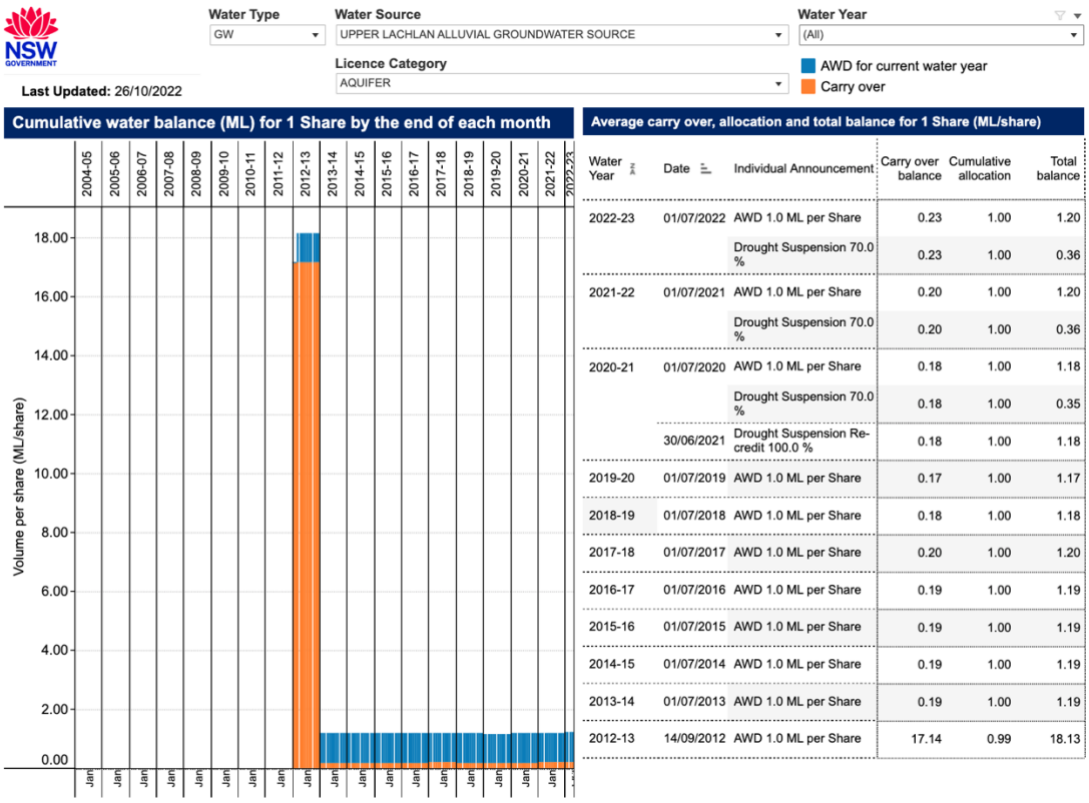
Local Water Utility (LWU) bore water allocations have not been restricted below 1ML/unit in the past decade, and in fact Parkes were entitled to access double their normal allocation in 2014 and 2017-19.



Water Year	Date	Individual Announcement	Carry over balance	Cumulative allocation	Total balance
2022-23	01/07/2022	AWD 100.0 %	0.000	1.000	1.000
2021-22	01/07/2021	AWD 100.0 %	0.000	1.000	1.000
2020-21	01/07/2020	AWD 100.0 %	0.000	1.000	1.000
2019-20	01/07/2019	AWD 100.0 %	0.000	1.000	1.000
2018-19	01/07/2018	AWD 100.0 %	0.000	2.000	2.000
2017-18	01/07/2017	AWD 100.0 %	0.000	2.000	2.000
2016-17	01/07/2016	AWD 100.0 %	0.000	1.000	1.000
2015-16	01/07/2015	AWD 100.0 %	0.000	1.000	1.000
2014-15	01/07/2014	AWD 100.0 %	0.000	2.000	2.000
2013-14	01/07/2013	AWD 100.0 %	0.000	1.000	1.000
2012-13	14/09/2012	AWD 100.0 %	0.000	1.000	1.000

Figure 1: Historical LWU groundwater allocation shares from DPE Water Balance Website

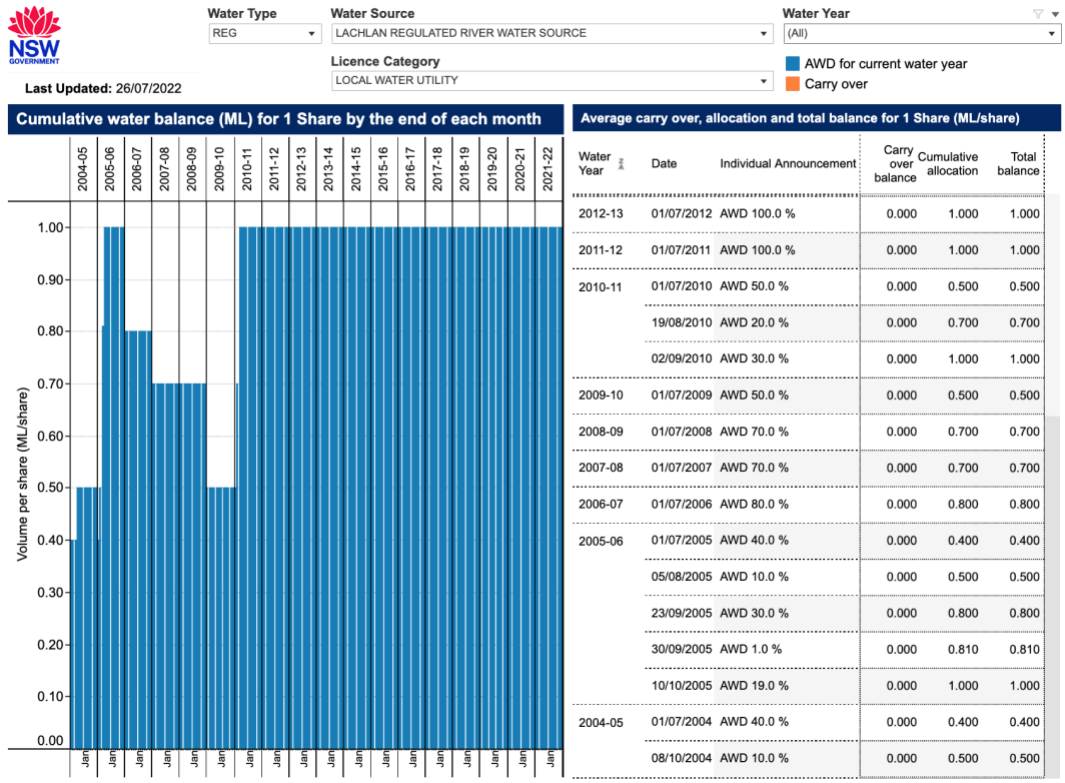
Shares for Aquifer licences (those held by NPM) have also not dropped below 1ML/share for the past 10 years.



Water Year	Date	Individual Announcement	Carry over balance	Cumulative allocation	Total balance
2022-23	01/07/2022	AWD 1.0 ML per Share	0.23	1.00	1.20
		Drought Suspension 70.0 %	0.23	1.00	0.36
2021-22	01/07/2021	AWD 1.0 ML per Share	0.20	1.00	1.20
		Drought Suspension 70.0 %	0.20	1.00	0.36
2020-21	01/07/2020	AWD 1.0 ML per Share	0.18	1.00	1.18
		Drought Suspension 70.0 %	0.18	1.00	0.35
	30/06/2021	Drought Suspension Re-credit 100.0 %	0.18	1.00	1.18
2019-20	01/07/2019	AWD 1.0 ML per Share	0.17	1.00	1.17
2018-19	01/07/2018	AWD 1.0 ML per Share	0.18	1.00	1.18
2017-18	01/07/2017	AWD 1.0 ML per Share	0.20	1.00	1.20
2016-17	01/07/2016	AWD 1.0 ML per Share	0.19	1.00	1.19
2015-16	01/07/2015	AWD 1.0 ML per Share	0.19	1.00	1.19
2014-15	01/07/2014	AWD 1.0 ML per Share	0.19	1.00	1.19
2013-14	01/07/2013	AWD 1.0 ML per Share	0.19	1.00	1.19
2012-13	14/09/2012	AWD 1.0 ML per Share	17.14	0.99	18.13

Figure 2: Historical Aquifer allocation shares from DPE Water Balance Website

Extraction from the Lachlan River can be reduced or at times be unavailable due to quality issues and by reductions to the general security allowance during times of drought. The figure below shows the monthly allocation and total balance of Parkes Shire Council's local water utility River licence from 2004-05 to 2021-22. In the majority of years, Parkes received a 100 per cent allocation of its licence entitlement but in 2004-05 to 2009-10 its allocation was constrained to as much as 40% of the normal amount.



Water Year	Date	Individual Announcement	Carry over balance	Cumulative allocation	Total balance
2012-13	01/07/2012	AWD 100.0 %	0.000	1.000	1.000
2011-12	01/07/2011	AWD 100.0 %	0.000	1.000	1.000
2010-11	01/07/2010	AWD 50.0 %	0.000	0.500	0.500
	19/08/2010	AWD 20.0 %	0.000	0.700	0.700
	02/09/2010	AWD 30.0 %	0.000	1.000	1.000
2009-10	01/07/2009	AWD 50.0 %	0.000	0.500	0.500
2008-09	01/07/2008	AWD 70.0 %	0.000	0.700	0.700
2007-08	01/07/2007	AWD 70.0 %	0.000	0.700	0.700
2006-07	01/07/2006	AWD 80.0 %	0.000	0.800	0.800
2005-06	01/07/2005	AWD 40.0 %	0.000	0.400	0.400
	05/08/2005	AWD 10.0 %	0.000	0.500	0.500
	23/09/2005	AWD 30.0 %	0.000	0.800	0.800
	30/09/2005	AWD 1.0 %	0.000	0.810	0.810
	10/10/2005	AWD 19.0 %	0.000	1.000	1.000
2004-05	01/07/2004	AWD 40.0 %	0.000	0.400	0.400
	08/10/2004	AWD 10.0 %	0.000	0.500	0.500

Figure 3: Historical River water allocation shares from DPE Water Balance Website

Low water levels in the Lachlan River can lead to increased turbidity, and occasionally blue green algae blooms, which restricts the ability to source water, and increases the need for pre-treatment.

The river offtake was upgraded in 2015 to be a permanent structure, however the capacity was not increased at this time, resulting in another limitation on the supply infrastructure.

2.6. Licence Entitlements

The licences available to Parkes Shire are sufficient to supply water to themselves and the SAP to 2050 at 7.9GL/year. However, recognising the restrictions on the availability of those licenced amounts results in a lower theoretical secure yield of just over 5.9GL/year. A more extreme drought could result in the River water being totally unavailable and the maximum yield from the borefield, according to the GHD modelling, of 2.5 - 4GL/year.

Council is actively sourcing more water licences on the market and the table below is the latest available information.

NPM is at risk of having no water available in the most extreme circumstances as their aquifer licences can be restricted, but again, this would not benefit Parkes town and water would still need to be provided under LWU licences.

SAP customers, depending on their type of industry, will have to apply for licences in the same way NPM has, and rely on PSC to transfer the water to them from the water sources.

Regardless of who owns which licences, the water all flows from the sources to the town, the mine and the SAP through the same pipelines and a balance of use between the end users has been managed effectively since the system started.

Table 3: Parkes Council Water licence availability and restrictions

Source	Water licence type and owner	ML/year	Minimum Historical Allocation (DPE announcements)	Resulting Allocation	Extreme Drought
Groundwater	Parkes LWU	4,350	100%	4,350	2,500 – 4,000
	Parkes Aquifer	700	100%	700	0
River	PSC LWU	3,345	40%	1,338	0
	PSC General Security	1,791	0%	0	0
	TOTAL	**9,970**		**6,340**	**2,500 – 4,000**

Table 4: Northparkes Mines Water licence availability and restrictions

Source	Water licence type and owner	ML/year	Minimum Historical Allocation (DPE announcements)	Resulting Allocation	Extreme Drought
Ground water	NPM Aquifer	2,650	100%	2,650	0
	NPM Other bores	5,272	0%	0	0
River	NPM High Security	755	10%	75	0
	NPM General Security	3,762	0%	0	0
	TOTAL	**12,439**		**2,725**	**0**

There is additional water supply from Endeavour Dam which can contribute a secure supply of 950ML/year.

Council has a licence to draw 1,500ML/year of raw water from the dams and up to 4ML/day can be transferred under gravity from Lake Endeavour Dam to the existing WTP. During 2018-19, Council used only 4 ML/year from the dams.

The 2015 hydrological models for the Lake Endeavour catchment (area 140km^2) and Lake Metcalfe catchment (32km^2) calculated average annual inflow as 3.7GL/annum for Lake Endeavour and 0.86GL/annum for Lake Metcalfe (Beargamil Dam). The median year flows are significantly lower than the average flow and combined capacity of the storages results in a sustainable yield of 1,100ML/annum although this was reduced to 950ML/annum due to the expected impacts of Climate Change by 2030 (Parkes IWCM 2016).

However, when there are drought conditions these two dams have been unable to supply any water for periods of up to 18 months. Also, the dams are more beneficial to the community as a water recreation space, so the full allocation will only ever be used in a dire emergency and is not generally included in supply calculations.

3. Future State Issues

3.1. Increasing Demand

The SAP will increase demand by up to 21ML/day by 2040, with the increase gradually over time due to construction activities. This demand is unpredictable as it relies on any business expressing an interest and setting up in the area. The Regional Growth Development Corporation is managing the on-site infrastructure, with a request for 200L/sec to be provided from Parkes Shire at the site boundary. A 10ML buffer tank is planned for some point in the future.

The SAP also brings an increased demand to Parkes township through site workers, their families and support industries. This has been factored into the Parkes Peak Hill demand forecast.

Detailed analyses to determine future demand were completed as part of the IWCM and liaison with NSW Regional to estimate the SAP demands is ongoing as more businesses make enquiries.

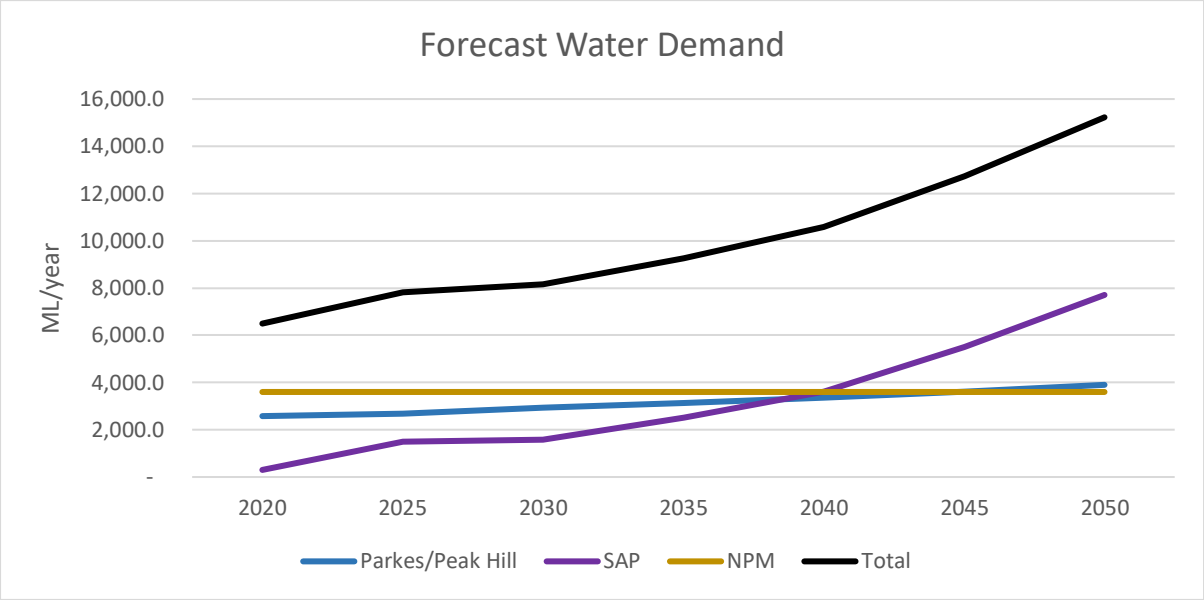


Figure 4: Forecast water demand for the main end users

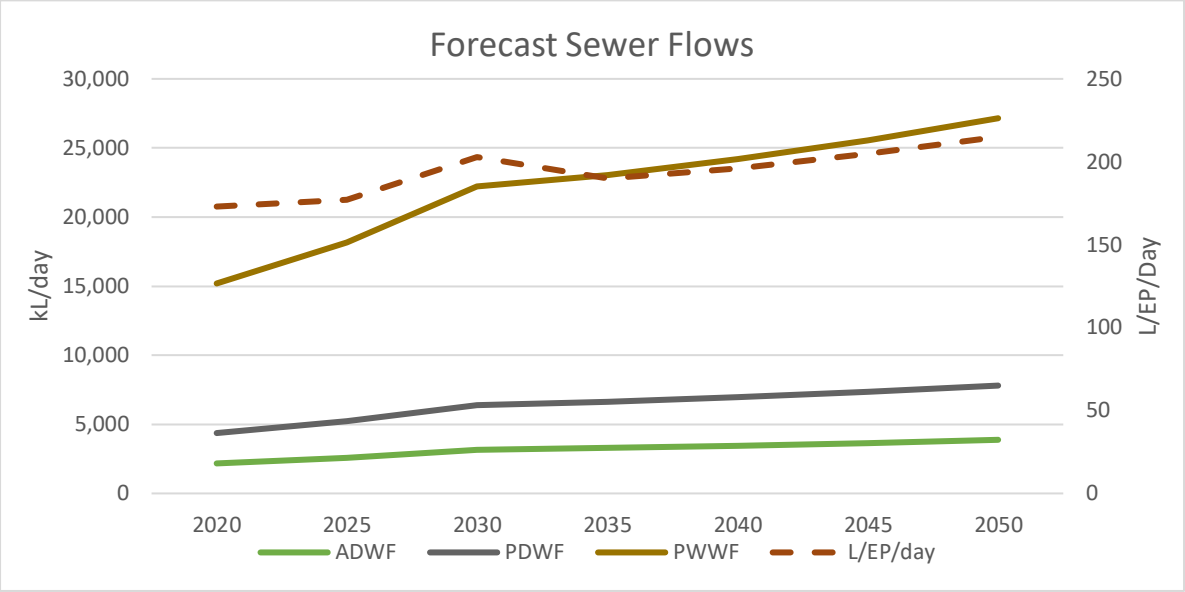


Figure 5: Forecast sewer flows: Average Day, Peak Day, Peak Wet Weather

A detailed summary of the demands and the requirements of the pipeline and WTP are shown in Table 4.

Table 5: Projected Peak and Average Daily Demand for all end users and major infrastructure in ML/Day and L/sec

	2020	2025	2030	2035	2040	2045	2050
Parkes Peak Hill							
WTP ML/Day	7.1	7.7	8.3	8.3	8.3	8.4	8.6
L/sec	82.2	89.0	95.9	95.5	95.6	97.2	99.5
Peak ML/Day (x2.47)	15.6	17.2	18.9	19.0	19.2	19.6	20.0
Peak L/sec	**180.1**	**199.1**	**218.5**	**219.7**	**222.3**	**226.5**	**230.9**
SAP							
ML/Day (is the peak)	0.8	4.1	4.3	6.8	9.9	15.1	21.1
L/sec	**9.3**	**47.5**	**49.8**	**78.7**	**114.6**	**174.8**	**244.2**
NPM							
ML/Day	11.0	11.0	11.0	11.0	11.0	11.0	11.0
L/sec	120.0	120.0	120.0	120.0	120.0	120.0	120.0
Peak L/sec	**150.0**	**150.0**	**150.0**	**150.0**	**150.0**	**150.0**	**150.0**
Pipeline Supply Requirement							
ML/Day	18.9	22.8	23.6	26.1	29.2	34.5	40.7
Peak L/sec	**339.4**	**396.5**	**418.3**	**448.4**	**486.9**	**551.3**	**625.1**
ML/Year	6,903	8,324	8,616	9,515	10,651	12,601	14,866
WTP Demand							
Average ML/Day	7.9	11.8	12.6	15.1	18.2	23.5	29.7
Peak L/sec	189.4	246.5	268.3	298.4	336.9	401.3	475.1

3.2. Infrastructure Capacity

The above issues lead to developing four scenarios for possible future water supply.

Scenario 1 – Paper Licences

Normal weather and full licence allocation is available to Parkes Shire and Northparkes Mines. This scenario assumes that the full allocation can be transferred to the Parkes Water Treatment Plant and peak demands are spread over a long enough period (say two weeks) that the plant can handle the demands.

Essentially this scenario shows that there is sufficient water available in the licences currently held by PSC and NPM.

Scenario 2 – Pipe Capacity

Similar to above, where there are no restrictions to the supply of water by allocation, however recognising that the Lachlan River transfer pipelines are constrained by peak for rates of 120L/second each, resulting in a maximum transfer capacity of 20ML/day or 7,569ML/year.

The pumps across the 8 bores can supply 120L/sec and the river pump 178L/sec. It is the pipelines that limit the supply.

Scenario 3 – Historical Restrictions

Using the recent history of restrictions to water licences, as shown in Table1, a total supply of 8,715ML/year could be drawn from the river and bore.

Scenario 4 – Extreme Drought

In the most extreme drought, River water would not be available and the bore limited to the range of 2.5-4GL/year estimated by GHD.

The following graphic shows the four scenarios described as they relate to demand increases over the next thirty years.

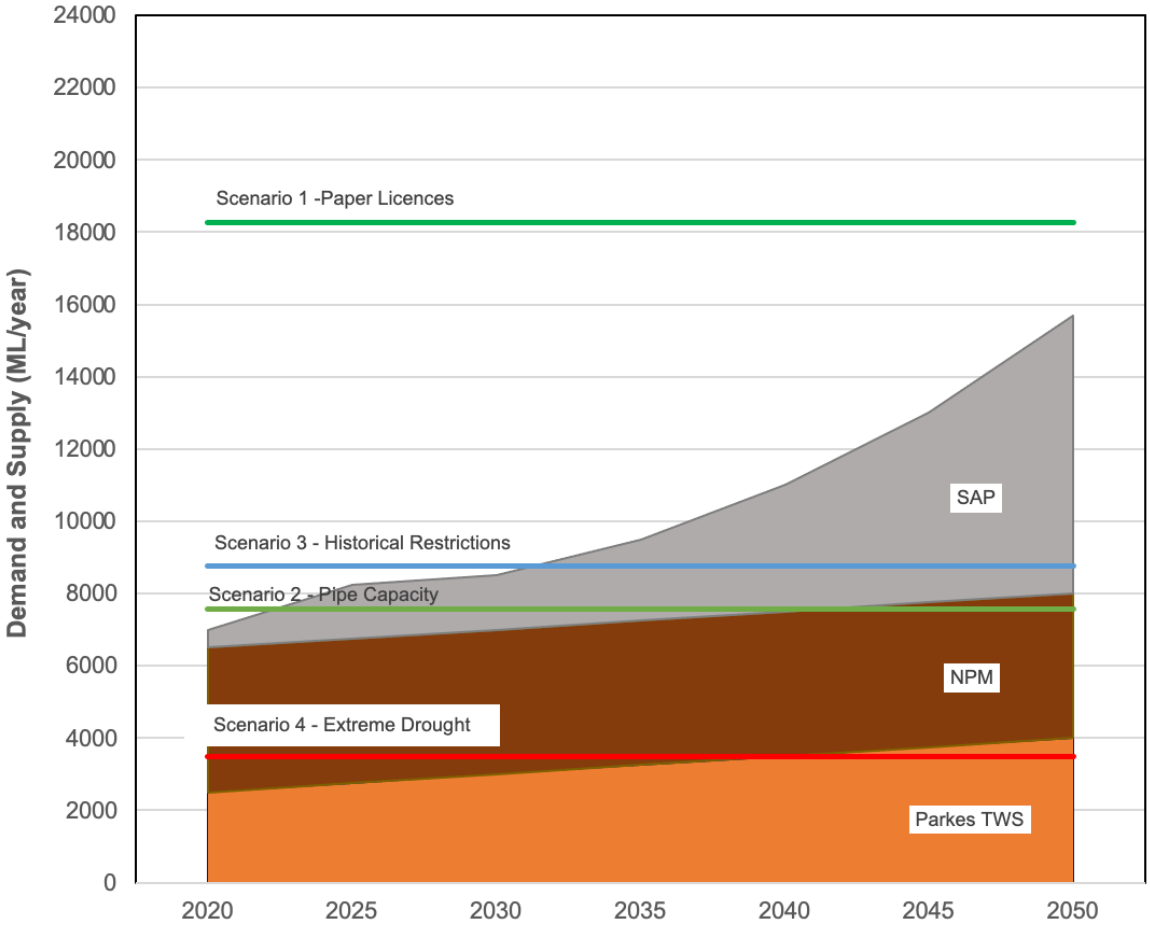


Figure 6: Graphic explaining restricted licence entitlements and future demand projections

It is clear that the water supply is secure only on paper and the future demand cannot be met by existing infrastructure. Scenarios 1, 2 and 3 rely on the borefield delivering more water than is considered sustainable from the GHD modelling.

In an extreme drought, supply to Northparkes Mines would have to be restricted, or cut off after 2035. The pipe capacity would be exceeded in 2023 if Northparkes Mines used all of the annual volume they required Parkes Shire to provide and if the SAP businesses commence as expected.

An alternate scenario where Northparkes Mines continues to use only their current (lower) volume of 2,400ML/year is also presented below. Should this occur, pipe capacity would be sufficient until 2033. In an extreme drought, supply would have to be restricted to ensure town water demands could be met. If any supply restrictions were imposed as they have been in the past, the demand would exceed supply before 2040.

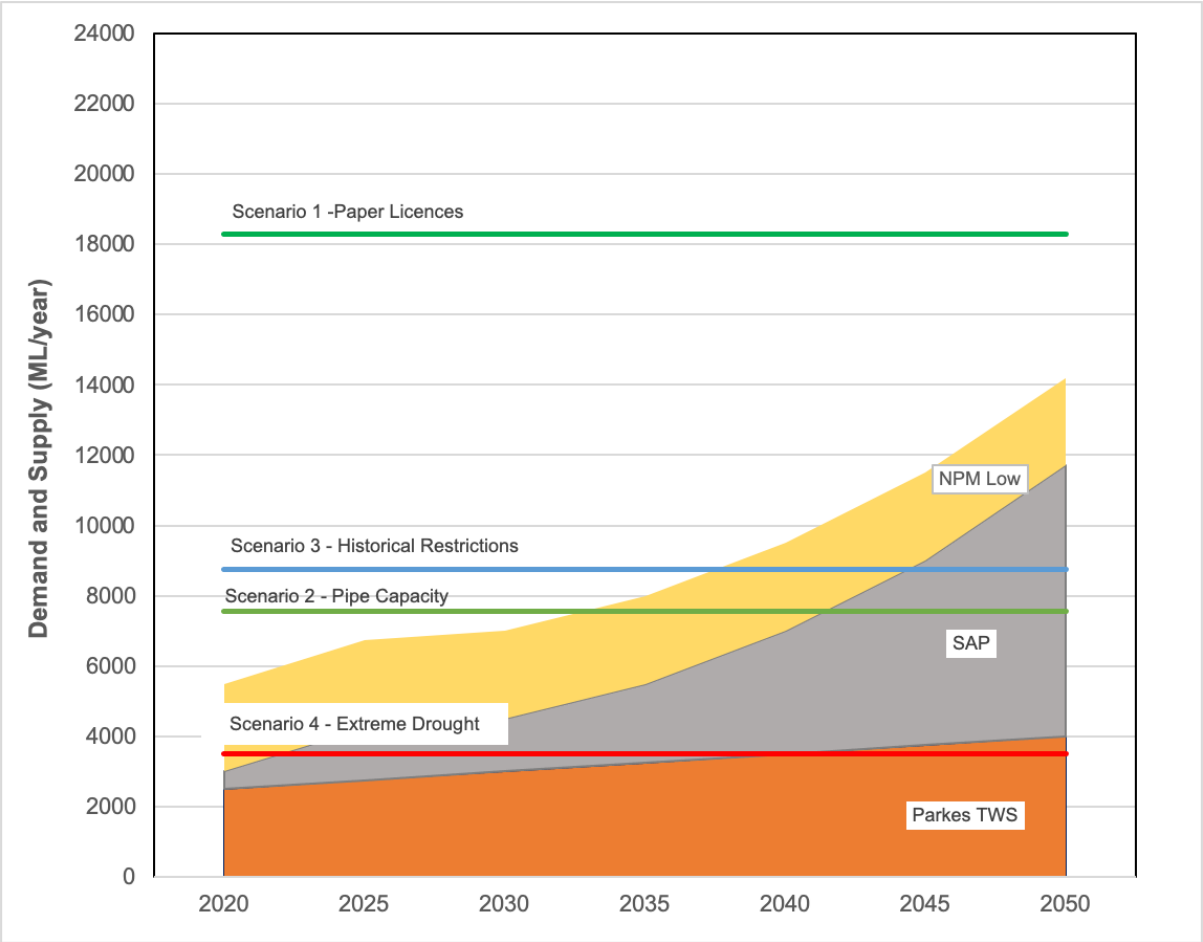


Figure 7: Graphic explaining restricted licence entitlements and future demand projections with low Northparkes Mines future demand

This shows clearly that there are limitations to the ability of Parkes to deliver water into the future. In summary:

- Pipe capacity of 7,569ML/year
- Borefield sustainable extraction limited to 2,500 – 4,000ML/year
- River can be restricted and poor quality reduce the volumes to 1,290ML/year
- Dam supply left for emergencies 950ML/year

These issues are being addressed by a suite of projects aimed at improving the sustainable extraction and transfer capacity of the system as described in the next section.

3.3. Groundwater Impacts

Despite groundwater entitlements not being restricted in the past, PSC Operators have had to manage water quality and bore levels by reducing extraction rates and changing which bores are operated. This is done by choosing to extract water sequentially from more distant bores, such as 1 and 4, 2 and 5.

The 2005, 2015 and 2021 IWCM Strategies each prepared theoretical groundwater models to determine the potential for drawdown impacts. These all had limitations to data and a set of assumed underground conditions that could not be confirmed.

The most recent study by GHD (2021) indicated that Bore 4 had only a 7-day capacity before reaching maximum drawdown at 40m/day transmissivity. However, at the higher bound of 70m transmissivity, it could go for 365 days. At 50m/day transmissivity it could go for 30 days and only Bore 5 was the other one impacted.

Table 6: Borefield extraction under various transmissivities (from GHD 2021)

Bore	Radial Distance from Bore 1	Direction	Available Drawdown (m)	Pumping Rate (L/s)	7 days		30 days		60 days		150 days		250 days		365 days	
					Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown
Hydraulic conductivity = 70 m/day																
Bore 1	1.0	N	31.5	20	7.23	**23.0**	9.51	**30.2**	10.61	**33.7**	12.07	**38.3**	12.89	**40.9**	13.50	**42.9**
Bore 2A	725.3	S	53.5	20	6.92	**12.9**	9.18	**17.2**	10.28	**19.2**	11.75	**22.0**	12.57	**23.5**	13.18	**24.6**
Bore 3A	579.2	ESE	30.5	50	11.63	**38.1**	13.93	**45.7**	15.03	**49.3**	16.50	**54.1**	17.32	**56.8**	17.93	**58.8**
Bore 4	1,063.9	ESE	16.5	40	10.31	**62.5**	12.60	**76.4**	13.71	**83.1**	15.18	**92.0**	16.00	**97.0**	16.60	**100.6**
Bore 5	1,580.3	ESE	16.5	30	8.23	**49.9**	10.50	**63.6**	11.60	**70.3**	13.07	**79.2**	13.89	**84.2**	14.49	**87.8**
Bore 6	3,494.9	ESE	16.5	13	3.49	**21.2**	5.52	**33.5**	6.59	**39.9**	8.03	**48.6**	8.84	**53.6**	9.44	**57.2**
Bore 7	983.3	NE	26.5	30	8.21	**31.0**	10.49	**39.6**	11.59	**43.7**	13.06	**49.3**	13.88	**52.4**	14.48	**54.7**
Bore 8	1,129.5	NNE	35.5	20	6.14	**17.3**	8.37	**23.6**	9.46	**26.7**	10.92	**30.8**	11.74	**33.1**	12.35	**34.8**
Hydraulic conductivity = 50 m/day																
Bore 1	1.0	N	31.5	20	9.41	**29.9**	12.56	**39.9**	14.10	**44.8**	16.15	**51.3**	17.30	**54.9**	18.14	**57.6**
Bore 2A	725.3	S	53.5	20	8.98	**16.8**	12.11	**22.6**	13.65	**25.5**	15.70	**29.3**	16.84	**31.5**	17.69	**33.1**
Bore 3A	579.2	ESE	30.5	50	15.55	**51.0**	18.75	**61.5**	20.29	**66.5**	22.35	**73.3**	23.49	**77.0**	24.34	**79.8**
Bore 4	1,063.9	ESE	16.5	40	13.70	**83.1**	16.90	**102.4**	18.44	**111.8**	20.49	**124.2**	21.64	**131.2**	22.49	**136.3**
Bore 5	1,580.3	ESE	16.5	30	10.80	**65.5**	13.95	**84.6**	15.49	**93.9**	17.54	**106.3**	18.69	**113.3**	19.54	**118.4**
Bore 6	3,494.9	ESE	16.5	13	4.34	**26.3**	7.03	**42.6**	8.49	**51.5**	10.49	**63.6**	11.63	**70.5**	12.47	**75.6**
Bore 7	983.3	NE	26.5	30	10.79	**40.7**	13.94	**52.6**	15.48	**58.4**	17.52	**66.1**	18.67	**70.5**	19.52	**73.7**
Bore 8	1,129.5	NNE	35.5	20	7.92	**22.3**	10.98	**30.9**	12.50	**35.2**	14.54	**41.0**	15.68	**44.2**	16.53	**46.6**

Bore	Radial Distance from Bore 1	Direction	Available Drawdown (m)	Pumping Rate (L/s)	7 days		30 days		60 days		150 days		250 days		365 days	
					Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown	Total Drawdown at Bore (m)	% of Available Drawdown
Hydraulic conductivity = 40 m/day																
Bore 1	1.0	N	31.5	20	11.18	**35.5**	15.09	**47.9**	17.01	**54.0**	19.56	**62.1**	20.99	**66.6**	22.05	**70.0**
Bore 2A	725.3	S	53.5	20	10.65	**19.9**	14.53	**27.2**	16.44	**30.7**	18.99	**35.5**	20.43	**38.2**	21.49	**40.2**
Bore 3A	579.2	ESE	30.5	50	18.85	**61.8**	22.81	**74.8**	24.74	**81.1**	27.31	**89.5**	28.74	**94.2**	29.80	**97.7**
Bore 4	1,063.9	ESE	16.5	40	16.54	**100.2**	20.50	**124.2**	22.43	**135.9**	24.99	**151.5**	26.42	**160.1**	27.49	**166.6**
Bore 5	1,580.3	ESE	16.5	30	12.93	**78.3**	16.83	**102.0**	18.75	**113.6**	21.30	**129.1**	22.73	**137.8**	23.80	**144.2**
Bore 6	3,494.9	ESE	16.5	13	5.01	**30.4**	8.22	**49.8**	10.02	**60.7**	12.50	**75.8**	13.91	**84.3**	14.96	**90.7**
Bore 7	983.3	NE	26.5	30	12.90	**48.7**	16.81	**63.4**	18.72	**70.7**	21.28	**80.3**	22.71	**85.7**	23.77	**89.7**
Bore 8	1,129.5	NNE	35.5	20	9.36	**26.4**	13.12	**36.9**	15.01	**42.3**	17.55	**49.4**	18.98	**53.5**	20.04	**56.5**

The 80% drawdown limit is a critical level which also shown in orange but no other bores fully reach 100% in 365 days. It is worth noting that constant extraction at the full rate of demand does not occur 365 days per year and the historical Parkes peak lasts for less than a week.

These results led GHD to propose that the sustainable extraction at full flow rates would be **2.5-4GL/year**, which is half the amount identified through historical licence conditions in Table 1. This finding has driven the need to investigate expanding the borefield as well as connecting into the CENTROC pipeline.

3.4. River Water

Analysis of River level vs flow rate of the offtake pump over the past five years indicates when the River level is lower, pump flow rate is consistent and high. In the floods of early 2020, and 2021-2022, the pump was often switched off due to high turbidity. The turbidity records are not available, as the probe is used just to switch off the pumps when the NTU is too high.

It is not definite how much more River water can be extracted with the pre-treatment as the levels change constantly but the pre-treatment enables using water up to 100NTU, nominally up **20%** from 80NTU currently.

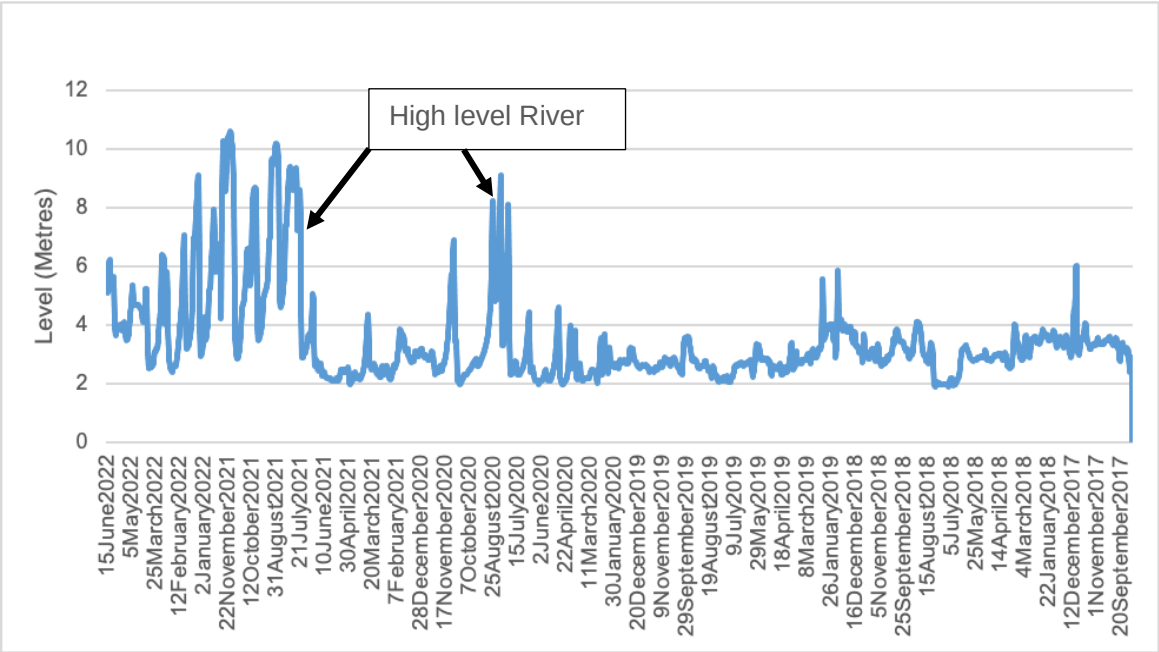


Figure 8: Lachlan River Level at the offtake well 2017-2022 (dates shown in reverse)

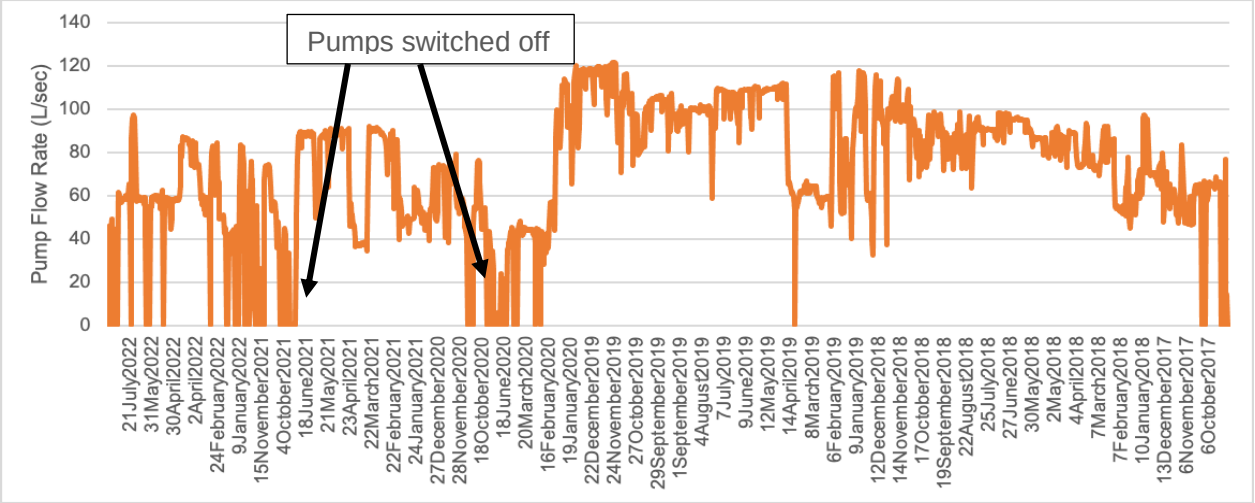


Figure 9: Lachlan River offtake pump flow rate 2017-2022 (dates shown in reverse)

4. Water Security Options

The projects identified in the IWCM Options Paper 2021 have been approved by Council, the PRG and have successfully received funding from a range of sources. With the variability of future demand influenced by climate and economic factors, the projects are being refined through detailed design and consultation. The key projects are presented in the Table below and described in full in the Options Report.

Table 7: Parkes Water Security Projects, Costs and Funding Source

Component	Cost	Funding Source
Additional Bore	$3,350,687	BBRF
Lachlan River Pump Station Augmentation	$904,811	BBRF
Eugowra Road Lachlan River Pump Station PTP	$5,572,040	BBRF
Lachlan Duplication Pipeline	$47,270,000	S&S
Parkes WTP Raw Water Dam	$2,731,584	BBRF
Eugowra Road Solar System	$1,843,366	BBRF
New Eugowra Road Pump Station	$2,501,334	RRP
Akuna Road Pump Station	$2,469,087	RRP
Bore Refurbishment	$726,000	DPE
CENTROC Water Grid	EXTERNALLY FUNDED	DPE
Total	**$67,368,909**	

4.1. Pipeline Duplication, Pump Upgrades and Storage

Options for the pipeline duplication diameter was narrowed down to sizing of 500mm or 600mm, and material choices from DICL, PVC or GRP. A 500mm diameter pipe can transfer 300L/sec and a 600mm pipe 470L/sec. Retaining the existing 375mm DICL pipe retains 120L/sec so a total transfer capacity of 420 or 590L/sec can be achieved. Referring back to Table 1, 420L/sec is required in 2031 and 625L/sec in 2050.

Council has decided that a 600mm internal diameter HDPE pipe is the preferred option which can deliver 470L/sec. This will enable demand to be met to 2040, and with refurbishment of the existing 375mm DICL pipeline at some point in the future when demand requires, can provide a combined peak of 620L/sec, sufficient for the projected demand in 2050.

The pipeline will have a design life of 100 years so needs to be able to accommodate future demands.

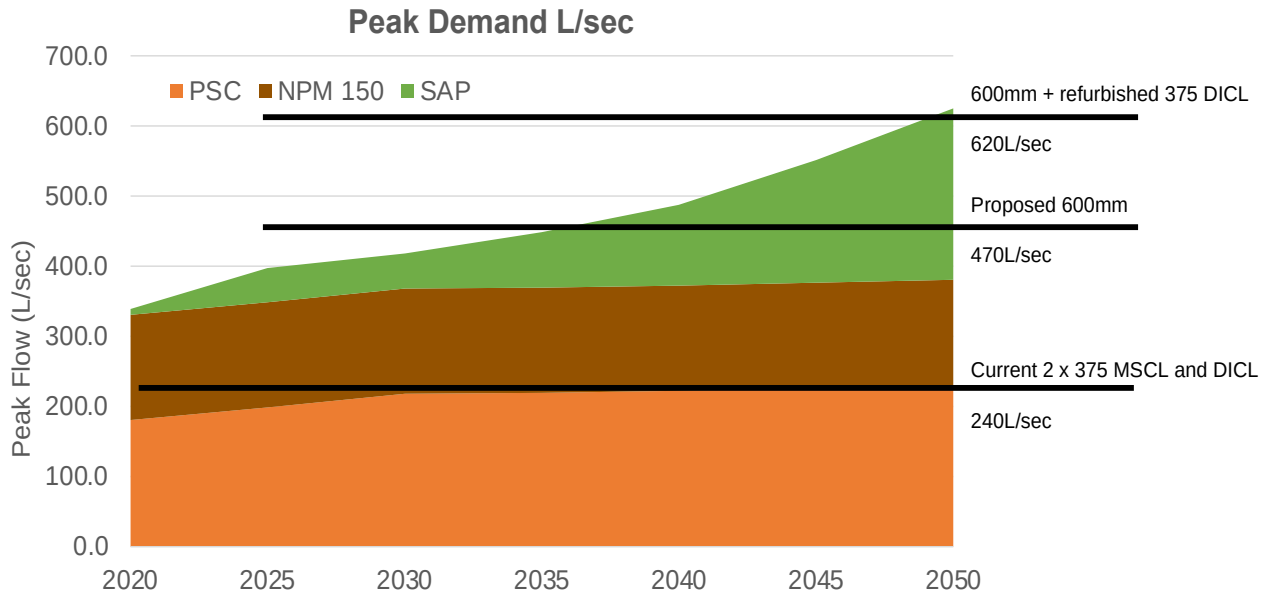


Figure 10: Projected peak flows and pipe sizing choices

This requires reallocation of funding from the solar arrays for the new pumps stations and additional Safe and Secure grant funding, as detailed in the business case.

The choice of the 600mm pipe and HDPE material also delivers energy efficient pumping for the next 40 years. GHD has modelled pump efficiency and upgrading the Eugowra Road and Back Yamma pumps with variable speed drives and managing flow rates with operation improvements can achieve a similar energy reduction to the solar panels. The solar panels will be able to be installed in the future as the flow rates increase in line with forecast demand.

This project includes a 20ML storage lagoon at the WTP which will also add some resilience to the network if source supply is interrupted.

4.2. River Water Pre-Treatment

The river pre-treatment project includes upgrading the off-take pump from 178L/sec to 278L/sec at peak capacity. The planned treatment ponds enable extracting water at higher turbidity more frequently, potentially a 20% increase in the current yield as mentioned in Section 3.4.

4.3. Borefield Expansion

Further analysis of the borefield capacity and opportunities to expand the borefield area to increase the yield was undertaken by GHD. Further detail is available in their report attached as an Appendix.

An action plan is outlined in Table 8 to gradually extend the borefield extraction area over time to ensure ongoing sustainable extraction.

The areas are defined in Figure 11 below.

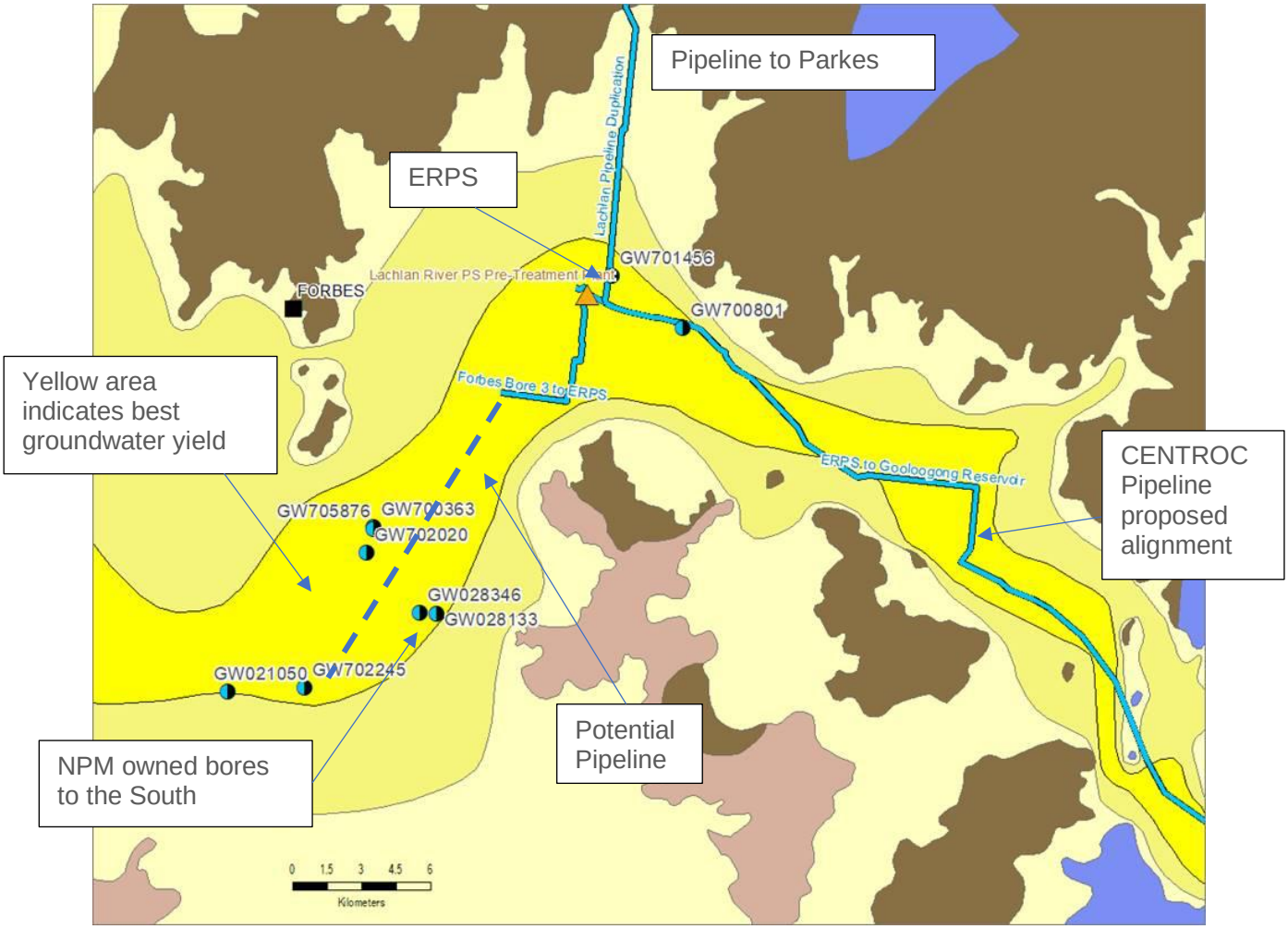


Figure 11: Groundwater topography map showing best part of aquifer in yellow), only NPM bores and the existing Parkes to Forbes Bore 3 and proposed CENTROC pipeline alignments

Table 8: Borefield Expansion Action Plan

Location	Comments	Benefit	Disadvantage	Action
Tallawalla	Test bore drilling found 12m clean sand layer at 100m deep. ML/year yield in report to be delivered by Milne Drilling	Close to existing pump station, shorter pipeline required. Minimal property impacts, negotiation requirements.	Near edge of reliable groundwater system. Close to existing bores so may experience or exacerbate drawdown.	Proceed with hydrogeological application to determined maximum yield and licence.
Northparkes Mines bores to the south	Three established bores with aquifer licences attached. 14-25km from ERPS. Combined licence allocation about 1.5GL/year.	Existing bores drilled. Near Forbes Bore 3 pipeline.	Negotiation with NPM to adopt these bores. May not be able to transfer licences to town water from aquifer status - less security.	**If Tallawalla yield is insufficient or otherwise unsuitable:** Apply to DPE to adopt and transfer licences to town water. Negotiate with Forbes Council and landowners for pipeline easement. Confirm groundwater quality and yield assessment i.e. capacity to take full volume Complete impact assessment of pumping full entitlement at each site Complete pipeline route selection, concept engineering design and costing analysis
CENTROC pipeline alignment	Regional pipeline project connecting Forbes Parkes and Gooloogong. Included in DPE Lachlan Regional Strategy. Estimated $50M plus.	Could provide security for many parties. Draft alignment is along deepest part of aquifer.	Long pipeline through road reserves and private property	**If pipeline can be externally funded:** Work with DPE and neighbouring Councils to scope, cost and design the pipeline.

4.4. Operational Strategy

Council water operators are regularly monitoring the level and quality of water at the supply sources and balance the use of river and bore water to enable delivering the right volumes to customers. Orders for river water are placed each week to Water NSW and river water is preferenced when the conditions are right. These conditions are a sufficient level in the river, and the turbidity is less than 80 NTU.

River water is primarily used to supply NPM and bore water is pumped through the WTP for town water use. The bores are monitored for water quality and flow rate and when these drop, a different bore will be used. This monitoring identified issues with Bores 2 and 3 in the past, leading to their refurbishment.

The key challenge facing operators has historically been transfer capacity of the pipe and pump system rather than availability of water. The 8 bores in the borefield have been able to supply water though several droughts and restricted river supplies.

The water security projects aim to make certain the water supply sources can be accessed to meet the future demand and the infrastructure will be able to transfer and treat sufficient water for each end user.

5. Financial Modelling

5.1. Funding Sources

Restart - Critical Drought Infrastructure

The Restart NSW Fund is the NSW Government's dedicated infrastructure fund which was established in 2011 to improve the economic growth and productivity of the state. Parkes received $4,000,000 towards improvement works on the borefields.

Building Better Regions Fund P1

The $1.38 billion Building Better Regions Fund (BBRF) supports the Australian Government's commitment to create jobs, drive economic growth and build stronger regional communities into the future. The Australian government contributed $6M to the Lachlan River pump station and pre-treatment projects, as well as some of the pump stations along the pipeline route. Council will contribute $4,402,488.

Regional Recovery Partnerships

The Australian Government has committed to fund Regional Recovery Partnerships which aim to help regions improve resilience after the impacts of COVID. Parkes received $5M form the Federal Government for the new Eugowra Road pump station and solar system, and the Akuna Road pump station. Council will contribute $2,063,012.

Safe and Secure

The Safe and Secure Water Program was established to address key risks to regional water safety and security in NSW, through water security projects and the IWCM planning process. Parkes received $1.03M to develop a business case for the Lachlan Pipeline Duplication and is in the process of finalising the application. Council will contribute $7,269,980.

Regional NSW is contributing funds to the Special Activation Precinct to prepare the land for development, including planning and design and all other utilities and road works required.

Smart Places Strategy

The NSW Government has established the Smart Places Acceleration Program, which implements Action 8 of the NSW Smart Places Strategy. The Program is facilitated by a $45 million funding envelope under the Digital Restart Fund over three years to accelerate the development of smart places across NSW.

Parkes would be seeking $4M to support the roll out of smart meters and an integrated IoT network for other users to connect with.

Northparkes Mine

From a Stantec Technical Memorandum dated June 15 20213, the return of capital component has been determined as the depreciation of this asset base which is $4.3 million per annum. A return on capital component has been included consistent with upper bound pricing using a rate of 3.40% as published by IPART in its February 2023 update of the weighted average cost of capital and equalling $6.7 million. Of this total capital component of $11.0 million, the share to be contributed by North Parkes Mine has been determined as this total multiplied by:

- The proportion of all water assets that are used to supply the mine (57% - thereby excluding assets such as the water treatment plant and distribution system)
- The proportion of total usage that North Parkes Mine accounts for (being 63% of total usage in line with usage forecasts made by North Parkes Mine).

The total capital component for North Parkes Mine is then $11.0 million x 57% x 63% = $4.0 million per year.

For the operating costs component, total operation and maintenance costs ($7.5 million per year) have first been reduced by the assessed costs for water treatment (18%) to account for North Parkes Mine receiving raw water. The remaining operation and maintenance costs have then been apportioned to North Parkes Mine based on forecast usage.

The operation cost component for North Parkes Mine is then $7.5 million x (1 – 18%) x 63% = $3.9 million per year.

The total revenue requirement from North Parkes Mine is then $7.9 million per annum.

Lachlan Regional Strategy

DPIE NSW is delivering the Lachlan Regional Strategy which identifies the B Section Pipeline and the Centroc Water Grid as major projects. These would be supported by Parkes Council as long as they are totally externally funded.

5.2. FINMOD Results

As the water security projects have been decided and LPD pipe size of 600mm agreed, the scenarios tested in the IWCM Options Paper were re-run to test the impact on Council's operating position with no contribution from SAP and low NPM demand, only 2,400ML/year.

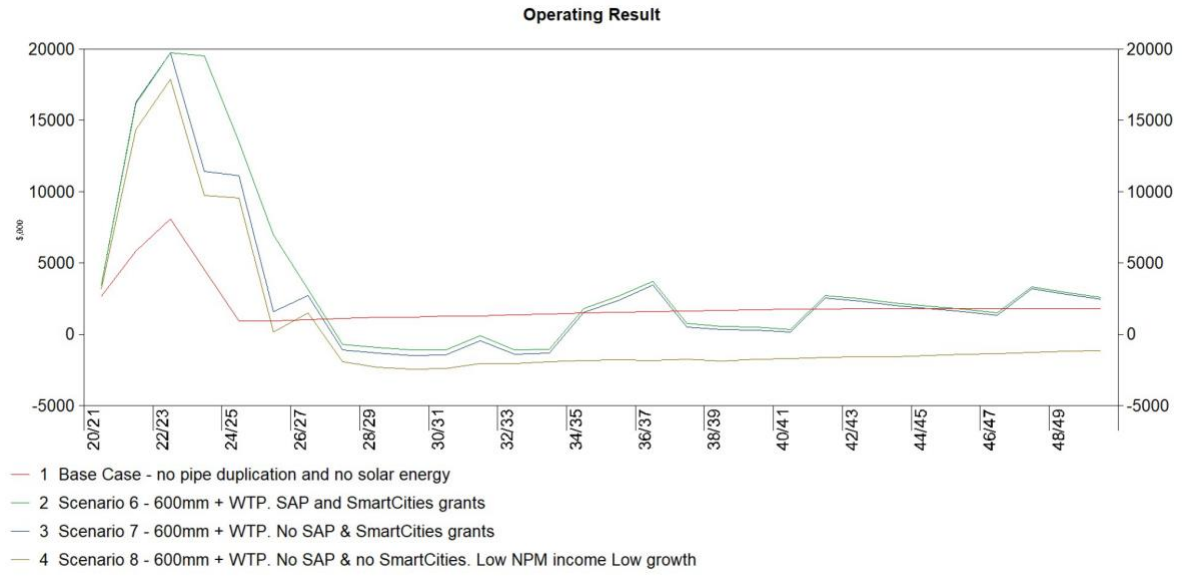


Figure 12: FINMOD results of the 600mm pipeline scenarios with different funding inclusions.

Scenario 8 is the worst case and results in Council's operating position in the red for many years. To mitigate this, borrowings were input into FINMOD and the following graph shows when that input would keep the financial position positive.

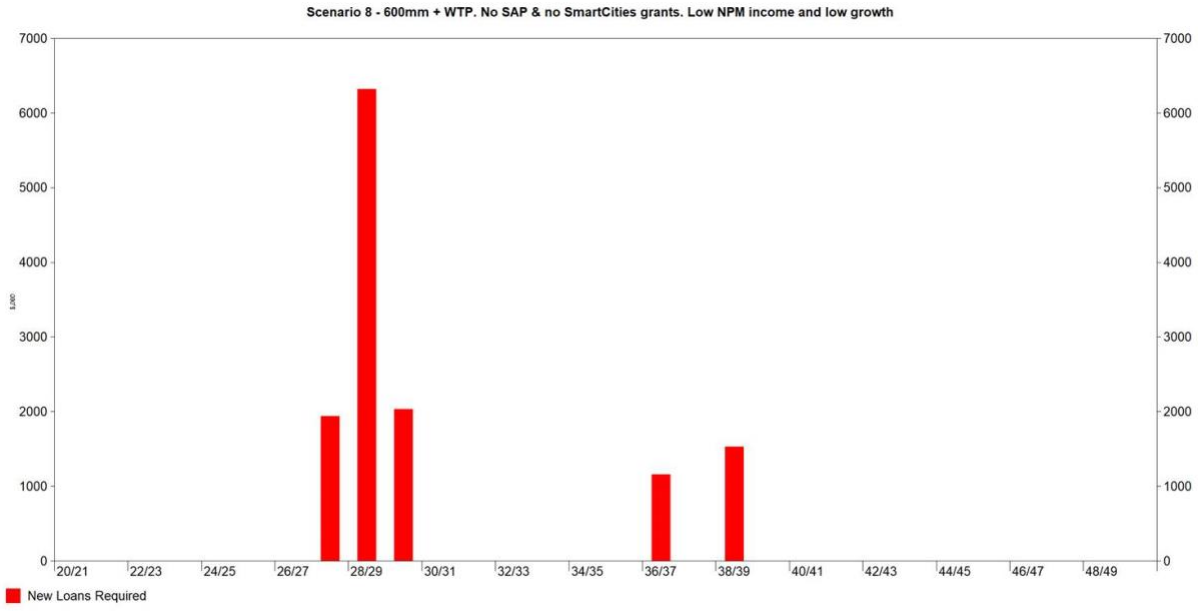


Figure 13: Borrowing required in the future to maintain Council's financial position

This analysis in the Options Paper led to negotiations with NPM to arrive at the minimum take agreement but as this has not be confirmed, further modelling will be required. Additional funding is therefore being sought from Safe and Secure, as supported by the business case already delivered to DPE.

6. References

AEC (2023) Parkes Water Security Projects Business Case

GHD (2021) Parkes IWCM Strategy 2020 Hydrogeological Assessment

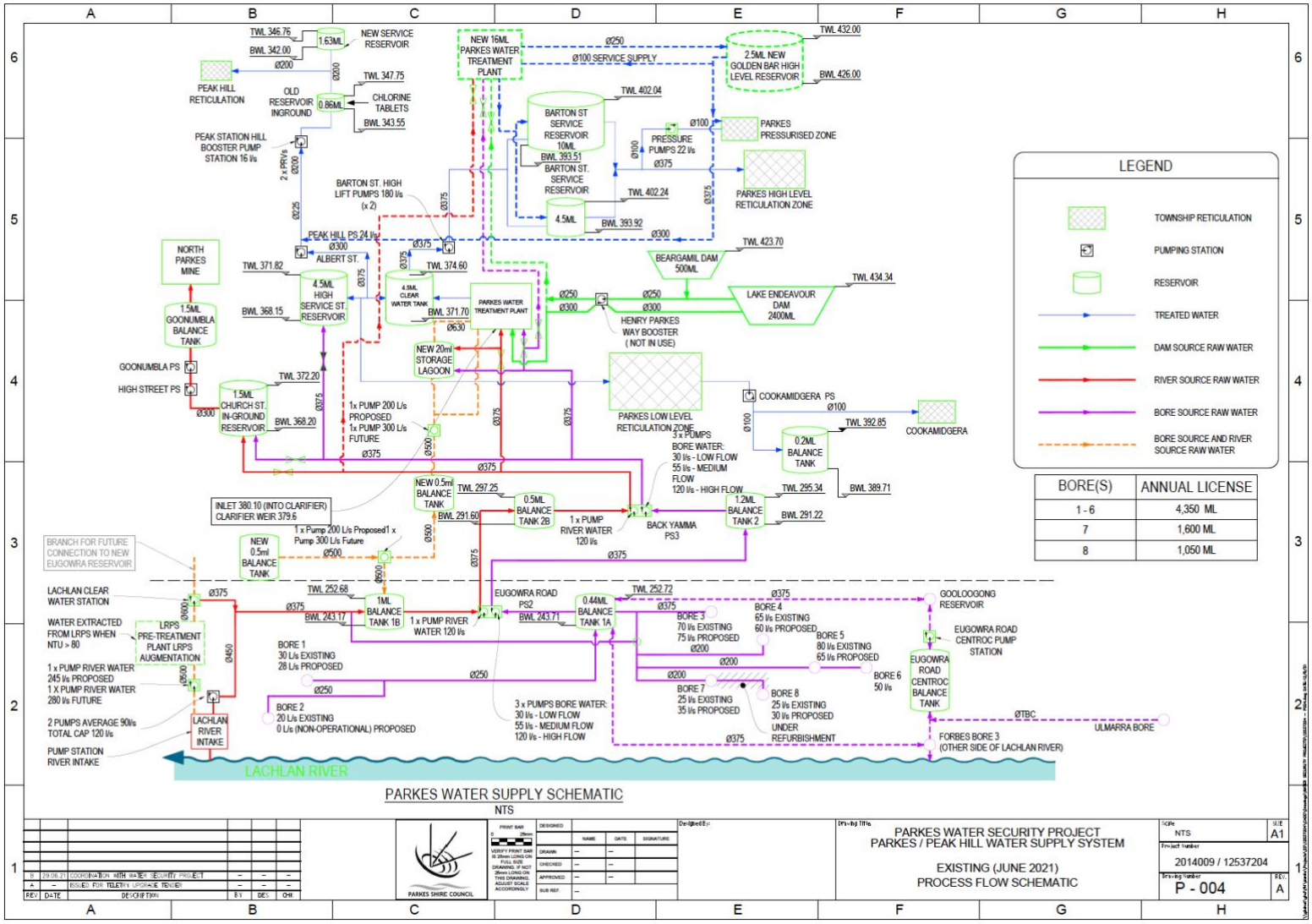
GHD (2023) Parkes Hydrogeological Assessment Extension

PSC (2021) Parkes IWCM Strategy Issues Paper

PSC (2021) Parkes IWCM Strategy Options Paper

Stantec (2023) Review of Parkes Shire Council Water Pricing Technical Memorandum

Appendix A: Water Supply Schematic



RESEARCH ENVIRONMENT INNOVATION DESIGN

Appendix B: Water Access Licences

WAL number	Licence Number	Owner	Water Source	Type	WSP	Category	Share (ML)	Nominated Works
8240	70AL600025	PSC	Lachlan Regulated		Lachlan Regulated 2016	LWU	3225	70WA600026
8244	70AL601569	PSC, McQuillan, Read	Lachlan Regulated		Lachlan Regulated 2016	Regulated (General Security)	195	70WA601571
9481	70AL603093	PSC	Lachlan Regulated		Lachlan Regulated 2016	Regulated (General Security)	1500	70WA600026
32032	70AL613603	PSC	Upper Lachlan Alluvial Groundwater	Utility	Lachlan Unregulated and Alluvial Water	Aquifer	4350	70CA613604
36043	70AL614682	PSC	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	700	70CA613604
35284	80AL719516	PSC	Upper Bogan River		Macquarie Bogan Unregulated and Alluvial	Unregulated River	2	80CA719517
35310	80AL719514	PSC	Upper Bogan River		Macquarie Bogan Unregulated and Alluvial	Domestic and Stock	4	80CA719517
35316	80AL719515	PSC	Upper Bogan River		Macquarie Bogan Unregulated and Alluvial	Town Water Supply	10	80CA719517
31747		PSC	Gunningbland and Yarrabandai		Lachlan Unregulated and Alluvial Water	LWU	2	70CA611396
1698		NPM	Lachlan Regulated	General Security	Lachlan Regulated 2016	Regulated River	486	
7866		NPM	Lachlan Regulated	High Security	Lachlan Regulated 2017	Regulated River	495	
8241		NPM	Lachlan Regulated	General Security	Lachlan Regulated 2018	Regulated River	2976	
9995		NPM	Lachlan Regulated	High Security	Lachlan Regulated 2019	Regulated River	260	
13108		NPM	Lachlan Regulated	General Security	Lachlan Regulated 2020	Regulated River	300	

WAL number	Licence Number	Owner	Water Source	Type	WSP	Category	Share (ML)	Nominated Works
32120		NPM	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	1050	70CA613702
32004		NPM	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	1600	70CA613802
31850		NPM	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	500	70CA613780
31863		NPM	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	534	70CA614066
31930		NPM	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	600	70CA613874
31963		NPM	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	700	70CA613868
31969		NPM	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	1728	70CA613936
32138		NPM	Upper Lachlan Alluvial Groundwater		Lachlan Unregulated and Alluvial Water	Aquifer	1110	70CA613938
34955		NPM			NSW Murray Darling Basin Fractured Rock Groundwater Sources	Dewatering of E22, E26, E27 and E48 underground and open cut mining areas.	232	

Appendix C: Financial Business Case

Developer Services Contributions

Council has updated the Developer Services Plan to determine the best charges to apply to new developments connecting to water sewer and recycled water in Parkes township and the SAP. These Plans are currently being audited prior to adoption by Council.

The charges need to be determined against the Equivalent Tenement (ET) which is the equivalent demand from a standard detached residential dwelling, defined for PSC as 234kL/dwelling/year.

The SAP is not going to have residential dwellings but the demand from each business will need to be forecast and converted to ET using the 234kL/year rate to determine the DSP amount.

Table 9: Draft DSP values for Parkes and the SAP for water and sewer

DSP	DSP areas	Calculated developer charges 2022/23$ ($/ET)
Water supply	Parkes	$11,148
	SAP	$3,078
Sewerage	Parkes and SAP	$2,608

Total Asset Management Plan

Council generally adopts ten year planning cycles for infrastructure and capital works but have also developed a 30 year asset management and capital works plan with a linked financial model to continually assess the water security projects, renewals and maintenance as new developments come to the town. This model is managed by the operational staff and a team of expert consultants who regularly meet to update the parameters and work with Council's financial team to help make funding decisions.

Income to usage ratio

The split between residential and non-residential use and income for Parkes Council is skewed by Northparkes Mines using a higher volume than the town. Income from the mine has been based on various agreements that have not been formally adopted, and their water use varies widely based on Mine ownership issues, rainfall in the area and market forces.

Parkes Council have proposed a minimum take volume of 2,400ML/year that Northparkes would pay for whether they use it or not, and then pay extra for any they use above that amount. This agreement is yet to be formalised.

Table 10: Ratio of residential to other incomes, current and projected

	2022		2050	
User	**ML/year**	**%**	**ML/year**	**%**
Residential	1,551	30%	2,050	14%
Non-Residential	507	10%	722	5%
Northparkes Mines	2,400	54%	4,000	28%
SAP	300	6%	7,700	53%

Business Case

AEC prepared a business case for the DN600 scenario documenting the case for change, project objectives, analysis of the project and implementation. The capital cost of the project was estimated at $51.3 million. A cost benefit analysis (CBA) for the project case relative to the base case was undertaken in accordance with NSW Treasury Guidelines. The CBA compared the discounted costs of the Project to the discounted benefits over a 30-year evaluation period based on a number of assumptions (including the exclusion of water treatment and reticulation capital for the SAP which was assumed to be fully covered by developer charges). The results of the CBA indicate that the development of the project (@ 7% discount rate) is economically viable. It presents a positive net present value (NPV) of $65 million and a benefit-cost ratio (BCR) of 2.2. Although not quantified in the CBA, it would be expected that the SAP would also create significant flow-on benefits for businesses in Parkes as SAP workers would make use of the town's amenities.

A financial appraisal (FAP) of the project case in relation to PSC was also undertaken. The FAP included escalation at 3% pa, depreciation and excluded benefits not accruing to PSC. The results of the FAP presents a NPV of -$25 million and a BCR of 0.7. This result underlines the need for funding support from the NSW Government to realise the significant net social economic benefits from the project. Requests for funding for the project focus on the capital cost requirements, with ongoing costs to be funded by PSC. PSC has dedicated $14.3 million in capital funding over three years for the project. Whilst the NSW Government has funded $5 million through the Regional Recovery Partnerships (RRP) program the funding shortfall is estimated at $32 million.

Business cases are prepared separately for each major projects using a financial modelling tool approved by Council for future use and includes the sought grant funding and payment scheduling arrangements. These should be referenced for each project in conjunction with this summary document.

Appendix D: Lachlan Pipeline Duplication Business Case Summary

LACHLAN DUPLICATION PROJECT
BUSINESS CASE
EXECUTIVE SUMMARY

Parkes Shire Council

Working Draft 01
February 2023

1. EXECUTIVE SUMMARY

1.1. INTRODUCTION

On 21 May 2018, Parkes Shire Council (PSC) was advised by the Department of Industry – Water that its Phase 1 application for co-funding for the Parkes Water Security Project (PTWSP) through the Safe and Secure Water Program (SSWP) had been successful. Phase 2 of the SSWP application by PSC subsequently secured funding for the Phase 3 application which was the subject of a business case for the project. This business case builds on the SSWP business case by considering alternative project case scenarios for two unfunded components of the PWSP and dissecting cost benefit analysis (CBA) outcomes by end water user and purpose.

The PWSP comprises multiple infrastructure packages that are packaged by funding program. Those that have secured funding are:

- RNSW2688 - Project title **Parkes Water Supply Stage 1**, Critical Drought Infrastructure $4.27M (Funded: $3.40M NSW Critical Drought Infrastructure, $0.6M NSW DPIE, $0.27M PSC).
- RNSW1865 - **Parkes Town Water Security Program**, Preparation of a Business Case for Parkes Town Water Security Program, Safe and Secure Business Case (NSW Govt) $2.03M (Funded $1.016M NSW Government, $1.016M PSC). Two packages of works to be delivered - one for PWSP and the second is the CENTROC water grid pipeline study.
- **Integrated Water Cycle Management Update** $0.435M (Funded: $0.235M NSW DPIE, $0.100M NPM and $0.100M PSC).
- Building Better Regions Fund (BBRF) - Stage 3 of **Water Security Project Package 1** $10.403M (Funded: $6M Australian Government, $4.403M PSC).
- Regional Recovery Partnerships Fund (RRP) **Water Security Project Package 2** $7.063M (Funded $5M Australian Government, $2.063M PSC). These components are included in this business case.

Those PWSP infrastructure that remains unfunded are:

- The **Lachlan to Parkes Water Supply Duplication** (LDP) will more than double the transfer capacity of the pipeline from the Lachlan River Pump Station (PS) to Parkes Water Treatment Plant (WTP). This along with the Arkuna Road Pump Station Solar System (ARPSSS) are included in this business case.
- The **CENTROC Water Grid Connection** will provide a new pipeline and supporting infrastructure linking three water utilities: Forbes Shire Council, PSC and Central Water Tablelands.

1.2. CASE FOR CHANGE

Parkes Shire is located in Central West NSW, 360km west of Sydney and covers a total area of 5,919km2. The Shire's four largest towns are Parkes, Peak Hill, Trundle and Tullamore. The urban centre of Parkes is located on the Newell Highway linking Melbourne and Brisbane, and the transcontinental railway connecting Sydney to Perth.

The Shire sits within the catchments of two main river systems, the Bogan and the Lachlan rivers, which are tributaries of the Murray-Darling System. Parkes Shire Council (PSC) is responsible for the Parkes/Peak Hill Water Supply System, which supplies the towns of Parkes and Peak Hill, as well as the villages of Alectown and Cookamidgera.

The PWSP is driven by four key inter-related problems:

- Increasing demand.
- Supply restrictions.

- Lower rainfall, including drought and climate change.
- Limited storage.

Increasing Demand

One of the key drivers for the Project is increasing demand associated with the NSW Government's Special Activation Precinct (SAP) at Parkes.

Supply Restrictions

The raw water for the Parkes/Peak Hill water supply is drawn from four sources:

- Lake Endeavour and Beargamil dams – Current capacity 60L/s (5.18ML/d, 1.9GL/a).
- Lachlan River Intake – Current capacity 120L/s (10.37ML/d, 3.8GL/a).
- Lachlan River Borefield – Current capacity 120L/s (10.37ML/d, 3.8GL/a).
- Recycled Water Scheme – Current capacity 20L/s (1.73M/d, 0.6GL/a).

The river and bore extraction capacity is matched to the pump and pipeline capacity:

- 120L/s from the borefield (10.37ML/d, 3.8GL/a).
- 120L/s from the river (10.37ML/d, 3.8GL/a).

PSC holds a high security licence for 8.84ML/d (102L/s, 3.2G/a) from the Lachlan River and a general security licence for 4.11 ML/d (48L/s, 1.5GL/a). PSC currently draws bore water from eight different bores, of which five are owned by PSC with a licence for 3.29ML/d (38L/a, 1.2GL/a) and three are owned by NPM with a licence for 7.26ML/d (84L/s, 2.6GL/a).

Town demand currently averages around 7ML/d (80L/s, 2.6GL/a), but during peak periods demand can reach the 16ML/d (185L/s, 5.8GL/a) maximum operational capacity of the WTP. When sufficient water is available, NPM currently demands around 11ML/d of raw water. Therefore, the current raw water extraction and transfer infrastructure is only capable of fully servicing demand during peak periods if all the water sources are available and there are no major supply restrictions.

Climatic Variability

Parkes Shire experienced a period of intense drought through 2018 and 2019, where all three indicators (rainfall, soil water, and plant growth) scored below the 5th percentile. During the peak of the drought, the capacity of Lake Endeavour Dam dropped to 17%. While 100% of PSC's high security river entitlements were available over 2018 and 2019, general security entitlement availability dropped to 0%. On average, only 50% of general security entitlements for the river are available for licence holders.

Projections developed through the NSW and ACT Regional Climate Modelling (NARCLiM) project suggest that Parkes' climate will become increasingly variable with more frequent periods of both flood and drought and more days of extreme temperatures.

Storage Limitations

PSC has limited water storage for contingency provision if supply is interrupted (~48hrs supply). The availability of raw water supply may be impacted by:

- Prolonged drought affecting river flow – restricting the Parkes offtake.
- Increased aquifer demand – affecting the available drawdown.
- Pump/power failure – disrupting raw water transfer.

1.3. PROJECT OBJECTIVES

The two original objectives of the PSWP project were:

- **Water reliability**. This includes water availability and water quality, as well as allowing higher flows from the borefields and treatment of river water for use by Northparkes Mine (NPM).
- **Drought security**. This reflects the need to increase water resilience to ongoing climatic changes and droughts.

These remain valid for the Project as they cannot be achieved without the additional pipeline transfer infrastructure provided by the Project. In addition, due to the SAP, a third objective can be added which is

- R**egional economic development**. Facilitating water availability to the SAP.

The Project meets these objectives through by

- Increasing **water reliability** through duplication of pipeline infrastructure and improving the network's operational flexibility
- Increasing **drought security** through enabling the draw on water sources – river, bore, dam – to be sustainably managed.

PROJECT OUTCOMES

The key expected outcomes of the Project are:

- Better customer service, including improved water reliability and quality.
- Improved operational performance.
- Improved financial performance.
- Improved resilience to drought, including improved water availability.
- Better environment: more sustainable outcomes.
- Enhanced local, regional and state economies.

1.4. ANALYSIS OF PROPOSAL

BASE & PROJECT CASES

The base case for the Project assumes the items for which funding has already been received are constructed and available to increase the volume of raw water. Some of this additional water can be supplied to the SAP (12L/s) through the existing transfer network.

The project case includes the following components:

- New Eugowra Road Pump Station
- Akuna Road Pump Station
- Lachlan Duplication Pipeline 600DN
- New Eugowra Road Pump Station Solar System
- Akuna Road Pump Station Solar System

The total capital cost for these items is estimated at $51,333 million and accounts for solar offsets.

OPTIONS ASSESSMENT

The development of a business case involves the identification and assessment of options before the conduct of a CBA to determine the preferred investment option(s).

Four alternative route alignments were considered for the LDP assessed using a multi-criteria analysis (MCA) approach. The preferred route alignment performed the best under both the weighted and unweighted scenarios.

PROPOSAL EXCLUSIONS

The project case excludes:

- Capital costs of an expanded Parkes WTP or new WTP in the SAP to supply potable water to SAP connections. For the purposes of the business case it is assumed that these capital costs would be fully covered by the NSW Government and recovered through developer charges such that the PV capital costs are matched by the PV of developer charges and thus have no net impact on the CBA.
- Capital costs of a reticulation system in the SAP.
- Operational costs of treating raw water supplied to the SAP.

The Project also excludes adjustments to existing sewer mains, to in ground and aerial electrical services and to existing in ground and aerial communication services.

COST-BENEFIT ANALYSIS

An incremental CBA for the Project compared to the base case was undertaken in accordance with NSW Treasury Guidelines for each scenario. The CBA compared the discounted costs of the Project to the discounted benefits over a 30-year evaluation period to ascertain whether the Project would deliver net social benefits for NSW.

The Project increases pump and pipeline capacity from 240L/s to 470L/s. Of this 230L/s capacity increase 20L/s (8.7%) is allocated to the town (based on REID, 2023) and the remaining 210L/s (91.3%) to the SAP. These shares are used to allocate the capital expenditure to end users in the CBA.

Future SAP water connections and demand is unknown. To be conservative the CBA caps water sold at 50L/s from 2030 which is 38L/s above the base case for the period of analysis (since this is the maximum allocation of potable water to the SAP from the existing WTP). The connection size is assumed at 80mm and the number of connections increases by 2-3 each year with the Project.

Table E1 CBA summary by end user, discount rate 7%, $M 2022-23

	Total	Town	SAP
PV Costs	$57.190	$4.973	$52.217
PV Benefits	$123.155	$18.227	$104.601
NPV	$65.964	$13.254	$52.384
BCR	2.2	3.7	2.0

The results of the economic appraisal indicate that the development of the Project (@ 7% discount rate) is economically viable. It presents a positive net present value (NPV) of $65 million and a benefit-cost ratio (BCR) of 2.2.

The most significant benefits are from SAP producer surplus (54.8%) based on kL of water sold. SAP usage charge revenue (26.8% of benefits) is over-estimated as the costs of water treatment are not included but would not significantly change the outcomes.

Although not quantified in the CBA, it would be expected that the SAP would also create significant flow-on benefits for businesses in Parkes as SAP workers would make use of the town's amenities.

The CBA results have been disaggregated by purpose, that is water security v water for growth. The water demand estimates for each purpose are used to divide the capital and operations costs whilst benefits are directly allocated to the end purpose.

Table E2 CBA summary by purpose, discount rate 7%, $M 2022-23

	Total	Security	Growth
PV Costs	$57.190	$4.973	$52.217
PV Benefits	$123.155	$16.615	$106.540
NPV	$65.964	$11.641	$54.323
BCR	2.2	3.3	2.0

The results show that for water security and growth purposes alone the Project achieves a BCR greater than 1 and that based on the assumptions most the benefits come from usage of the water for growth purposes.

FINANCIAL APPRAISAL & SUPPORT

The results of the financial analysis in relation to PSC for the Project (which includes escalation at 3%pa, depreciation and exclude benefits not accruing to PSC), incremental to the base case, at a 7% discount rate over a 30 year evaluation period are summarised below.

Table E3 Results of the financial analysis incremental to the base case, nominal values

Scenario	
PV Costs	$78.092
PV Benefits	$52.943
NPV	-$25.149
BCR	0.7

As with the CBA the financial appraisal does not take into account the cost of treating all water used by the SAP. With SAP usage charge revenue making up 89.3% of the benefits and a NPV of $47 million. Should the PV of treating this water be greater than $47 million then the NPV will be reduced further. This result underlines the need for funding support from the NSW Government to realise the significant net social economic benefits from the Project.

PROPOSED FUNDING ARRANGEMENTS

Requests for funding for the Project focus on the capital cost requirements, with ongoing costs to be funded by PSC. PSC has dedicated $14.332 million in capital funding over three years for the Project. Whilst the NSW government has funded $5 million through the Regional Recovery Partnerships (RRP) program The funding shortfall for the Project is estimated at $32 million, ideally from the NSW SSWP.

1.5. IMPLEMENTATION CASE

As the delivery of Stage 1 of the SAP is underway, the need for the Project is imminent. The current timeframe for delivery of the Project is for work be underway in 2022-23 and completed by mid-2024 with the Project fully operational over 2025-26.

The Project is being overseen by the PSC's Project Management Office (PMO). The PMO will be responsible for delivering the Project via PSC and contract personnel. This is to provide a Project implementation phase consistent with the utilisation of current committed resources, roll-out of PSC conforming methodologies / technologies and added benefits of PSC and region-specific familiarisation.

The Project Management Plan details the Project's risk and issues management approach. A project specific Broad Brush Risk Assessment (BBRA) process has been implemented to evaluate the business risks & opportunities associated with the implementation & closure phase of the Project.

A Preliminary Environmental Assessment (PEA) has been prepared for components of the Project. The PEA incorporates the triggers for stakeholder consultation under state legislation and outlines proposed mitigation measures to manage stakeholder impacts during construction.

PSC will fully own, operate and maintain the assets created by the Project.