NSW GOVERNMENT Public Works Advisory

Integrated Water Cycle Management Strategy

Strategy Paper

Report Number: ISR22022

June 2022

Prepared for:

essential water

Report Number: ISR22022

EssentialWater_IWCM_Strategy03.docx

Document control

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Cover photo: *Lake Menindee.*
(Source: http://www.visitnsw.com/destinations/outback-nsw/broken-hill-area/menindee.

Executive Summary

The Integrated Water Cycle Management (IWCM) Strategy is a local water utility's (LWU's) 30-year strategy for the provision of appropriate, affordable, cost-effective, and sustainable urban water services that meet community needs and protect public health and the environment. The key outcomes of a LWU's IWCM Strategy are a 30-year Total Asset Management Plan (TAMP), a 30-year financial plan and a drought and emergency response contingency plan (DERCP). The development of Essential Water's IWCM Strategy has followed the Department of Planning and Environment (DPE) Water's IWCM Strategy Check List.

Essential Water

Essential Water is a division of Essential Energy, a NSW State Owned Corporation, located in Broken Hill, NSW. It provides potable water to people in Broken Hill and Menindee, and non-potable water to the settlements of Silverton and Sunset Strip. Essential Water also provides sewerage services to Broken Hill, where it operates two sewage treatment plants.

Growth and economic outlook

Broken Hill is the largest community and the economic centre of the region. The mines in the Broken Hill district have traditionally been focused on silver, lead, and zinc. More recently, investigations have been undertaken into the potential for cobalt mining about 25km west-south-west of Broken Hill. While the mines are still very active, the population in Broken Hill has been stable or decreasing for at least the last 50 years. A stable population was adopted as a conservative assumption for the future planning purposes. The decreasing household size however, is expected to lead to a very low rate of dwelling growth in Broken Hill and Menindee. The projected total dwellings in the serviced community of Broken Hill and Menindee, are summarised in Table S1.

Table S1: Serviced dwellings in Broken Hill and Menindee

		2021	2026	2031	2036	2041	2046	2051
Broken Hill	Cumulative total new dwellings	204	304	416	544	673	804	936
Menindee	Total new dwellings	4	9	12	17	22	27	38

Broken Hill water supply – issues and options

Water security

Water for the Broken Hill water supply is secured from the Murray River. This is a regulated river and the sustainability and drought reliability of the source is determined through analysis undertaken by DPIE Water.

Water quality

The water quality objectives for the potable water supplies are being met by the Mica Street water treatment plant for the Broken Hill water supply.

A catchment to tap risk assessment undertaken jointly by Essential Water and WaterNSW identified the risk of a blue green algal outbreak developing within the WaterNSW bulk water terminal storage. The current Broken Hill non-potable supply does not have a barrier for algal toxins. The cost for a treatment option is included in the asset management plan and will be constructed between 2022 and 2025 as per the IPART determination.

There is a risk to the health of residential and non-residential customers in Silverton through the accidental consumption of water that has been classified as non-potable. This potential conversion of this supply into a potable supply has been considered.

Supply reliability

The Wentworth to Broken Hill pipeline system provides an estimated raw water supply reliability of 98 percent, which equates to 7.3 days of supply outage(s) per annum. It is anticipated that any single outage will take no longer than 3 days to restore supply. The target level of service is 99.99 percent. A comprehensive study into water supply continuity will be undertaken commencing in 2023 to identify options to ensure supply outages are managed within agreed customer expectations. This study will include a review of the ongoing role of Stephens Creek and Umberumberka reservoirs have in managing supply risks.

Menindee water supply – issues and options

Water security

The Menindee and Sunset Strip schemes are supplied from the Menindee weir. Menindee also has a groundwater source with a licensed entitlement of 370 ML/year. The security of these schemes was assessed as part of the Western Weirs Project. The assessment showed that the Menindee weir provides water security for the Menindee and Sunset Strip water supply. The groundwater source can be considered as a drought contingency or as an alternate source during an emergency.

Water quality

The water quality objectives for the potable water supplies are being met by the upgrade water treatment plant for the Menindee and Sunset Strip water supply.

Supply reliability

The current Menindee water supply reservoir capacity is substantially less than the peak day demand. This could result reduced pressures during a sustained hot period (week or fortnight), and system failure if the supply to the reservoir is interrupted for between 2 and 2.5 hours during peak demand periods. The provision of additional reservoir storage, to mitigate this risk, has been considered.

Broken Hill sewerage schemes

Both the sewage treatment plants (STPs) in Broken Hill have failed to meet the treated effluent quality parameters set out in their licences on one or more occasion every year since 2011 for the South STP and 2014 for the Wills St STP. On 1st July 2021, the EPA added a pollution reduction program to the Wills St STP licence. The program states that Essential Water must: “Replace the existing Wills Street STP with the capacity to treat effluent currently sent to South STP. The construction of a new sewage treatment plant is currently in the planning phase.

IWCM Scenario

A single preferred option has been identified for each issue that needs to be addressed and these options have been combined into an IWCM Scenario presented in Table S2.

Table S2: Identified works for the IWCM Scenario

Period	Issue	Identified work
Short Term 2022-2025	Work Health and Safety, performance and reliability	Decommission South Broken Hill STP and transfer sewage to a new Wills Street STP.
Medium Term 2027-2029	Public Health risk of Silverton non-potable supply	Convert the Silverton non-potable water supply to a potable supply.

Period	Issue	Identified work
	Reliability of Menindee water supply	Decommission the existing reservoir and construct a new 1 ML reservoir

Typical residential bill analysis

As part of the assessment of IWCM scenarios, approximate annual Typical Residential Bills (TRBs) for the EW's water supply and sewerage services have been estimated by developing water and sewer fund financial models. The financial models were developed using DPE Water's FINMOD 4 financial modelling software.

The water and sewer fund financial models have been set up using EW's 2019-20 and 2020-21 water and sewer income statements as historic input details and developed using the capital and operating budgets in EW's pricing proposal submission to IPART. The TRBs for the period 2022/23 to 2026/27 in both the water and sewer fund financial models also have been set to be the same as proposed in EW's pricing proposal to IPART (Table S3) for both the BAU and the IWCM scenarios.

Table S3: EW's Water and Sewer Pricing Proposal for IPART

Year	Water TRB p.a. in 2021-22$	Sewer TRB p.a. in 2021-22$	Combined water + sewer TRB in 2021-22$
2021-22 (Current)	915	546	1,461
2022-23	930	569	1,499
2023-24	945	579	1,524
2024-25	960	589	1,549
2025-26	975	599	1,574
2026-27	990	609	1,599

Both the water and sewer fund financial model demonstrates that the forecast TRBs for the years after the current IPART determination period are not affected by the IWCM scenario. For water fund, EW can maintain the TRB of $990 p.a. (in 2021/22$) for all the remaining forecast years from 2027/28 onwards for both the BAU and the IWCM scenarios.

Similarly, for the sewer fund, EW can maintain the TRB of $609 p.a. (in 2021/22$) for all the remaining forecast years from 2027-28 onwards for both the BAU and the IWCM scenarios.

Figure S1 compares the combined (water + sewer) forecasts for the BAU and the IWCM Scenario in terms of TRBs, Essential Energy's contribution requirements and the accrued net cash levels during the forecast period. Further details of the TRB analysis for IWCM Scenario are provided in Section 7.2.

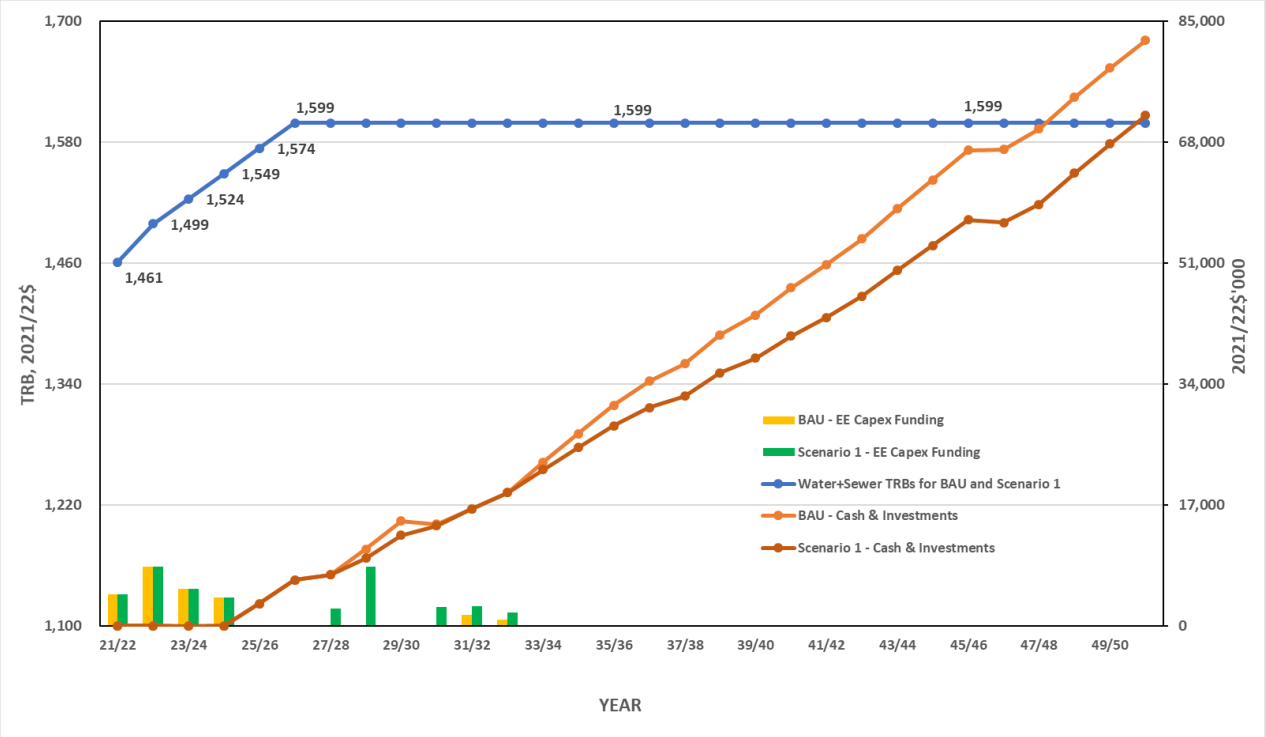

Figure S1: Comparison of Combined TRB (Water + Sewer) for the IWCM Scenarios

Long-term Financial Plans

Essential Water's Total Asset Management Plan for water supply and sewerage has been updated to include the growth and Improved Level of Service (ILOS) capital works identified to address the IWCM issues by the preferred strategy. Financial models for water and sewer funds developed for the TRB analysis have been further reviewed and refined to forecast the lowest stable sustainable price path for water supply and sewerage services on which to base Council's tariff structure. Note, all the forecast values are in 2021-22 dollars.

Essential Energy, the parent organisation, maintains the cash reserves of the water supply and sewerage operations and manages capital works expenditure of Essential Water by way of contributing funds as required. The financial models considered any additional funding required to be contributed by Essential Energy for the planned capital works as borrowings by EW, and all such additional capital funding are to be repaid over a 20-year period at an interest rate of 3% p.a. The models also consider that the net revenues accumulated over the forecast period will be retained by the parent organisation. The cumulative net operating revenue from water supply operations of EW is shown as cash and investments in the forecasts.

Water Fund Financial Plan

The water fund financial model forecasts for the IWCM scenario demonstrate that based on the pricing proposal submitted by EW to IPART for the 5-year determination period 2022-23 to 2026-27, the proposed TRB of $990 p.a. (in 2021/22$) for 2026-27 can be maintained for all the remaining forecast years from 2027-28 onwards with ongoing annual adjustments for CPI. The model does not consider any government grant or subsidy for any of the planned capital works for water supply services.

The forecast levels of TRB, capital works, capital works funding by EE and the accrued net cash during the forecast period are shown in Figure S2. For detailed discussions of the water fund financial model forecast for the IWCM scenario, refer to Section 9.5.

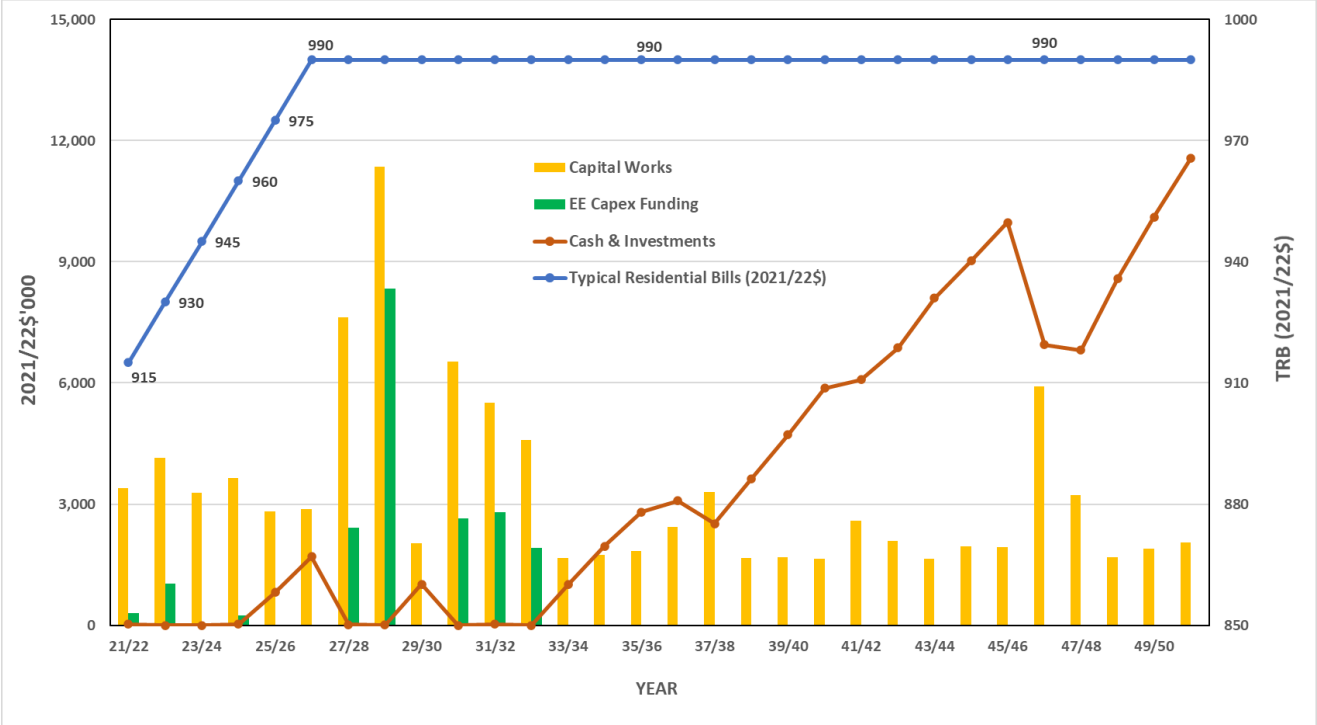

Figure S3: Water Fund Financial Model Forecasts for the IWCM Scenario

Sewer Fund Financial Plan

The sewer fund financial model forecasts for the IWCM scenario show that based on the pricing proposal submitted by EW to IPART for the 5-year determination period 2022-23 to 2026-27, the proposed TRB of $609 p.a. (in 2021/22$) for 2026-27 can be maintained for all the remaining forecast years from 2027-28 onwards with ongoing annual adjustments for CPI. The IWCM scenario of the model considers a government grant of $7.337 Million will be available for the Wills Street WWTP upgrade works.

The forecast levels of TRB, capital works, capital works funding by EE and the accrued net cash during the model forecast period are shown in Figure S4. For detailed discussions of the sewer fund financial model forecast for the adopted IWCM scenario, refer to Section 9.6.

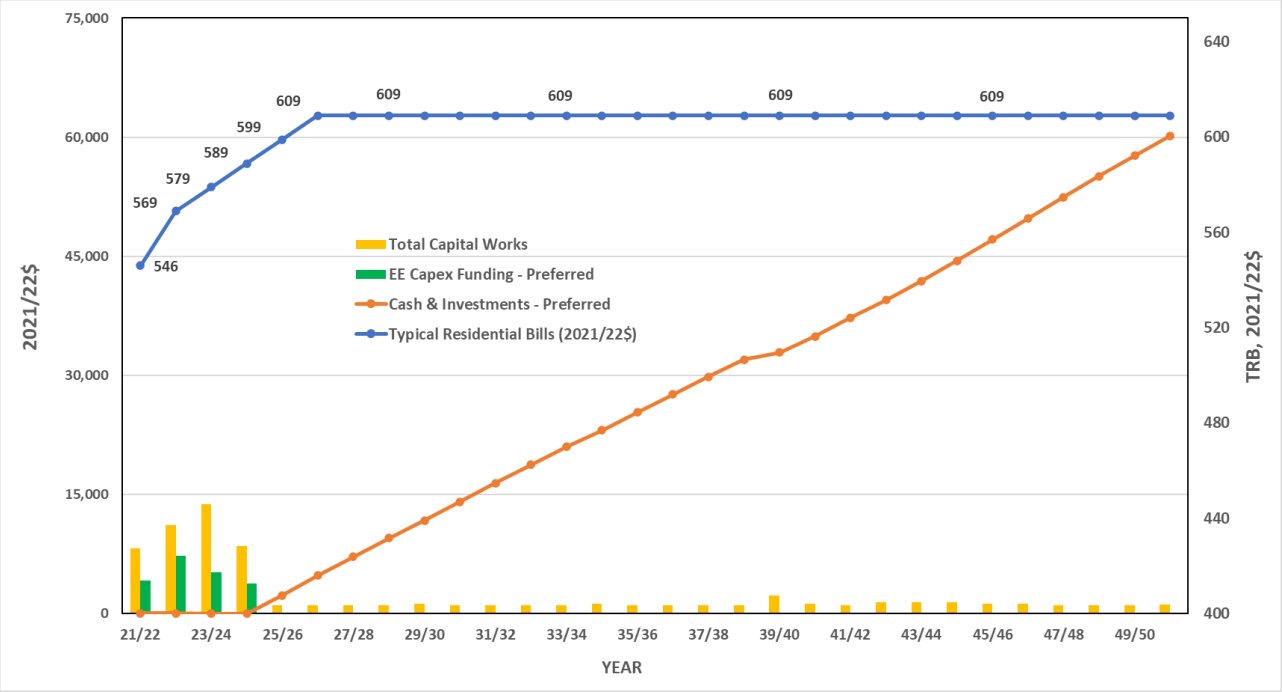

Figure S4: Sewer Fund Financial Model Forecasts for the IWCM Scenario

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1. The IWCM Strategy

1.1 Process

The Integrated Water Cycle Management (IWCM) Strategy is a local water utility's (LWU's) 30 year strategy for the provision of appropriate, affordable, cost-effective and sustainable urban water services that meet community needs and protect public health and the environment. A local water utility's (LWU's) peak planning documents for its water supply and sewerage businesses are its adopted IWCM Strategy and strategic business plan (SBP).

The IWCM Strategy:

- Identifies the water supply and sewerage needs of an LWU;
- 'Right sizes' any infrastructure projects and determines their priority;
- Identifies the lowest level of stable Typical Residential Bill (TRB) to meet the levels of service;
- Includes a 30 year Total Asset Management Plan and Financial Plan; and
- Identifies strategies to mitigate identified organisation risks such as drought, water quality health-based targets, climate change and community expectations on levels of service.

The process of preparing an IWCM Strategy follows the 2019 Department of Planning, Industry and Environment (DPIE) Water's IWCM Strategy Check List and broadly includes the following:

- Preparation of an IWCM Issues Paper
- Evaluation of feasible options
- Developing the IWCM Strategy; and
- Preparation of a Total Asset Management Plan (TAMP) and Financial Plan.

The key outcomes of a Local Water Utility's (LWU) IWCM Strategy are:

- 30 year Total Asset Management Plan;
- 30 year financial plan; and
- Drought and emergency response contingency plan (DERCP)

The process of preparing an IWCM is shown in Figure 1-1.

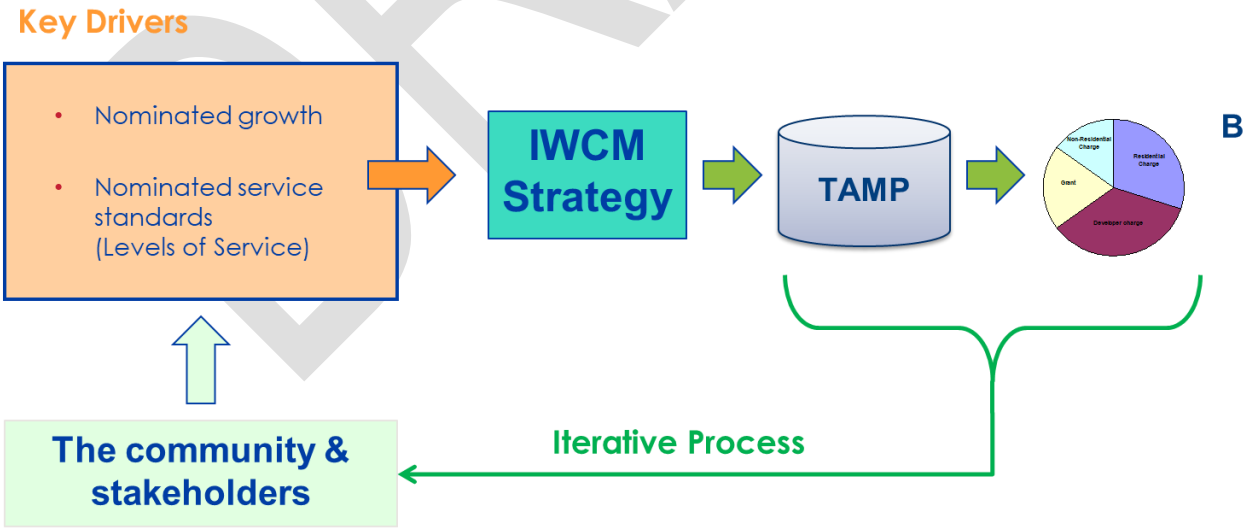


Figure 1-1: Process of preparing an IWCM Strategy

The nominated growth and adopted levels of service (LOS) targets are the key drivers that impact the development of the TAMP. The 30-year financial plan determines the revenue requirements to support the TAMP and forecasts the Typical Residential Bill (TRB) and the Developer Charge (DC)

for the preferred strategy. The process is iterative, and an affordable level of service and DC is determined through community and stakeholder consultation.

1.2 Progress

The development of Essential Water's IWCM Strategy has followed the DPIE Water IWCM Strategy Check List. The following tasks have been completed:

- **IWCM Issues Paper**

  This report identified and outlined the current and 30-year projected issues relating to Essential Water's regulatory requirements, growth, levels of service (LOS), and performance of the water supply and sewerage services. The Issues paper addresses Tasks 1 to 8 of the IWCM Check List.

- **Options Paper**

  This report presents the options that have been evaluated and assessed to address the issues identified. Options to address some of the issues have already been assessed in parallel to the development of the IWCM Strategy. The options assessment addresses Tasks 9 and 10 of the IWCM Check List.

2. Background information

2.1 Regional context

Essential Water is a division of Essential Energy, a NSW State Owned Corporation, located in Broken Hill, NSW. It provides potable water to around 18,300 people in Broken Hill and Menindee, and non-potable water to the settlements of Silverton and Sunset Strip. Essential Water also provides sewerage services to Broken Hill, where it operates two sewage treatment plants.

The region is the most arid in the state and experiences extreme climatic variations including more frequent droughts than coastal areas. Town water supply has historically been dependent on water sourced from the Darling River and pumped to Broken Hill via more than 120 km of pipeline. In 2018, the Darling River supply source was replaced by the Murray River via a 280 km pipeline and 760 ML bulk water storage connecting the Murray River at Wentworth to Mica St WTP.

Broken Hill is seen as the gateway to the Australian Outback and supports a vibrant artist community. Silverton, as the original settlement site, is a historic village that is often home to film crews from around the world. The villages of Menindee and Sunset Strip are located on the edges of the Menindee Lakes. The natural assets of the area include the ore deposits beneath Broken Hill, the Darling River the man-modified Menindee Lakes system and Kinchega National Park.

The serviced communities are shown in Figure 2-1

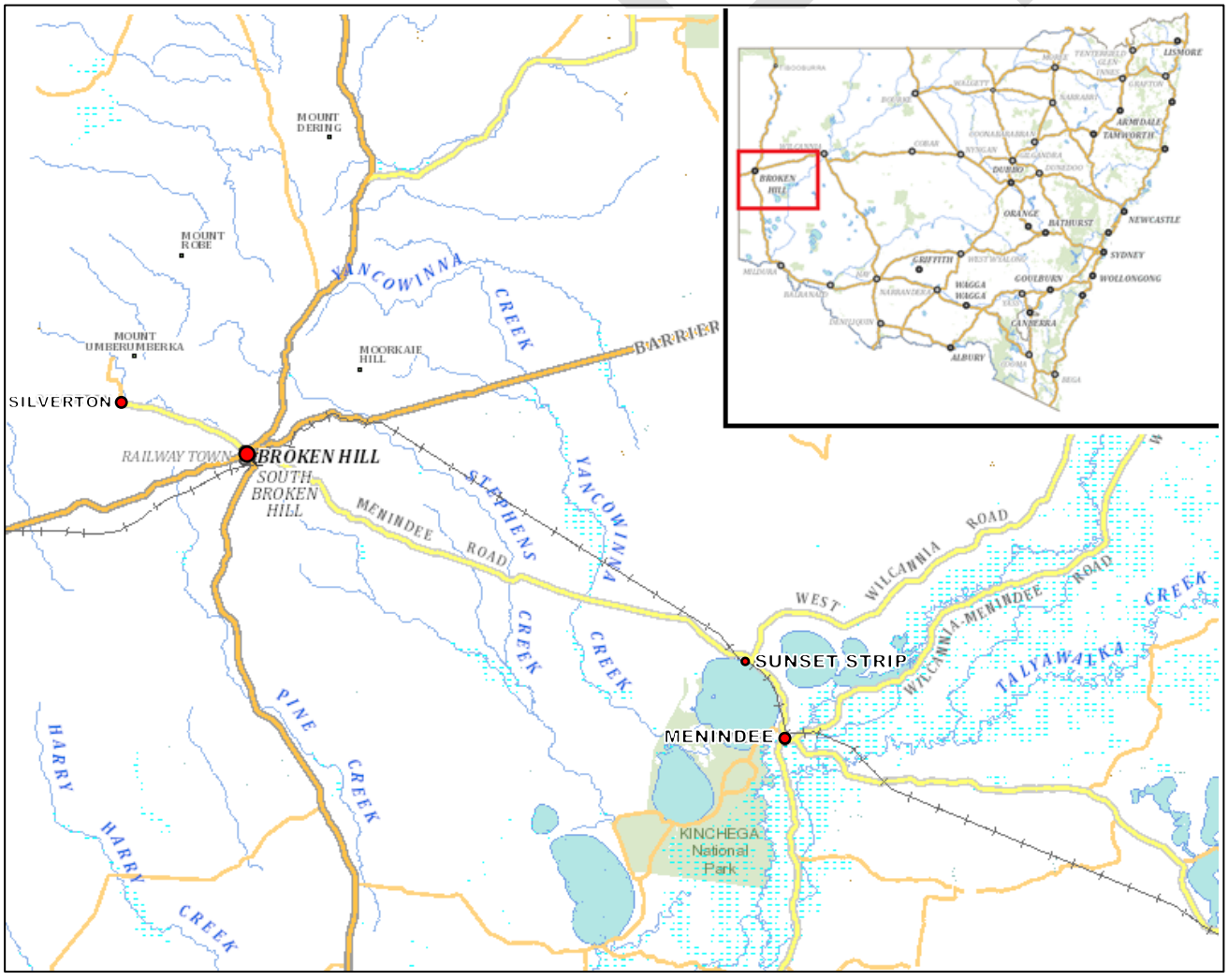


Figure 2-1: Essential Water serviced communities – map

The communities provided with water and sewer services by Essential Water are summarised in Figure 2-2.

Figure 2-2: Communities served by Essential Water

Community	Water supply scheme	Sewerage service
Broken Hill	Broken Hill Potable Water Supply Scheme Broken Hill Non-Residential Non-Potable Water Supply Scheme	Broken Hill Sewerage Scheme
Silverton	Silverton Chlorinated Non-Potable Water Supply Scheme	On-site sewage management systems
Menindee	Menindee Potable Water Supply Scheme	On-site sewage management systems
Sunset Strip	Sunset Strip Chlorinated Non-Potable Water Supply Scheme	On-site sewage management systems
Rural pipelines	Pipeline customers	On-site sewage management systems

2.2 Growth and economic outlook

Broken Hill is the largest community and the economic centre of the region. The mines in the Broken Hill district have traditionally been focused on silver, lead, and zinc. More recently, investigations have been undertaken into the potential for cobalt mining about 25km west-south-west of Broken Hill (this project is still in the pilot plant phase). While the mines are still very active, the population in Broken Hill has been stable or decreasing for at least the last 50 years, decreasing from 30,036 in 1966 to 17,269 in 2020. Therefore, a stable population was adopted as a conservative assumption. NSW Planning expects that the household sizes in the Broken Hill City and Central Darling Shire Local Government Areas will decrease. The decreasing household size is expected to lead to a very low rate of dwelling growth in Broken Hill and Menindee (there are expected to be no changes in the number and type of users in Silverton, Sunset Strip, and along the pipelines). The projected serviced population and total dwellings in each serviced community are summarised in Table 2-1.

Table 2-1: Serviced population and dwellings

		2016	2021	2026	2031	2036	2041	2046	2051
Broken Hill	Total Population *	17,944	17,944	17,944	17,944	17,944	17,944	17,944	17,944
	Cumulative total new dwellings	0	204	304	416	544	673	804	936
Silverton	Total Population *	49	49	49	49	49	49	49	49
	Total new dwellings	0	0	0	0	0	0	0	0
Menindee	Total Population *	384	384	384	384	384	384	384	384
	Total new dwellings	0	4	9	12	17	22	27	38
Sunset Strip	Total Population *	83	83	83	83	83	83	83	83
	Total new dwellings	0	0	0	0	0	0	0	0

* includes average visitor population and non-private dwelling population

2.3 Water demand and sewer loads projection

The water demand projections are summarised for Broken Hill system Table 2-2 and the Menindee Table 2-3 for the future system configuration. The systems will be re-configured between 2022 and 2025, as per the IPART determination. The projections account for the impact of the 1°C warming scenario.

Table 2-2: Broken Hill system demand – Future configuration (ML)

		Time period	2017	2021	2026	2031	2036	2041	2046	2051
Climate change scenario	Potable	Average year	4,765	4,797	4,817	4,839	4,864	4,889	4,915	4,941
		Average day	13	13	13	13	13	13	13	14
		Dry year	5,119	5,173	5,206	5,242	5,284	5,327	5,370	5,413
		Peak day	30	31	31	31	31	32	32	32
	Non-potable	Average year	948	2,044	2,044	2,044	2,044	2,044	2,044	2,044
		Average day	3	3	3	3	3	3	3	3
		Dry year	1,299	2,395	2,395	2,395	2,395	2,395	2,395	2,395
		Peak day	5	5	5	5	5	5	5	5
	Storage and transmission losses	Average year	285	285	350	350	350	350	350	350
		Average day	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
		Dry year	336	336	401	401	401	401	401	401
		Peak day	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
	Total	Average year	6,111	7,304	7,324	7,346	7,371	7,397	7,422	7,448
		Average day	16.74	16.83	16.88	16.94	17.01	17.08	17.15	17.22
		Dry year	6,873	8,088	8,121	8,157	8,199	8,242	8,285	8,328
		Peak day	37.47	37.78	37.96	38.17	38.40	38.64	38.88	39.13

Table 2-3: Menindee system demand – Future configuration (ML)

		Time period	2017	2021	2026	2031	2036	2041	2046	2051
Climate change scenario	Potable	Average year	108	154	155	156	157	158	159	159
		Average day	0.30	0.42	0.43	0.43	0.43	0.43	0.44	0.44
		Dry year	138	205	207	208	210	212	214	214
		Peak day	0.99	1.42	1.42	1.42	1.42	1.42	1.42	1.42
	Non-potable	Average year	22	22	22	22	22	22	22	22
		Average day	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
		Dry year	49	49	49	49	49	49	49	49
		Peak day	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
	Total	Average year	130	176	177	178	179	180	182	182
		Average day	0.36	0.48	0.49	0.49	0.49	0.49	0.50	0.50
		Dry year	187	254	256	257	259	261	263	263
		Peak day	1.18	1.61	1.61	1.61	1.61	1.61	1.61	1.61

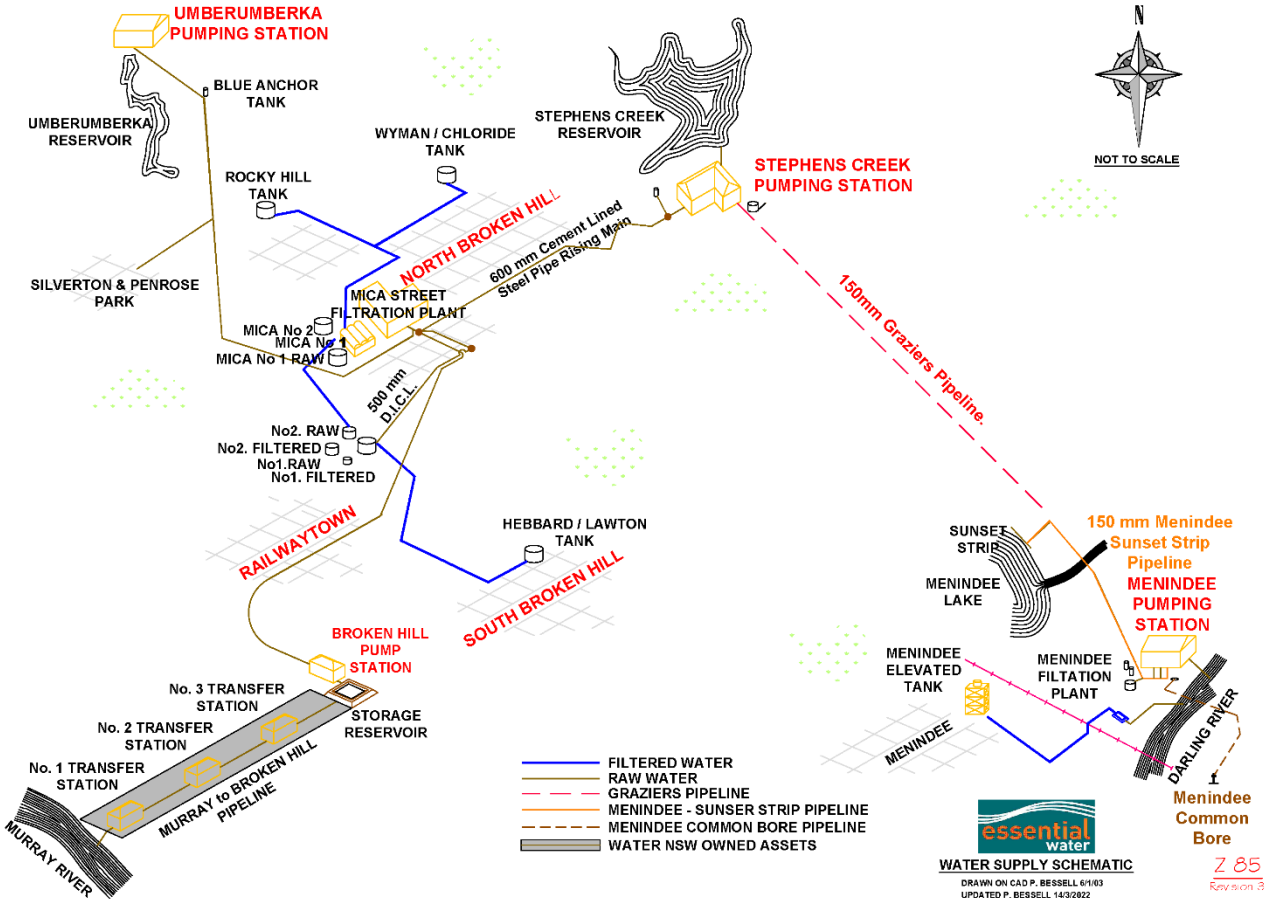
3. Urban Water Services

3.1 Broken Hill water supply

3.1.1 Water source

Water for Broken Hill is sourced from the Murray River at Wentworth, upstream of Lock and Weir 10. The Weir is about 600m downstream of the confluence of the Murray River and the Darling River. The flows in the Murray and Darling are physically regulated by a series of dams, weirs, and locks. These structures regulate the flows, greatly reducing the flood flows and enabling the controlled release of water for use by towns, farms, industry and the environment along the rivers and irrigation channels.

A schematic of the Broken Hill bulk water transfer system is shown in Figure 3-1.



* Sunset Strip and Menindee Lakeside Caravan Park will be provided with potable water from Menindee once the new pipeline is completed

Figure 3-1: Broken Hill Water Supply Schematic

The Wentworth to Broken Hill pipeline scheme components are listed in Table 3-1.

Table 3-1: Wentworth to Broken Hill water supply scheme components

Component	Details
River offtake and pump station	ML/day
Pipeline from Murray River to Bulk Water Terminal Storage	270 km long 760mm diameter concrete lined steel pipe
Booster pumping stations	4
Bulk Water Terminal Storage	720 ML15km south of Broken Hill
Supply pump station	37.4 ML/day
Pipeline from Bulk Water Terminal Storage to Mica St WTP	20 km long 760 mm diameter steel pipeline

3.1.2 Supplementary storages

Stephens Creek Reservoir

Stephens Creek Reservoir is a 19,000 ML. In the earlier scheme, water was transferred from the Darling River to Stephens Creek reservoir from where it was supplied to Broken Hill. It also receives water from a 570 km^2 catchment.

Stephens Creek Dam was inspected in 2020. The inspection report noted that “Stephens Creek Dam currently has several dam safety deficiencies, including a major shortfall in spillway capacity and potential stability risks associated with the embankment training walls.” Other issues of note include a significant leak at the pumping station used to transfer water from Stephens Creek Dam to Broken Hill.

With the water now being sourced from the Murray River, the reservoir is currently used as a backup water source in the event of supply disruptions from the Wentworth to Broken Hill Transfer Scheme. Approximately 100ML of water is maintained in the reservoir for this purpose.

Umberumberka Reservoir

Umberumberka Reservoir is a 7,800 ML reservoir located 28 kilometres north-west of Broken Hill on Umberumberka Creek. Umberumberka Dam is a deep storage, but its catchment is unreliable as a sustainable water source. With the water now being sourced from the Murray River, the reservoir is no longer part of the water supply scheme.

Umberumberka Reservoir was also inspected in 2020. The dam appeared to be in a satisfactory condition.

Imperial Lake

Imperial Lake is a 670 ML storage that collects water from its own small catchment which includes part of the Broken Hill urban area. Water can be transferred to Imperial Lake from Stephens Creek and Umberumberka via the Mica Street WTP.

The lake has historically been used only as emergency storage. With the completion of the Murray Pipeline Imperial Lake is no longer being required to provide emergency water supply and has been disconnected from the water supply system.

Reservoir Rationalisation – Review of Supply Reliability

A review of the future use of both Umberumberka and Stephens Creek Reservoirs will be subject to a comprehensive study commencing in 2023. The study will aim to quantify risks to supply continuity from the Wentworth to Broken Hill transfer Scheme and identify options to manage these risks.

3.1.3 Non-potable water supply

There are several customers that are supplied with non-potable water by Essential Water. The customers and type of non-potable water supplied, are summarised in Table 3-3.

Table 3-2: Non-potable water supply classification, zone and treatment

Customers	Supply type
Broken Hill commercial users and mines.	Raw water
Rural users along the Broken Hill to Stephens Creek pipeline.	Chlorinated and/or treated with PAC when required
Rural users (graziers) along the Menindee to Stephens Creek pipeline.	Raw water
Village of Silverton supplied from an off-take on the Umberumberka to Broken Hill pipeline.	Chlorinated raw water
Rural users along the Umberumberka to Broken Hill pipeline	Raw water

Due to the change in the source water quality, the raw water supplied to non-potable users' will require additional treatment to reduce corrosion potential as well as to remove algae and algal toxins. To achieve this, it is proposed to provide the necessary treatment required adjacent to the Mica Street water treatment plant.

With the commissioning of the new Wentworth to Broken Hill pipeline, there is no longer a requirement to transfer raw water from Menindee to Broken Hill and customers who relied on a water supply from the Menindee pipeline (graziers) will no longer have access to raw water. Essential Water is planning to construct a fit for purpose pipeline that will establish a new raw water supply from Stephens Creek to close to Sunset Strip to service the existing 16 grazier connections.

3.1.4 Potable water supply

The Broken Hill Water Supply Scheme supplies potable water to Broken Hill. The water is treated at the Mica Street Water Treatment Plant from where it is pumped to the four water supply reservoirs. The plant has a capacity of 31.5 ML/day, and uses a conventional flocculation, clarification, filtration treatment process, followed by UV treatment. The plant has a 6 ML/day Reverse Osmosis (RO) unit that can be used when the raw water is high in minerals.

An aerial image of the plant is included in Figure 3-2.

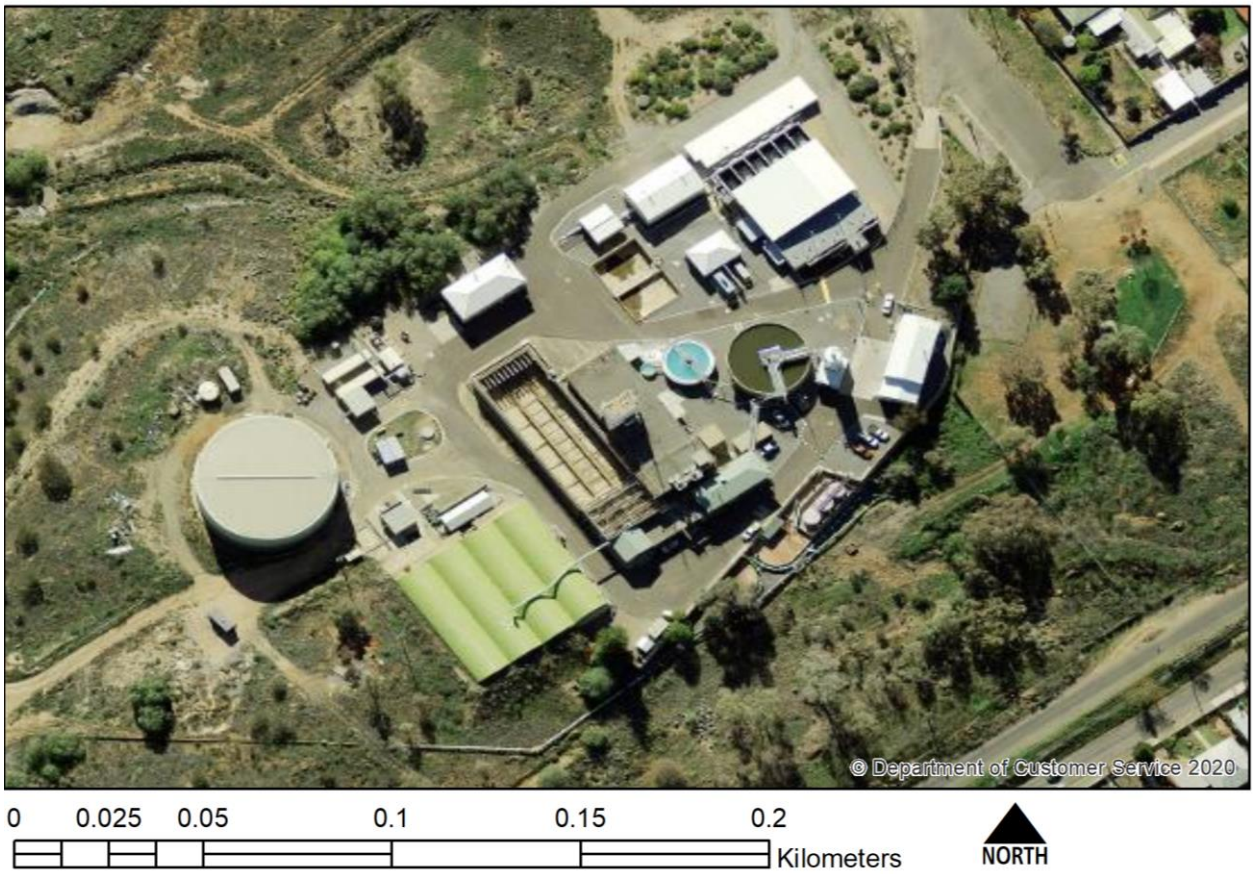


Figure 3-2: Mica St WTP

3.1.5 Service area

The service area and functions of Essential Water are defined in the Water Management (General) Regulation 2011 (Part 9, Division 2). Essential Energy's area of operations in Broken is the area of land shown by distinctive marking on the map marked "Area of Operations of Broken Hill Water Board" deposited in the offices of DPIE, being land within the local government area of the Broken Hill City Council, and the Stephens Creek, Umberumberka Creek and Yancowinna Creek Special Areas referred to in Division 6. The service area map for Broken Hill is shown in Figure 3-3

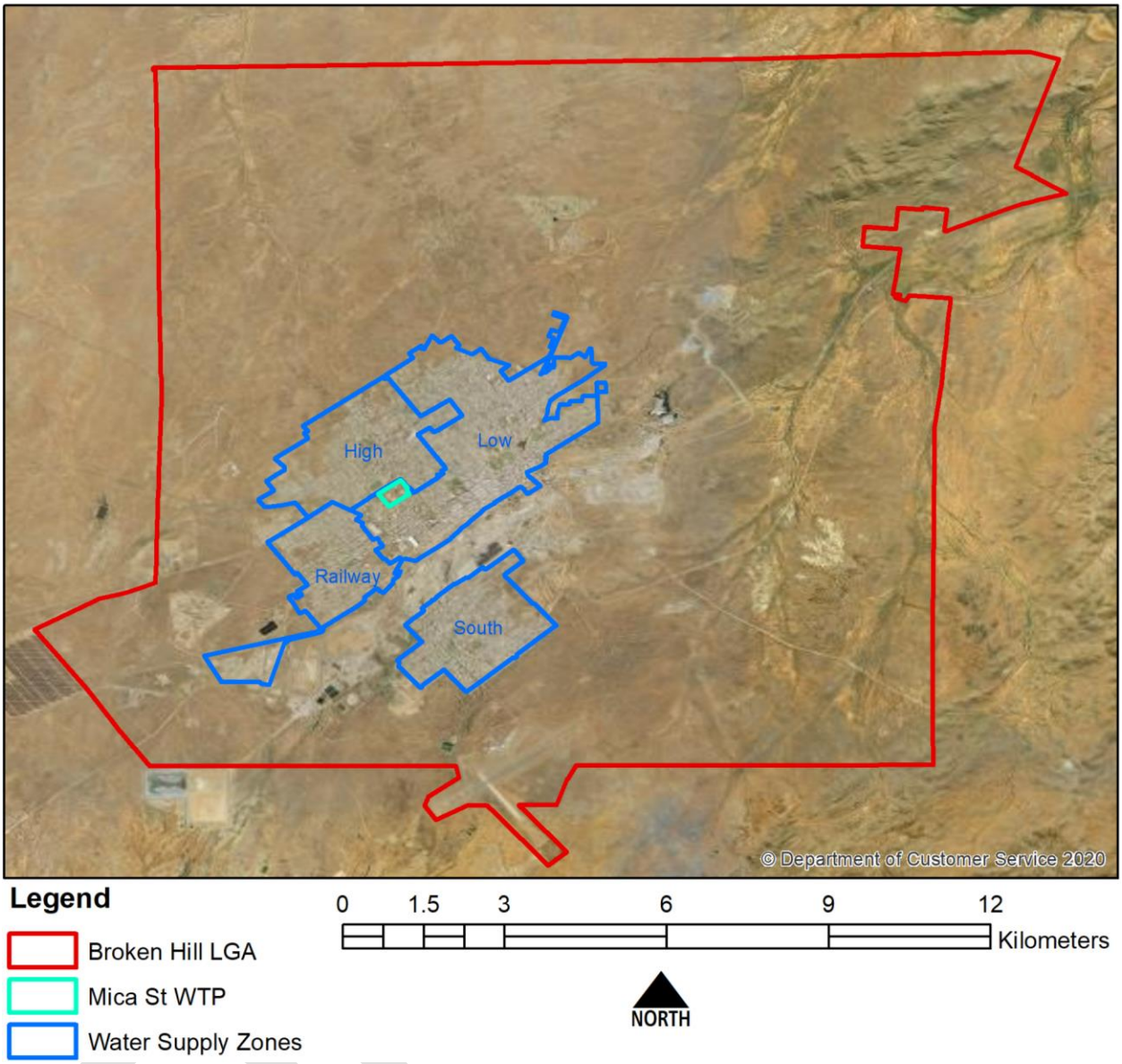


Figure 3-3: Broken Hill water supply service area

3.2 Menindee water supply

3.2.1 Water source

The Menindee Lakes are a naturally occurring series of shallow wetlands located along the Lower Darling River, approximately 200 kilometres upstream of the junction with the Murray River at Wentworth. Naturally ephemeral, the Menindee Lakes is currently the primary water supply for the community of Menindee along with farms in the region.

The regulated storage system at Menindee consists of four main interconnected lakes, a schematic of the lakes is included in Figure 3-4. The Menindee Water Supply pumps water out of the Darling River upstream of Weir 32 (1), the flow into this reach of river is controlled by the releases from of Lake Wetherell (2), Lake Pamamaroo (3) and Lake Menindee (4).

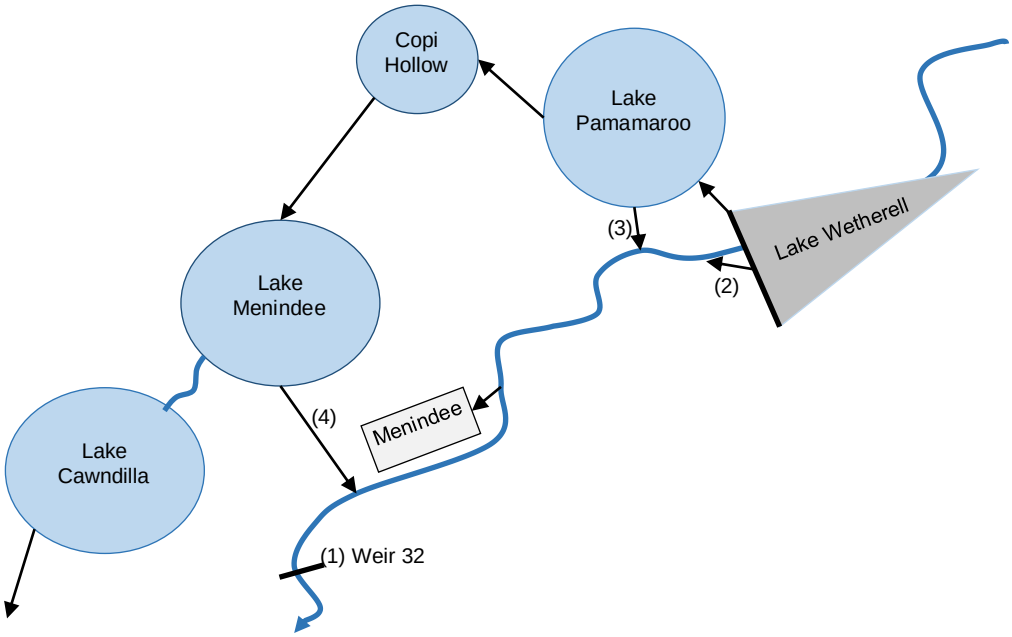


Figure 3-4: Schematic of the Menindee Lakes System

3.2.2 Non-potable water supply

There are some customers that are supplied with non-potable water by Essential Water. The customers and type of non-potable water supplied, are summarised in Table 3-3.

Table 3-3: Non-potable water supply classification, zone and treatment

Sub-category/zone	Supply type
Menindee school oval and community oval	Raw water
Menindee Lakes Caravan Park	Chlorinated raw water
Sunset Strip village	Chlorinated raw water

3.2.1 Potable supply

The Menindee Water Supply Scheme supplies potable water to Menindee. The new Menindee Water Treatment Plant was completed in 2021. Essential Water is currently in the planning stage of a project to construct a pipeline to provide potable water from the Menindee WTP to the Menindee Lakeside Caravan Park and Sunset Strip. The new plant capacity of 1.98 ML/d is sufficient to provide water to Menindee, the Menindee Lakeside Caravan Park and Sunset Strip for the next 30 years.

A review of the elevated potable water storage tanks in Menindee has identified an opportunity to improve the systems supply continuity in the event of supply short term supply loss from the Water Treatment Plant. An increase in elevated tank capacity has been identified as a potential option and will be subject to further analysis to determine the most appropriate size and location.

3.2.2 Service area

Essential Water's area of operations in Menindee is the localities of Menindee and Sunset Strip, and the land over which the Menindee to Stephens Creek pipeline is situated. The service area map for Menindee is shown in.

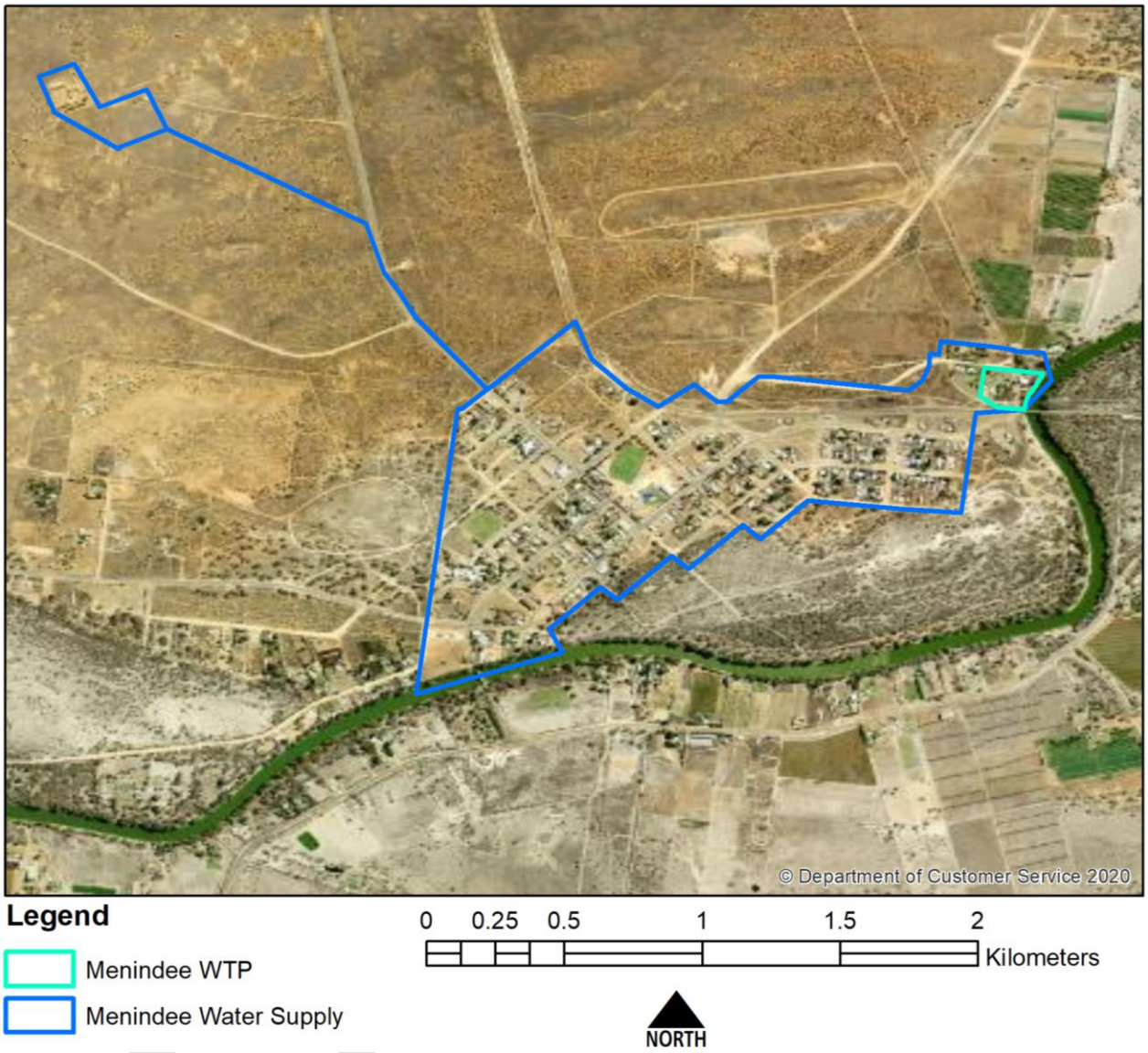


Figure 3-5: Menindee water supply service area

3.3 Sewerage schemes

Broken Hill currently has two sewerage schemes. There are two sewage treatment plants (STPs), the Wills Street STP and the South Broken Hill STP. The service area and catchments are shown in

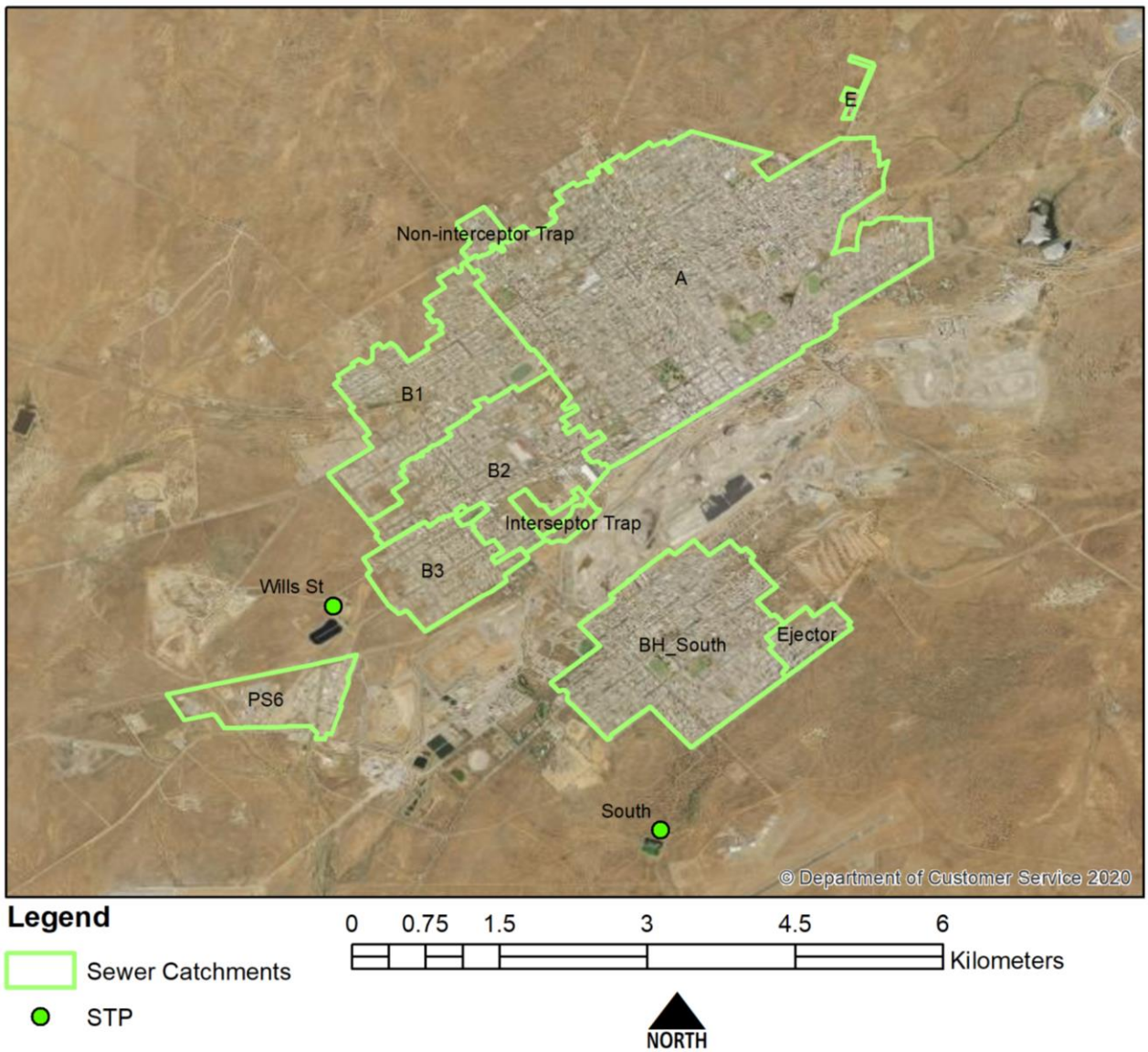


Figure 3-6: Broken Hill sewage catchments

Effluent Management

Effluent from the South STP and Wills St STP is currently transferred/reused at the White Leeds artificial wetland. The effluent reuse scheme also supplies water to:

- Broken Hill Golf Club
- Cristal Sands Mining
- 1A Calcite Street
- Silverlea
- Broken Hill City Council
- Broken Hill Racecourse
- Perilya mine.

Figure 3-7 shows the location of the two sewage treatment plants relative to the various effluent reuse customers.

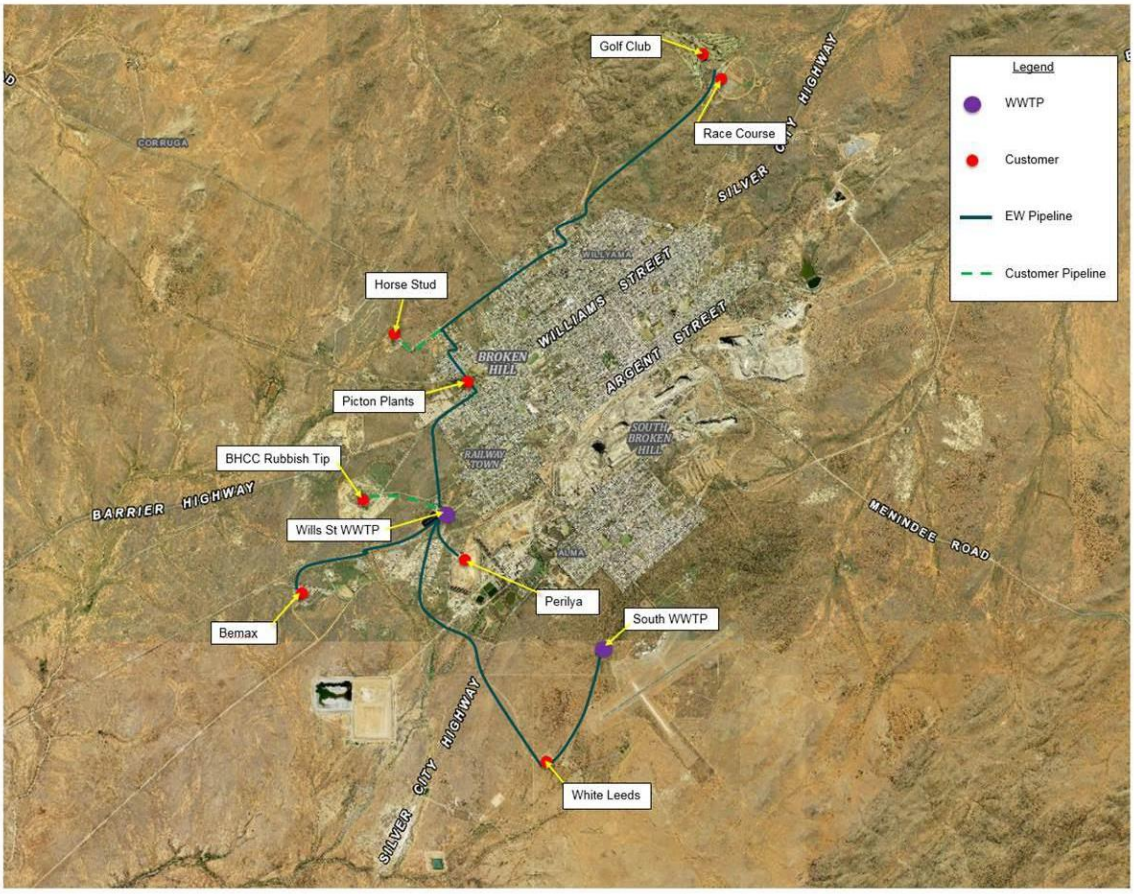


Figure 3-7: Location of Wills St STP, South STP and recycled water customers

Essential Water has prepared Recycled Water Management Plans for the effluent reuse from both the Sewage Treatment Plants.

3.4 Urban Stormwater

Essential Water is not responsible for the urban stormwater systems in its operating area, these are the responsibility of the relevant local councils.

4. Levels of service and agreements

4.1 Agreement with WaterNSW

Essential Water is a bulk water supply customer of WaterNSW and sources water for the Broken Hill Water Supply through the Wentworth to Broken Hill pipeline. Essential Energy has entered into a Raw Water Supply agreement with WaterNSW for supply from the Murray to Broken Hill Pipeline. The agreement is attached in Appendix A.

4.2 Customer levels of service

Essential Water's water supply objectives are listed in Table 4-1 and the wastewater objectives are listed in Table 4-2. Each objective has one or more measurable performance indicators which relate to a Service Standard (or Design Basis) drawn from the IPART determination, legislation, best practice guidelines, and industry practice. Essential Water has nominated a target for each performance indicator against which the performance of the water supply and wastewater schemes will be assessed. The performance indicators and targets are also outlined in the tables. The customer charter distributed to all customers is summarised in 0.

Table 4-1: Essential Water's water service objectives and targets

Water	Criteria	Past Performance	Future Performance	Performance Gaps
Availability of Water Supply	• Minimum pressure 15 m head of water in reticulation system, conveying 6 litres per minute per residential connection under normal conditions.	• Pressure is adequately maintained by management of tanks in Broken Hill. No poor pressure complaints in Broken Hill during last 12 months. Operational procedures in place to maintain pressure. Ongoing monitoring of tank levels by way of telemetry.	• Continued adherence to operation procedures	• No identified gaps
	• Water restrictions should not be applied more than 5% of the time	• Implementation of drought management plan. Meeting water restriction target. Monitored by Dashboard Metric Local Reservoir Volumes. • Restrictions were implemented for two years from 8/12/14 to 9/12/16 in response to continuing drought conditions in western NSW, reducing water storages and very poor raw water quality	• Active monitoring of reservoir levels and Menindee Lakes going forward. Open dialogue with Water NSW in regard to Menindee Lake management.	• Restrictions were implemented for two years from 8/12/14 to 9/12/16 in response to continuing drought conditions in western NSW, reducing water storages and very poor raw water quality
	• 3000 L/tenement/per day for residential potable water	• New developments are required to obtain statements of available pressure to ensure criteria are being met.	• Continued requirement to obtain statement of available pressure.	• No identified gaps
	• Planned works: residential customers 2 days written notice, non-residential 7 days written notice	• Procedures in place to ensure adequate notification protocols are adhered too.	• Continued adherence to operational procedures	• Performance data collection
	• Water will be available from reticulation fire hydrants for fire-fighting at minimum flow rates determined by guidelines	• Active fire hydrant maintenance and replacement programme. 372 hydrants maintained in the past 12 months	• Continued fire hydrant maintenance programme.	• No identified gaps

Water	Criteria	Past Performance	Future Performance	Performance Gaps
Water Quality	• Potable water supply should meet Australian Drinking Water Guidelines • Non-potable water supply should meet public health standards with respect to bacteria, contaminants and pathogens, consistent with its use.	• 100% Compliance for health related criteria. Monitored by Dashboard metric water quality breaches. • See water quality reports located at: http://www.essentialwater.com.au/content/water-quality-reports	• Strictly adhering to Australian Drinking Water Guidelines, incorporating changes as required.	• No identified gaps
Response Times	• Priority 1 – defined as failure to maintain continuity or quality of supply to a large number of customers or to a critical use at a critical time. Response time: ✓ 30 minutes (business hours) ✓ 1 hour (after hours) • Priority 2 – defined as failure to maintain continuity or quality of supply to a small number of customers or to a critical user at a non-critical time. Response time: ✓ 1 hour (business hours) ✓ 2 hours (after hours) • Priority 3 -defined as failure to maintain continuity or quality of supply to a single customer. Response time: ✓ 1 working day • Priority 4 – defined as a minor problem or complaint which can be dealt with at a time convenient to the customer and the water authority. Response time: ✓ Within 2 weeks	• Performance not measured on a job by job basis. • Anecdotal evidence that service response times are effective, by no formal customer complaints being received YTD 2012/2013. • Customer survey completed in 2012 found that EW ranked 9/10 for reliability of water service and 8.5/10 for customer service for water services.	• Not measured on an individual basis at this stage • Periodic customer surveys	• Procedure implemented to ensure response times are appropriately measured in an appropriate system.

Water	Criteria	Past Performance	Future Performance	Performance Gaps
Customer Complaints	• Customer complaints other than supply failure ✓ Respond to 95% of written complaints or inquiries within 4 working days of receipt. ✓ Respond to 95% of personal complaints or inquiries within 4 working days.	• In accordance with Dashboard metric Average Complaint Resolution Time. YTD 2012/2013 = 100%. • EW ranked 8.5/10 for customer service	• Ongoing monitoring through Dashboard to ensure criteria is being met.	• No gaps identified.

Table 4-2: Essential Water's wastewater service objectives and targets

Sewerage	Criteria	Past Performance	Future Performance	Performance Gaps
Availability of Sewerage Service	• Connections for domestic sewage should be provided to all houses, units or businesses within the defined service area of Broken Hill. There are no plans at present for sewerage services to other locations. • Acceptance of commercial and industrial wastes (trade waste) should be in accordance with approval conditions for each discharger.	• Sewer reticulation system established and maintained within Broken Hill service area • Trade Waste Policy lodged with DPIE Water. • Commercial customers have been assessed, 43 business registered as trade waste customers that do discharge to sewer, and 6 business are under a trade waste agreement.	• New developments in Broken Hill are required to pay a capital contribution if outside the current service area. • All commercial customers to be on a trade waste agreement • Future implementation of trade waste charges.	• No identified gaps

Sewerage	Criteria	Past Performance	Future Performance	Performance Gaps
Average System Failures	• Controlled, expected (overflow structure) – related to rainfall and design: ✓ Not more than 2 times in 1 year on average. • Controlled, unexpected (flow relief structure): ✓ Not more than once in 5 years. • Uncontrolled, unexpected: ✓ Private Property: not more than 50 per 1000 properties per year. ✓ Public Property – sensitive areas: not more than once per 3 years. ✓ Public Property – elsewhere: not more than once per 10 km of main per year.	• Overflows manually recorded but not actively monitored apart from yearly report to Environmental Protection Agency • 2011/12 licence return reported 2 wet weather overflows, 11 dry weather overflows, and 579 chokes. • Monitoring by Dashboard metric sewer mains rodded which directly impacts on the number of overflows and chokes. YTD 2012/2013 favourable to target 24%.	• Ongoing reporting to the Environmental Protection Agency. • Ensure sewer main rodding dashboard targets are being met. • EW is continuing with its annual sewer main replacement and relining program. EW's sewer mains replacement occurs when it becomes too hot to proceed with the water mains replacement program or at other times with relining contractors.	• No identified gaps

Sewerage	Criteria	Past Performance	Future Performance	Performance Gaps
Response Times	• Priority 1 – defined as 'major failure to contain sewage within the sewer system or any problem affecting a critical user at a critical time'. Response time: ✓ 30 minutes (working hours) ✓ 1 hours (after hours) • Priority 2 – defined as 'minor failure to contain sewage within the sewer system or any problem affecting a critical user at a non-critical time'. Response time: ✓ 1 hour (working hours) ✓ 2 hours (after hours) • Priority 3 – defined as 'minor failure to contain sewage affecting a single property or as bad odours'. Response time: ✓ next working day	• Performance not measured on a job by job basis. • Anecdotal evidence that service response times are effective, by no formal customer complaints being received YTD 2012/2013. • Customer survey completed in 2012 found that sewer ranked 8.9/10 for reliability of sewer service and 8.8/10 for customer service.	• Not measured on an individual basis at this stage • Periodic customer surveys	• Procedure implemented to ensure response times are appropriately measured in an appropriate system.
Customer Complaints	• Respond to 95% of written complaints or inquiries within 4 working days of receipt. • Respond to 95% of personal complaints or inquiries within 4 working days.	• In accordance with Dashboard metric Average Complaint Resolution Time. YTD 2012/2013 = 100%. • EW ranked 8.8/10 for customer service for sewer.	• Ongoing monitoring through Dashboard to ensure criteria is being met.	• No gaps identified.
Odours/ Vectors	• Not more than 2 incidents per year that results in complaints	• Monitoring by way of Dashboard metric Environmental Compliance. No formal complaints YTD 2012/2013 received regarding odour.	• Ongoing monitoring by Dashboard	• No gaps identified
Impact of Sewage Treatment Plants	• The maximum level of noise should not be more than 5 dB above the background noise level. • Odour should not be detectable outside the utility's buffer zone around the treatment works.	• Monitoring by way of Dashboard metric Environmental Compliance. No formal complaints YTD 2012/2013 received regarding odour or noise.	• Ongoing monitoring by Dashboard	• No gaps identified

Sewerage	Criteria	Past Performance	Future Performance	Performance Gaps
Effluent Discharge/ Bio-solids Management	• The minimum performance standards for effluent discharge and bio-solids management are set by statutory requirements and regulations through licensing.	• Non-compliant for pH on the annual licence requirements over the past number of years	• Ongoing reporting to the Environmental Protection Agency. Actively managing non-compliances for effluent discharge.	• EW has entered into negotiations with the Environmental Protection Agency for a licence amendment. • If pH non-compliances cannot be resolved satisfactorily, future works may be required (i.e. acid-dosing plant)

5. Performance review and risks

The issues and risks identified in the water supply and sewerage schemes operated by Essential Water are presented below. For some risks, solutions have already been identified and included in the Total Asset Management Plan. For other risks, solutions that have been evaluated are presented in the options assessment.

5.1 Regulatory Compliance

Dam Safety Acy

Stephens Creek reservoir has been assessed as having insufficient spillway capacity and has works scheduled to be undertaken between 2027 and 2033 to address these issues.

Prior to commencement of dam remediation works, a comprehensive study of raw water supply continuity risks will be undertaken to determine the future use of Stephens Creek Reservoir in the Broken Hill water supply scheme. The review will commence in 2023 and will inform the extent of works required for the Dams remediation.

5.2 Water security review and risks

Broken Hill

Water for the Broken Hill water supply is secured from the Murray River. This is a regulated river and the sustainability and drought reliability of the source is determined through analysis undertaken by DPIE Water.

Menindee

The security of the Menindee and Sunset Strip water supply was assessed as part of the Western Weirs Project. The results showed that the existing Menindee Weir has a secure yield of 411 ML/year under the 1°C warming scenario.

Menindee also has a groundwater source with a licensed entitlement of 370 ML/year. For the Western Weirs project a reliability of 60 percent was assigned to the groundwater source, providing a reliable groundwater yield of 222 ML/year.

The estimated 2051 unrestricted annual extraction for Menindee and Sunset Strip is 258 ML/year under the 1°C warming scenario. Therefore, the Menindee weir provides water security for the Menindee and Sunset Strip water supply. The groundwater source can be considered as a drought contingency or as an alternate source during an emergency.

5.3 Water Quality

Potable water supply

The water quality objectives for the potable water supplies are being met by the Mica Street water treatment plant for the Broken Hill water supply, and the upgraded Menindee water treatment plant for Menindee and Sunset Strip water supply.

Non-potable supplies

A catchment to tap risk assessment undertaken jointly by Essential Water and WaterNSW identified the risk of a blue green algal outbreak developing within the WaterNSW bulk water terminal storage. Algal toxins can cause skin irritation and the current Broken Hill non-potable supply does not have a barrier for algal toxins.

An options study has been completed for the treatment of the non-potable water to mitigate the algal toxin risk. The cost for this treatment option is included in the asset management plan and will be constructed between 2022 and 2025 as per the IPART determination.

Silverton water supply

There is a risk to the health of residential and non-residential customers through the accidental consumption of water that has been classified as non-potable. This potential conversion of this supply into a potable supply has been discussed in the options assessment.

5.4 Supply reliability

Broken Hill water supply

The Wentworth to Broken Hill pipeline system provides an estimated raw water supply reliability of 98 percent, which equates to 7.3 days of supply outage(s) per annum. It is anticipated that any single outage will take no longer than 3 days to restore supply.

The target level of service is 99.99 percent which allows for up to (approx.) 12 hours of raw water supply interruptions prior to potable water supplies to customers being affected.

A comprehensive study into water supply continuity will be undertaken commencing in 2023 to identify options to ensure supply outages are managed within agreed customer expectations. This study will include a review of the ongoing role of Stephens Creek and Umberumberka reservoirs have in managing supply risks.

Menindee water supply

The current Menindee water supply reservoir capacity is substantially less than the peak day demand. This could result in the following two issues.

- Reduction in available pressure during a sustained hot period (week or fortnight), due to dropping reservoir levels.
- System failure if the supply to the reservoir is interrupted for even a relatively short period of time (between 2 and 2.5 hours) during peak demand periods.

The provision of additional reservoir storage volume will mitigate this risk. This is discussed in the options assessment.

5.5 Environmental risks

Sewage needs to be ‘safely managed’ to prevent public health impacts and impacts to receiving waterway uses and values. Both STPs have failed to meet the treated effluent quality parameters set out in their licences on one or more occasion every year since 2011 for the South STP and 2014 for the Wills St STP. On 01 July 2021, the EPA added a pollution reduction program to the Wills St STP licence. The program states that Essential Water must: “Replace the existing Wills Street STP with the capacity to treat effluent currently sent to South STP.

The construction of a new sewage treatment is discussed in the options assessment.

6. Options assessment

6.1 Silverton Non-potable Supply

The two options considered to address this issue are:

1. Continue to supply chlorinated non-potable water and improve notification and customer education using notices like the one in Appendix C
2. Construct a new potable supply.

The advantages and disadvantages of these options are summarised in Table 6-1.

Table 6-1: Comparison of options to reduce risks associated with non-potable supply

	Improved notification and education	Supply potable water
Advantages	▪ Very low cost per customer	▪ Eliminates the health risk due to the potential consumption of non-potable water.
Disadvantages	▪ Effectiveness is dependent on continuous notification, education, and customer behaviour	▪ High cost per customer

Essential Water's preferred option is to convert the Silverton supply into a potable water supply and this is included in the IWCM Scenario. A comprehensive community and stakeholder engagement process will be undertaken to determine the extent of support for this initiative.

6.2 Menindee water supply reliability

Additional storage needs to be provided for the Menindee water supply to ensure supply reliability. Reservoir storage options of 1 ML and 0.5 ML were evaluated. For the 0.5 ML reservoir, it would take 3 or more hours for the level to drop to 50 percent and 7 hours to empty. For the 1 ML reservoir, it would take 6 to 7 hours for the level to drop to 50 percent and nearly a full day to empty. Given that the estimated return to service time from a trunk main break is about 4 hours, a new 1 ML standpipe reservoir is recommended.

6.3 Broken Hill Sewage Treatment

A sewage treatment plant (STP) augmentation options assessment was completed with the following four options being assessed:

Option 1 – Retain and refurbish both Wills Street and South Broken Hill STPs

Option 2 – Decommission South Broken Hill STP and transfer sewage to a **refurbished** Wills Street STP

Option 3 – Decommission South Broken Hill STP and transfer sewage to a **new** Wills Street STP

Option 4 – Refurbish South Broken Hill STP and construct a **new** STP adjacent to the existing Wills Street STP

Option 3 is Essential Water's preferred augmentation option. The current effluent reuse scheme will continue with the new plant which will produce higher quality discharge effluent to ensure compliance with the changes in EPA Discharge requirements that come into effect in 2025

7. IWCM Scenario

A single preferred option has been identified for each issue that needs to be addressed and these options have been combined into an IWCM Scenario presented in Table 7-1.

Table 7-1: Identified works for the IWCM Scenario

Period	Issue	Identified work
Short Term 2022-2025	Work Health and Safety, performance and reliability	Decommission South Broken Hill STP and transfer sewage to a new Wills Street STP.
Medium Term 2027-2029	Public Health risk of Silverton non-potable supply	Convert the Silverton non-potable water supply to a potable supply.
	Reliability of Menindee water supply	Decommission the existing reservoir and construct a new 1 ML reservoir

7.1 Present Value Analysis

The detailed net present value cost estimate for the IWCM Scenario is provided in Appendix D.

Table 7-2 presents the summary of the estimated total cost of capital outlay and the present value of the capital, and the operating and maintenance (O&M) cost estimates over the 30 years of the IWCM Scenario based on 2020-21 dollars.

Table 7-2: Capital and present value costs

	Total Capital Cost $K (over 30 years)	Present Value of capital cost $K @7%	Total present value $K @7%
Broken Hill STP	34,245	25,779	26,355
Silverton potable supply	10,079	6,313	7,308
Menindee reservoir	936	552	577
IWCM Scenario	**45,260**	**32,644**	**34,240**

7.2 Typical Residential Bill Analysis of IWCM Scenarios

As part of the assessment of IWCM scenarios, approximate annual Typical Residential Bills (TRBs) for the EW's water supply and sewerage services have been estimated. The approximate TRBs for the IWCM scenarios have been established by way of developing water and sewer fund financial models using FINMOD 4, the financial modelling software developed by DPE Water. Approximate TRBs are expected to be within about 10% of the final TRBs that will be forecast in the Financial Plan for the adopted IWCM Strategy.

The water and sewer fund financial models have been set up using EW's 2019-20 and 2020-21 water and sewer income statements as historic input details and developed using the capital and operating budgets in EW's pricing proposal submission to IPART. The baseline (business as usual - BAU) scenarios of the models have been set up base on EW's 30-year asset renewal plan, and the estimated capital costs of the IWCM initiatives for the scenario incorporated for the analysis.

The 30-year capital works program for water supply for the IWCM scenario and the BAU scenario are compared in Figure 7-1. The operation, maintenance, and administration (OMA) cost estimates for the water supply IWCM scenario including additional expenses for IWCM initiatives and the recommended management system improvement measures are presented in Figure 7-2. The BAU

scenario reflects the EW's pricing proposal submission to IPART for the 5-year (2022/23 – 2026/27) price path determinations.

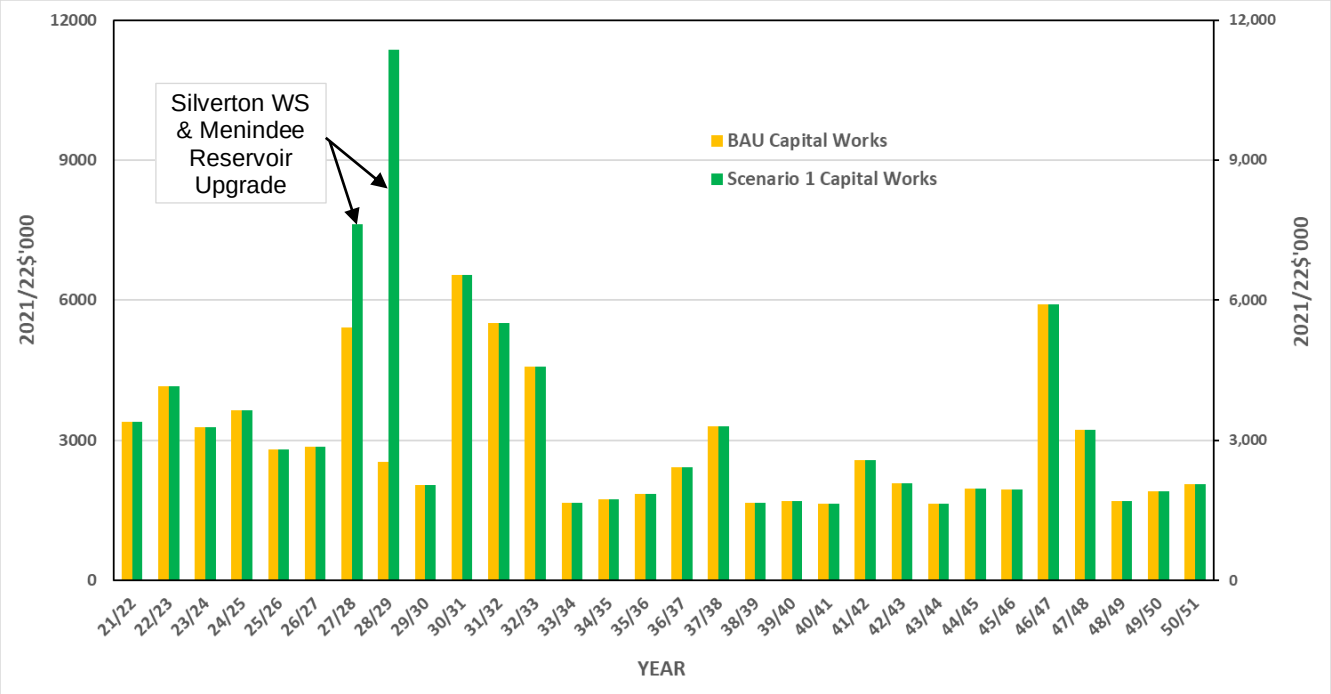


Figure 7-1: Comparison of 30-year Capital Works Programs – Water Supply

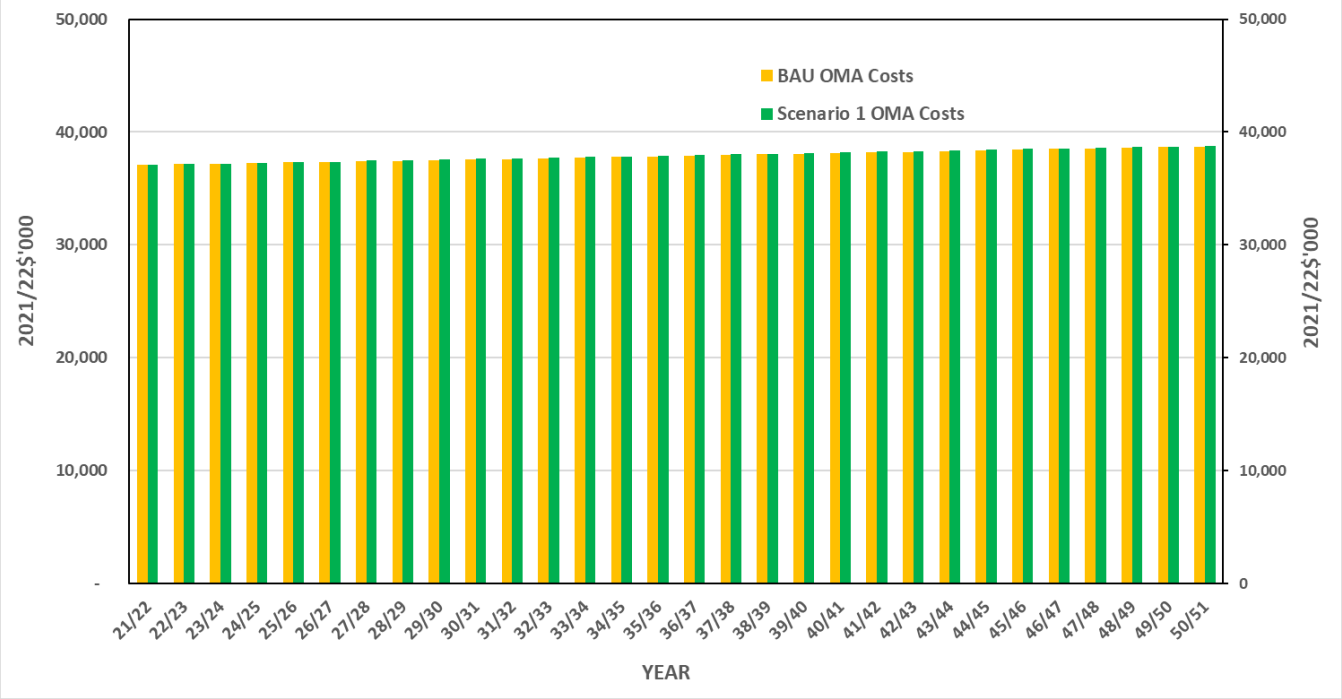


Figure 7-2: Comparison of 30-year OMA Costs – Water Supply

For sewerage services, identified IWCM issues do not require capital work solutions, hence, the IWCM scenario capital works program and OMA cost estimates are the same as the BAU scenario (refer to Figure 8-3 and Figure 8-4 in Section 8.1).

The operational and capital expenditure funding of Essential Water is generally managed as part of the overall budget allocations by the parent company (Essential Energy), and any net operating profit or loss by Essential Water also is absorbed by it. Therefore, EW does not separately maintain cash

reserves for the capital and operating expenses and is funded by the parent company on an 'as required' basis.

Developer charges for water supply and sewerage services generally constitute significant revenue stream to the water and sewer funds and are impacted by the future capital work expenditure for service level improvements and service extensions to future service areas. The developer charge, therefore, is an important input parameter in the financial model for TRB forecasts. Customer growth forecasts for the water supply and sewerage services in EW service areas are mainly through service extensions to infill developments and no new service areas are planned. Hence, no additional revenue contribution through developer charges has been considered for financial model forecasts.

7.2.1 TRB Forecasts for Water Supply Service

The water fund financial model has been developed with reference to the historic input details based on EW's 2019-20 and 2020-21 water income statements and has been set to reflect EW's pricing proposal submission to IPART. The water supply TRBs for the period 2022/23 to 2026/27 has been set the same as proposed in the IPART submission for both the BAU and the IWCM scenarios (Figure 7-3) EW can maintain the TRB of $990 p.a. (in 2021/22$) for all the remaining forecast years from 2027/28 onwards.

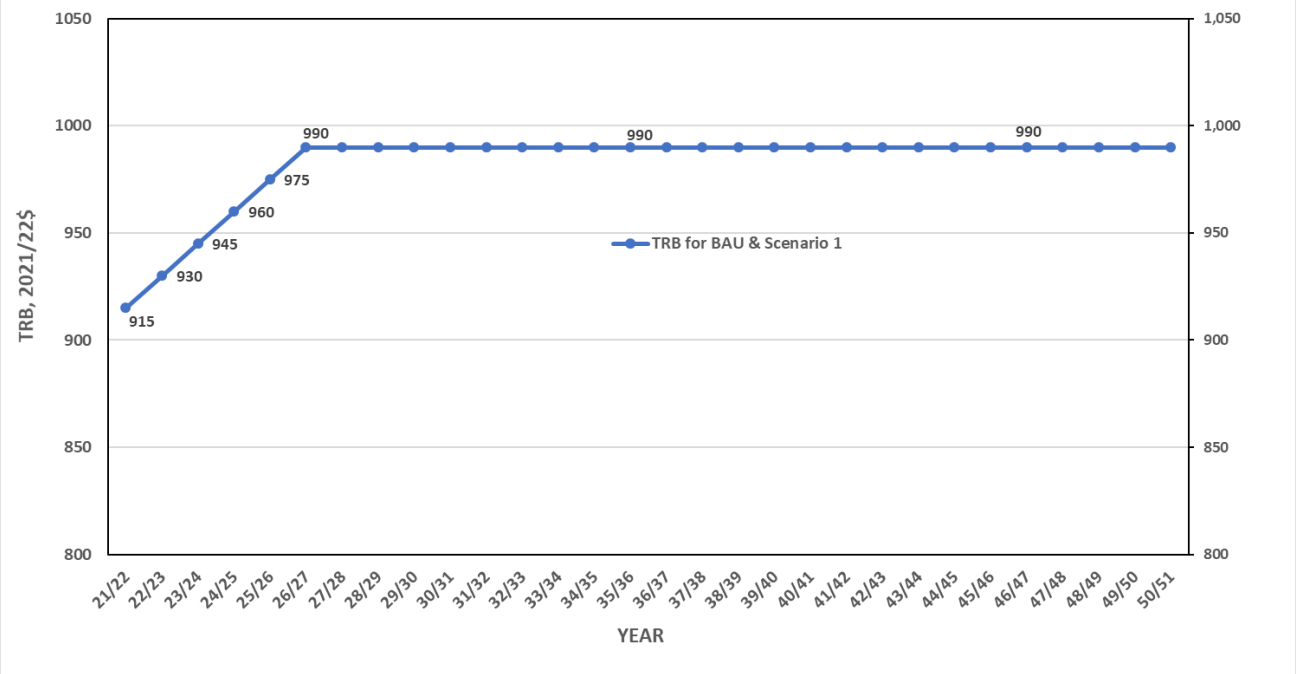


Figure 7-3: Comparison of TRB Forecasts for BAU and IWCM Scenarios – Water Supply

The model reveals that to maintain TRBs as forecast above, some of the planned capital works will required additional funding contribution by the parent company Essential Energy for both the BAU and the IWCM scenarios. Figure 7-4 compares the level of capital funding required from Essential Energy and the cumulative net operating cash levels for the BAU and the IWCM scenarios during the forecast period.

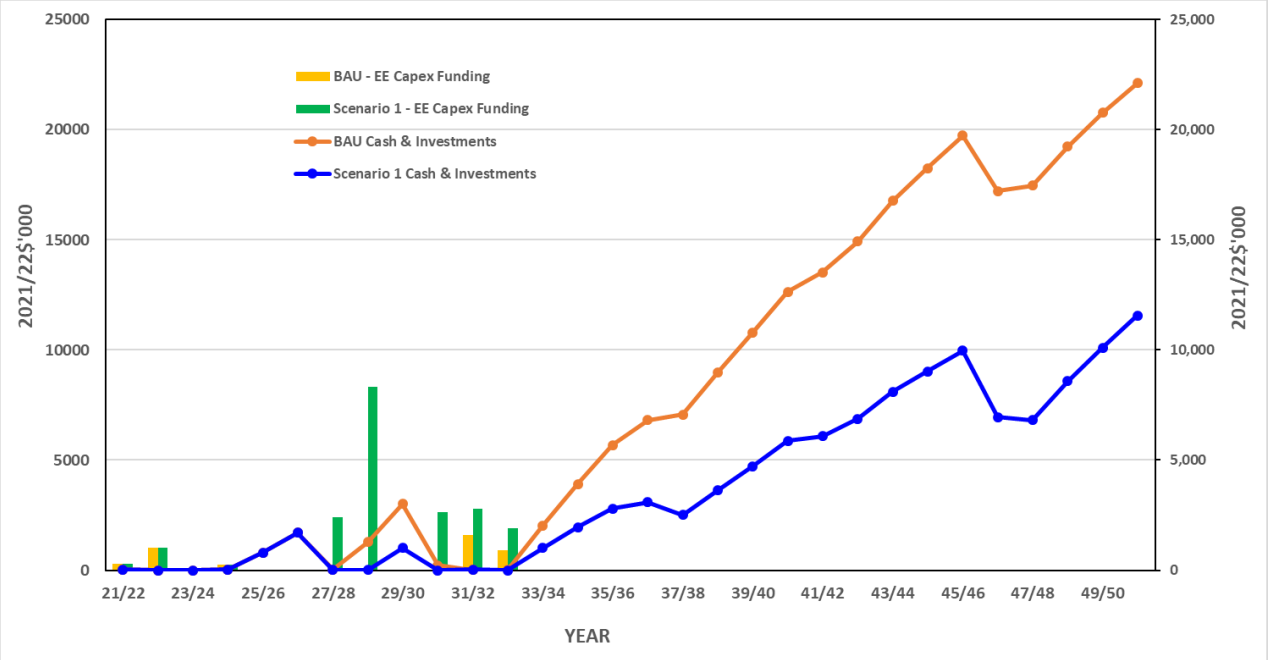


Figure 7-4: Comparison of EE Capital Funding & Cash Reserves – Water Supply

7.2.2 TRB Forecasts for Sewerage Service

The sewer fund financial model has been developed with reference to the historic input details based on EW's 2019-20 and 2020-21 sewer income statements and has been set to reflect EW's pricing proposal submission to IPART. As mentioned earlier, for sewerage services, identified IWCM issues do not require new capital work solutions that are not already in the BAU scenario. Hence, there is no separate IWCM scenario for sewerage services.

Sewerage TRBs for the period 2022/23 to 2026/27 has been set the same as proposed in the IPART submission (Figure 7-5). The model forecasts that EW can maintain the TRB of $609 p.a. (in 2021/22$) for all the remaining forecast years from 2027/28 onwards.

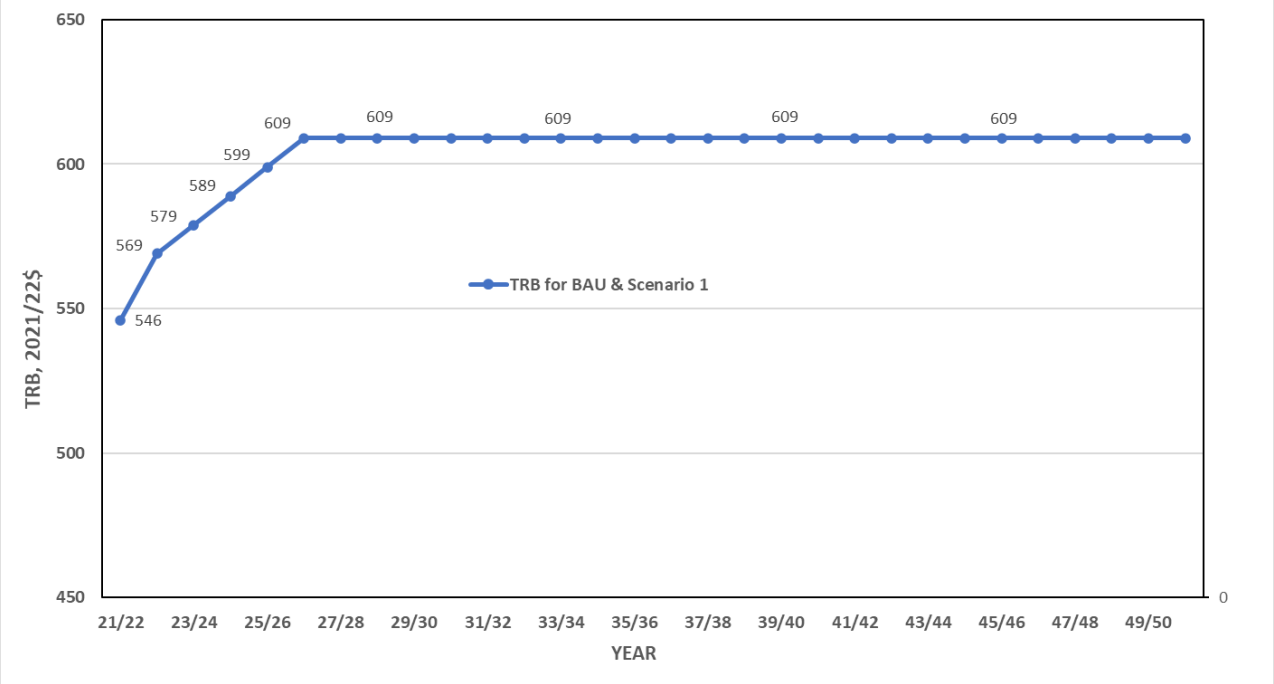


Figure 7-5: TRB Forecasts for BAU and IWM Scenarios - Sewerage

The model has considered $7,377 K government grant for the Wills Street WWTP capital upgrade work. At the proposed level of TRB in the IPART submission, additional capital funding from parent company, Essential Energy, to the tune of $20.5 Million over a 4-year period starting 2021/22 will be required. The level of capital funding required from Essential Energy and the cumulative net operating cash levels for the BAU scenario during the forecast period are shown in Figure 7-6.

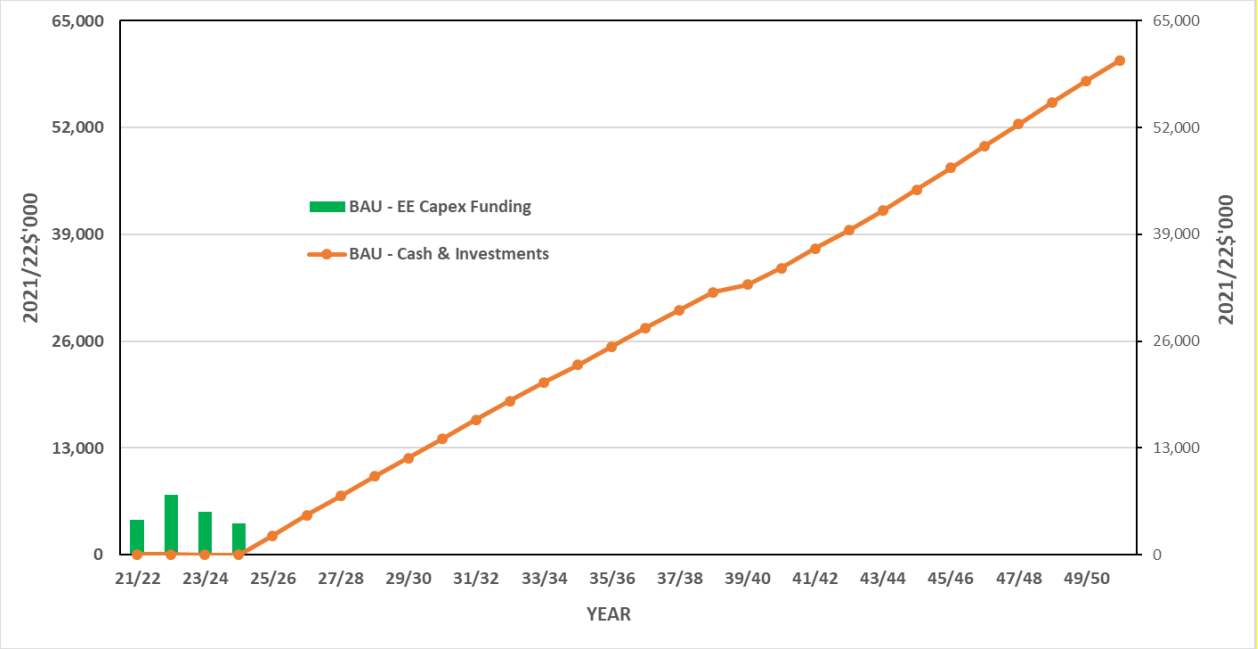


Figure 7-6: Comparison of Cash Reserves Forecasts for IWCM Scenarios – Sewerage

7.2.3 Combined Water and Sewerage Forecasts

A comparison of combined water and sewerage forecasts for the BAU and the IWCM scenarios for TRBs, Essential Energy contribution requirements and the accrued net cash levels during the forecast period is presented in Figure 7-7.

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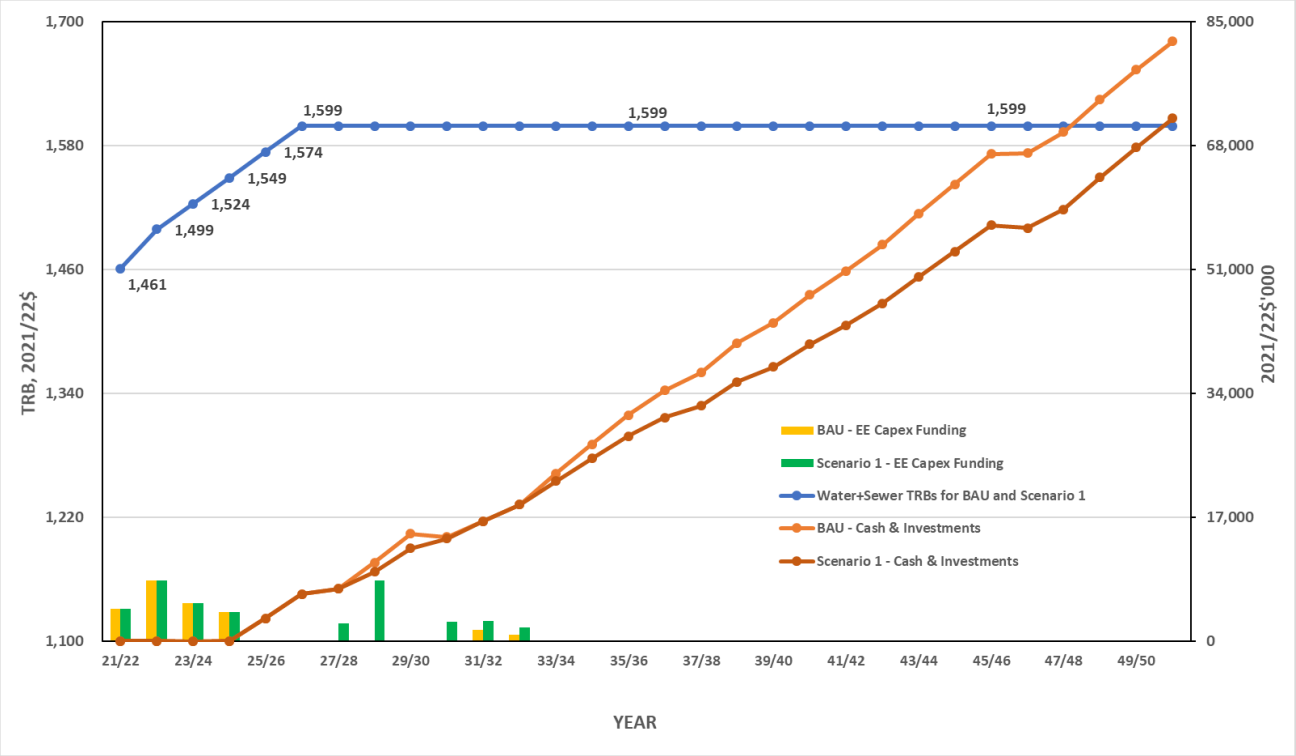

Figure 7-7: Comparison of Combined (Water + Sewerage) Forecasts

8. Total Asset management Plan

Total asset management plan (TAMP) provides the details of proposed capital works and recurrent operations, maintenance, and management (OMA) expenditure over a 30-year planning horizon) and is essential for managing infrastructure assets to meet the levels of service in the most cost-effective manner for the present as well as the future customers.

TAMP provides vital inputs to the Local Water Utilities to develop their long-term funding strategies by linking to a long-term financial plan. The financial plan identifies funds required to implement planned capital works and the recurrent expenditure at affordable levels of customer charges.

8.1 Capital Works

The preferred 30-year capital works program for the IWCM strategy builds upon the capital work expenditure proposed by EW in its IPART submission for the 2022-27 determination period. The program capital works satisfy the forecast service demands in terms of growth, improved levels of service and renewal and replacement of existing assets.

Growth works	Works required to increase the capacity of facilities, to extend service new developments and subdivisions etc.
Improved level of service works – Improved Level of Service (ILOS), including backlog works	Works to provide better public health and environmental standards, better service, higher reliability, or an extension of services to currently unserviced existing development. Works in this category may be eligible for Government grants.
Asset renewal	Renewal and replacement of existing assets which have aged and reached the end of their effective economic service life.

The adopted IWCM strategy develops the growth and ILOS capital works over the planning horizon based on the preferred options to address the identified IWCM issues. The water supply and sewerage renewal works schedule including assets with the end of remaining useful lives falling within the IWCM planning horizon as estimated for EW for long-term budget planning have been included in the 30-year capital works program (Table 8-1 and Table 8-2). Summaries of capital works program are shown in Figure 8-1 and Figure 8-3 for water supply and sewerage, respectively.

8.2 Recurrent Costs

Administration/ Management costs	Reflects true overheads associated with providing a service.
Operations and Maintenance (O&M) costs	It is assumed that the current level of costs shown in the historical financial statements reflect a realistic level of expenditure for the current schemes. The projections assume costs increase in proportion to growth.
Model cost overrides	Additional costs are included where specific activities have been identified for future years. This includes new initiatives, plus additional costs associated with new capital works identified as part of the adopted IWCM scenario.

Details of overrides include additional recurrent expenditure identified for future initiatives planned by EW and are as follows:

- Administration – as estimated and adopted by EW.
- Engineering and supervision – as estimated and adopted by EW.
- Operation and maintenance expenses – as estimated and adopted by the EW. Additional OM costs for the initiatives identified in the IWCM scenario also included.
- Energy costs – as estimated and adopted by EW.
- Chemical costs – as estimated and adopted by EW.
- Other expenses – as estimated by Council.
- Other revenue, grants, and contributions – bulk water supply revenues from mine customers, as estimated by EW.

Summaries of 30-year OMA cost forecasts for the preferred IWCM scenario is presented in Figure 8-2 and Figure 8-4 for water supply and sewerage services, respectively.

Table 8-1: 30-Year Capital Works Schedule for Water Supply – IWCM Scenario 1 (Preferred)

ITEMS	ILOS	GROWTH	RENEW	Total	1 2021/22	2 2022/23	3 2023/24	4 2024/25	5 2025/26	6 2026/27	7 2027/28	8 2028/29	9 2029/30	10 2030/31	11 2031/32	12 2032/33	13 2033/34	14 2034/35	15 2035/36	16 2036/37	17 2037/38	18 2038/39	19 2039/40	20 2040/41	21 2041/42	22 2042/43	23 2043/44	24 2044/45	25 2045/46	26 2046/47	27 2047/48	28 2048/49	29 2049/50	30 2050/51
Stephens Creek Pumping Station No. 4 Unit				**4,000**	**0**	**0**	**0**	**0**	**0**	**1,000**	**3,000**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
New Emergency PS	100%									1,000	3,000																						
Stephens Creek Reservoir Dam Wall Rehabilitation				**12,695**	**5**	**50**	**200**	**50**	**50**	**50**	**300**	**650**	**550**	**5,050**	**3,050**	**2,550**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**10**	**0**	**0**	**0**	**0**
SCR Dam Wall Safety Works			100%																														
Remove parapets			100%								250																						
Replace wave wall			100%									600																					
Embankment filter			100%										500																				
Training wall abutments	30%		70%											5,000																			
Southern Spillway supports	30%		70%												3,000																		
Northern Spillway supports	30%		70%													2,500																	
Stephens Creek - Minor equipment replacements			100%		5	50	50	50	50	50	50	50	50	50	50	50	10	10	10	10	10	10	10	10	10	10	10	10	10				
Tower isolation valve	100%						150																										
Mica Street Service Reservoir Replacement				**2,900**	**1,500**	**1,400**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Mica No. 3 Clear Water Tank Construction	100%				1,500	1,400																											
Rocky Hill Service Reservoirs - Replacement				**2,851**	**0**	**0**	**1,800**	**0**	**100**	**0**	**190**	**761**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Menindee Elevated Tank (Treated Water) - IWCM			100%								190	761																					
Silverton Tank Replacement			100%						100																								
Sunset Strip poly tanks			100%																														
Rocky Hill No. 1 - Steel (Treated Water)			100%				1,800																										
Service Reservoirs - Refurbishment				**6,360**	**60**	**0**	**0**	**2,100**	**740**	**60**	**0**	**500**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2,100**	**740**	**60**	**0**	**0**
Block 10 No. 4 - Steel (Treated Water)			100%					500	60																				500	60			
Hebbard Street - Steel (Treated Water)			100%						500	60																				500	60		
Wyman Street - Steel (Treated Water)			100%		60			500	60																				500	60			
Rocky Hill tank - Steel (Treated Water)			100%					500	60																				500	60			
Mica Street No. 2 - Steel (Treated Water)			100%					600	60																				600	60			
Blue Anchor Tank			100%									500																					
Menindee Water Treatment Plant Major Works				**12,076**	**47**	**15**	**15**	**15**	**15**	**55**	**2,081**	**8,078**	**15**	**15**	**305**	**115**	**15**	**15**	**15**	**155**	**65**	**15**	**15**	**15**	**555**	**110**	**15**	**15**	**15**	**55**	**65**	**15**	**15**	**135**
Menindee & SS WTP																																	
Minor equipment			100%		5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Civil buildings			100%													50					50					50							
Civil earthworks			100%		5																												
Mechanical pumps and motors			100%		5										200									200									
Mechanical pipes and fittings			100%		2						50					50				100					50					50			
Electrical			100%		5										50									300									100
Chemical systems			100%		5					20					20					20				20					20				
Telemetry			100%		5					20					20					20				20					20				20
Silverton Chlorinator			100%		5	5			5			5			5			5			5			5			5			5			5
Hebbard Street Tank Chlorinator			100%		5		5			5			5			5			5			5			5			5			5		
Wyman Street Tank Chlorinator			100%		5			5			5			5			5			5			5					5			5		
Silverton potable water supply (incl. pipeline replacement)	100%										2,016	8,063																					
Broken Hill Reticulation Replacement			100%	**36,275**	**715**	**790**	**840**	**890**	**940**	**990**	**1,040**	**1,090**	**1,140**	**1,190**	**1,240**	**1,290**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**	**1,340**
Reservoir General Works				**2,915**	**15**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Dams safety monitoring and civil replacements			100%		15	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bulk Water Transfer Pipelines			100%	**1,215**	**32**	**7**	**5**	**157**	**5**	**87**	**15**	**5**	**57**	**5**	**37**	**55**	**7**	**55**	**7**	**55**	**65**	**5**	**57**	**5**	**207**	**55**	**7**	**55**	**7**	**35**	**57**	**5**	**57**	**7**
Water Pumping Station Refurbishment / Overhauls			100%	**4,055**	**75**	**10**	**0**	**0**	**350**	**20**	**420**	**0**	**0**	**0**	**0**	**300**	**20**	**0**	**0**	**0**	**1,050**	**20**	**0**	**0**	**0**	**300**	**0**	**220**	**0**	**0**	**750**	**0**	**220**	**300**
Mica Street WTP Capital Works Program			100%	**9,865**	**925**	**1,655**	**205**	**205**	**390**	**385**	**350**	**50**	**50**	**50**	**650**	**50**	**50**	**100**	**250**	**650**	**550**	**50**	**50**	**50**	**250**	**50**	**50**	**100**	**350**	**2,150**	**50**	**50**	**50**	**50**
Other Works - Water				**3,500**	**20**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**	**120**
Buildings and Compounds General (CME)	50%		50%		20	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
GRAND TOTAL				**98,707**	**3,394**	**4,147**	**3,285**	**3,637**	**2,810**	**2,867**	**7,616**	**11,354**	**2,032**	**6,530**	**5,502**	**4,580**	**1,662**	**1,740**	**1,842**	**2,430**	**3,300**	**1,660**	**1,692**	**1,640**	**2,582**	**2,085**	**1,642**	**1,960**	**1,942**	**5,910**	**3,222**	**1,690**	**1,902**	**2,052**

Table 8-2: 30-Year Capital Works Schedule for Sewerage – IWCM Scenario 1 (Preferred)

					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
ITEMS	**ILOS**	**GROWTH**	**RENEW**	**Total**	**2021/22**	**2022/23**	**2023/24**	**2024/25**	**2025/26**	**2026/27**	**2027/28**	**2028/29**	**2029/30**	**2030/31**	**2031/32**	**2032/33**	**2033/34**	**2034/35**	**2035/36**	**2036/37**	**2037/38**	**2038/39**	**2039/40**	**2040/41**	**2041/42**	**2042/43**	**2043/44**	**2044/45**	**2045/46**	**2046/47**	**2047/48**	**2048/49**	**2049/50**	**2050/51**
Replacement of Wills Street WWTP				**35,755**	**7,035**	**10,070**	**12,070**	**5,070**	**40**	**40**	**50**	**50**	**80**	**50**	**50**	**50**	**50**	**100**	**50**	**50**	**50**	**50**	**100**	**50**	**50**	**50**	**50**	**100**	**50**	**50**	**50**	**50**	**70**	**80**
Wills Street WWTP - Replacement	50%		50%		7,000	10,000	12,000	5,000																										
Wills Street - Minor equipment			100%		10						10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Wills Street - Civil Buildings			100%		5													20					20					20					20	
Wills Street - Civil Tanks			100%		5																													
Wills Street - Mechanical			100%		5	30	30	30					30					30					30					30						30
Wills Street - Electrical & Controls			100%		5	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Wills Street - UV Plant			100%		5	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Sewer Reticulation Repair				**27,000**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**	**900**
Sewer Mains Renewal - Relining			100%		700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700	700
Sewer Mains (General)			100%		200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200	200
Sewer Pump Station Refurbishment / Overhauls			100%	**6,805**	**160**	**130**	**335**	**140**	**150**	**80**	**155**	**155**	**140**	**150**	**80**	**155**	**155**	**140**	**150**	**80**	**155**	**155**	**1,225**	**315**	**80**	**505**	**505**	**315**	**315**	**280**	**155**	**155**	**140**	**150**
South Wastewater Treatment Plant				**3,380**	**20**	**20**	**520**	**2,420**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**100**	**0**	**0**	**0**	**0**	**0**	**0**
South WWTP - Convert to Pumping Station	50%		50%				500	2,400																										
South WWTP - Pipeline to Wills Street WWTP	100%																																	
South SPS - Civil/Mech/Elect			100%		20	20	20	20					100					100					100					100						
Other Works - Sewer				**120**	**120**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Other Works			100%		120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GRAND TOTAL				**73,060**	**8,235**	**11,120**	**13,825**	**8,530**	**1,090**	**1,020**	**1,105**	**1,105**	**1,220**	**1,100**	**1,030**	**1,105**	**1,105**	**1,240**	**1,100**	**1,030**	**1,105**	**1,105**	**2,325**	**1,265**	**1,030**	**1,455**	**1,455**	**1,415**	**1,265**	**1,230**	**1,105**	**1,105**	**1,110**	**1,130**
		Grant/ Subsidy for Will St WWTP		**7,377**	**300**	**300**	**5,250**	**1,527**																										

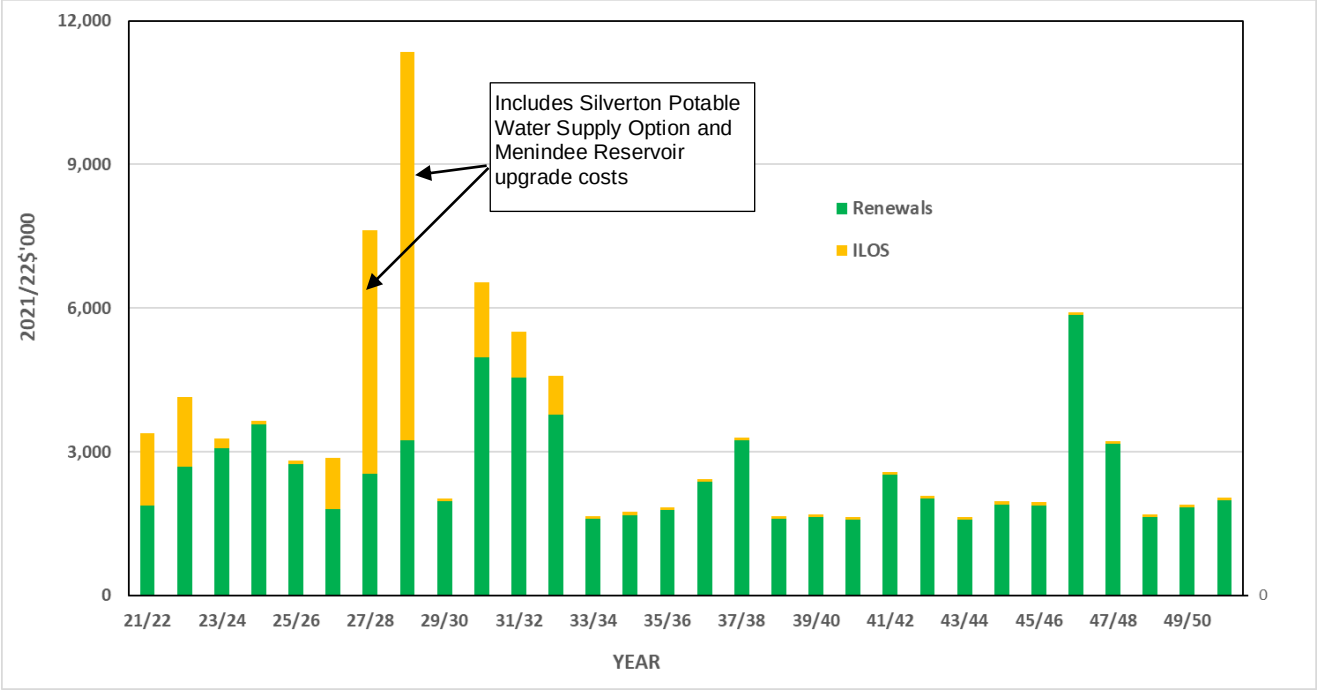

Figure 8-1: 30-year Capital Works Summary – Water Supply ($'000)

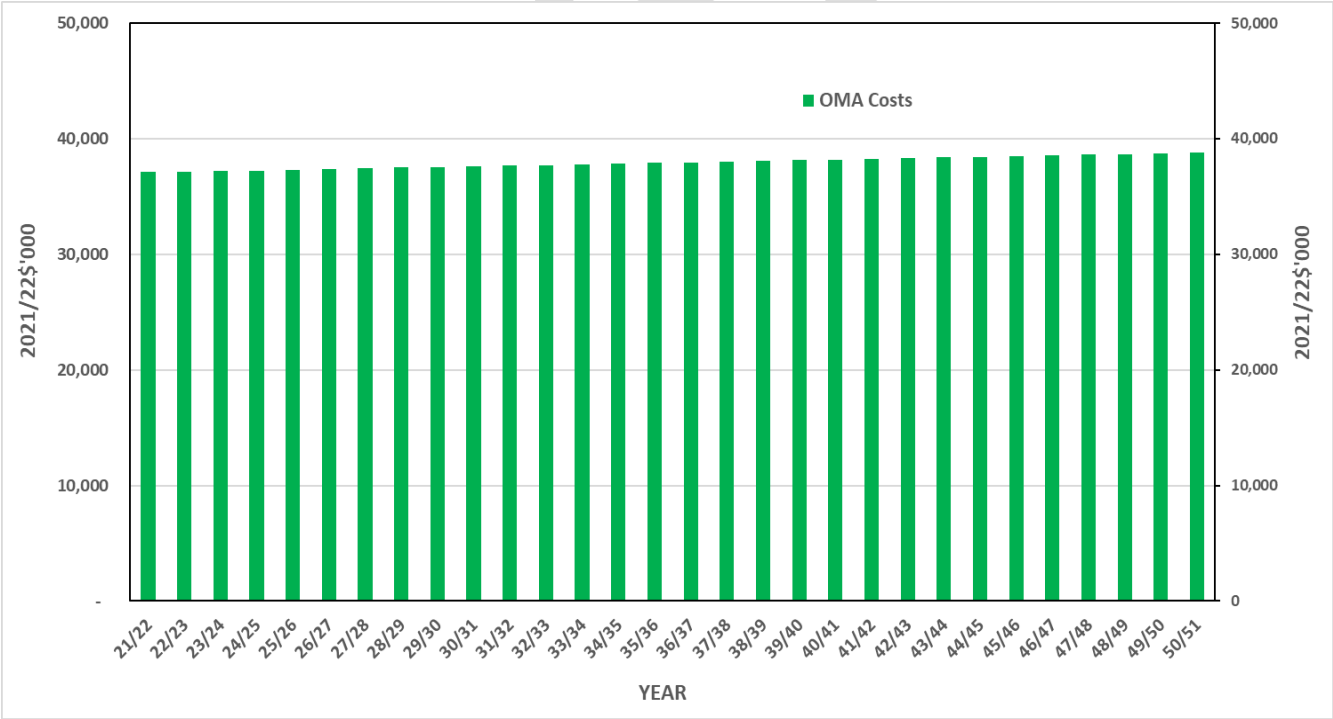

Figure 8-2: 30-year Recurrent O&M Expenditure Summary – Water Supply ($'000)

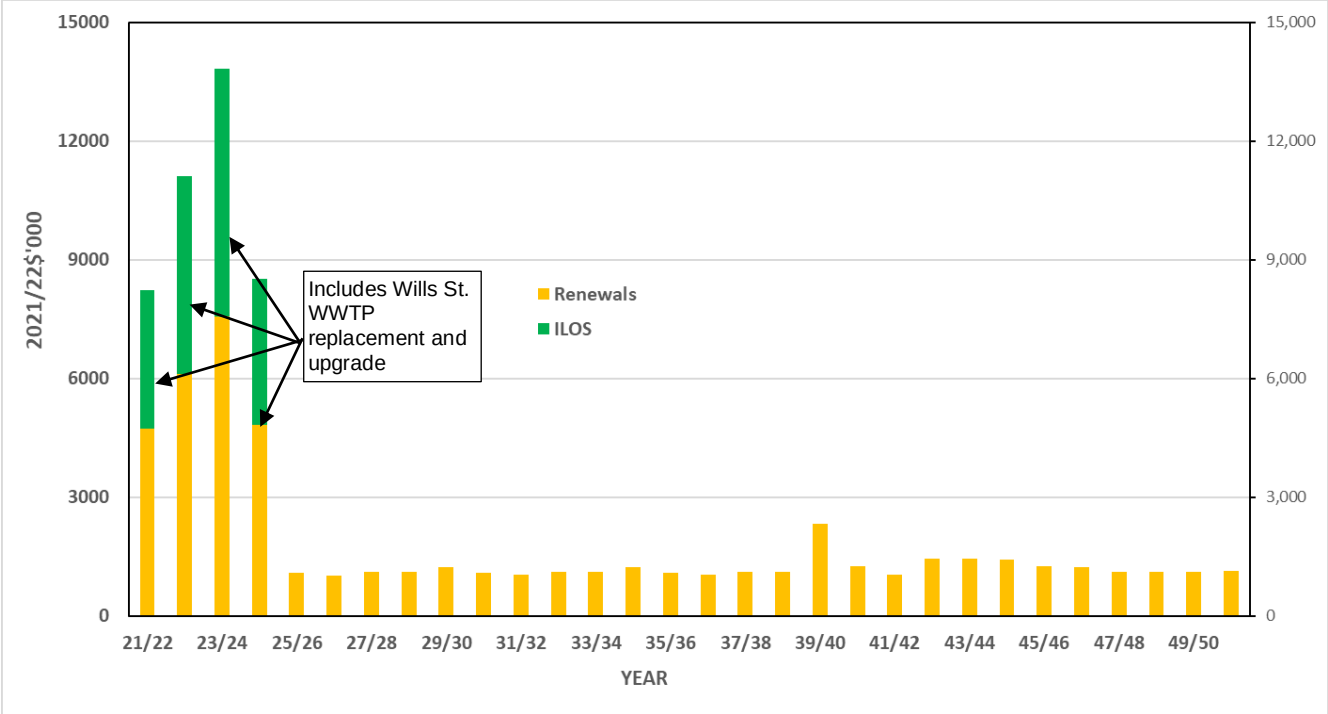

Figure 8-3: 30-year Capital Works Summary – Sewerage

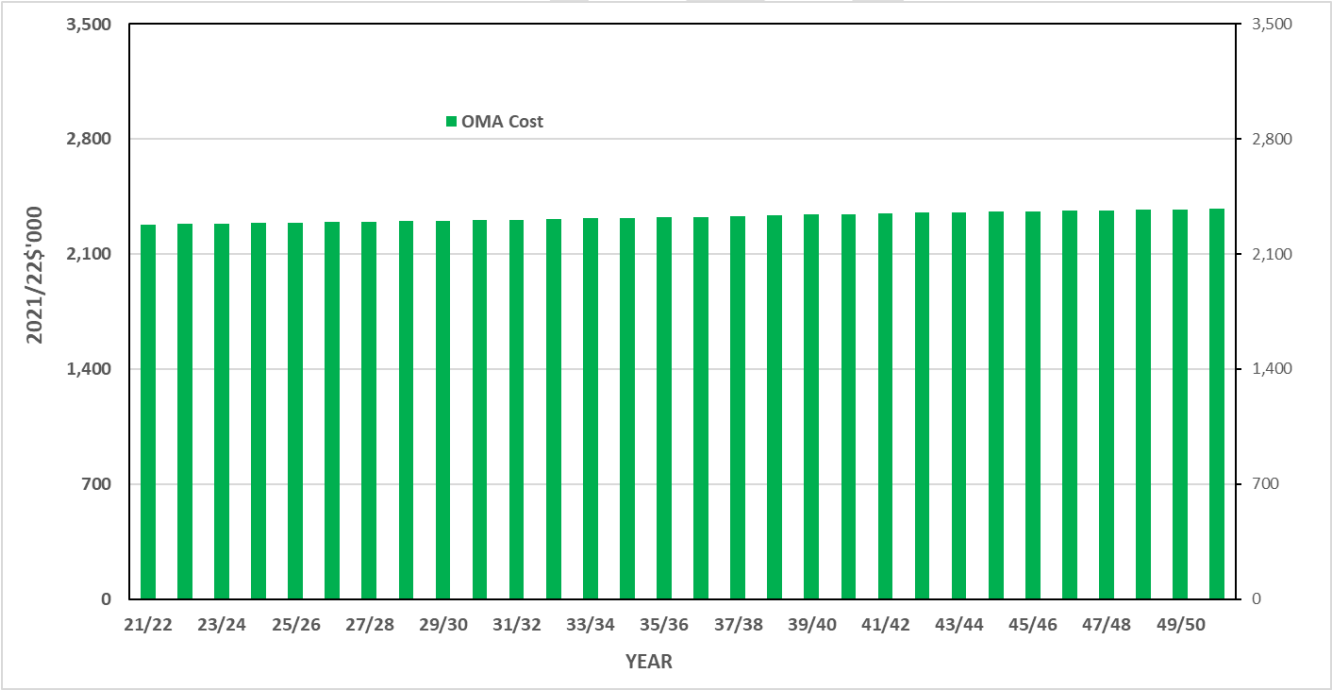

Figure 8-4: 30-year Recurrent O&M Expenditure Summary – Sewerage

9. Financial Plan

9.1 Overview

This section presents the details of long-term financial plans for water supply and sewerage services for preferred IWCM scenario (scenario 1). The overall goal of financial planning is to determine the lowest, sustainable price path for the water supply and sewerage services on which to base Council's tariff structure. The details of assumptions, input data and output financial projections for the adopted IWCM capital works and growth are presented in this plan. The plan also presents the sensitivity of financial projections to possible changes in key model variables.

9.2 Financial Modelling Methodology

FINMOD 4.0, the software developed by the Department of Planning, Industry and Environment - Water (DPIE Water) was used to develop the financial models. For a particular Level of Service (LOS), FINMOD enables an examination of a range of funding options to determine the best mix of borrowing and internal funding.

A stable level of annual residential charges for water supply and sewerage services has been achieved using Finmod by optimising the long-term funding strategy in meeting the demands of the capital works program and day-to-day operations, while ensuring a minimum level of cash liquidity. The financial models have been developed for a 30-year planning horizon.

The financial model balances the forecast income and expenditure for each service delivery option over the projected modelling period. Figure 9-1 illustrates the main elements which affect the financial modelling.

The goals of the financial modelling task are to:

- optimise the long-term funding strategy;
- meet the demands of the capital works program and other life cycle costs of the system assets;
- ensure a minimum level of cash liquidity; and
- provide a forecast of the average residential annual charges over the long- term.

The long-term financial plans demonstrate the sustainability of future actions and also demonstrate the sensitivity of model outcomes to some of the key assumptions made.

Funding is usually achieved from a mix of borrowing and direct revenue and can also be offset by receiving Government grants and subsidies where available.

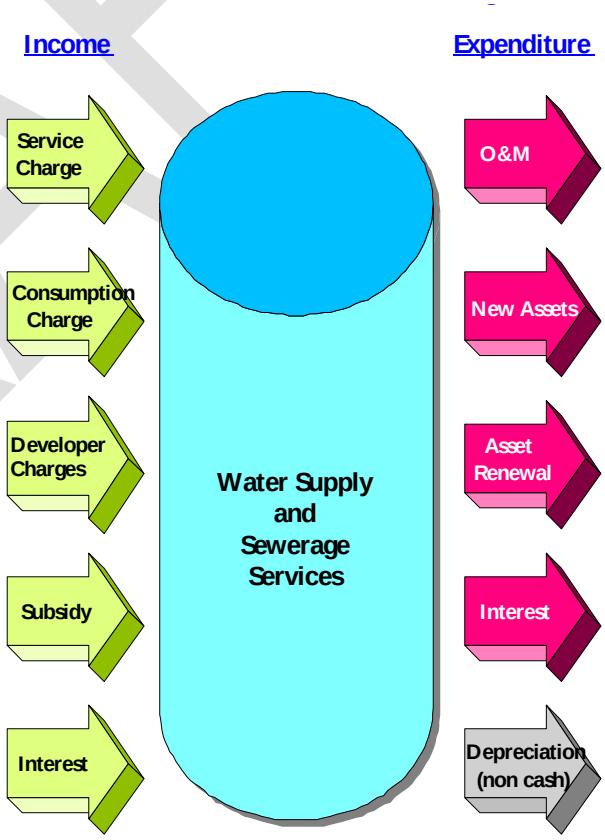

Figure 9-1 – Elements of Financial Modelling

Renewal programs would usually be funded from revenue, and some cash would be accumulated in anticipation of major projects, in order to reduce the need for borrowing. DPIE - Water encourages the use of long-term loans because they support the idea of intergenerational equity, and thereby reduce the demand for funds in the short term.

If the resulting annual charges are considered unacceptable or unaffordable, some input variables, such as levels of service, can be adjusted to arrive at a satisfactory projection of annual charges. For example, to reduce the level of annual charges, the LWU may delay some of the capital works, may increase developer charges, or may take long-term or structured loans. LWU's charging and pricing policies will also take into account corporate policies, approach to risk and the acceptability of charges to the community. Some of these risks are evident from the sensitivities presented in this plan.

While the preferred model reflects the expected performance of the systems, it does not give any indication of the sensitivity of the proposed solution should the basic assumptions used prove significantly different in practice.

For that reason, a sensitivity analysis is carried out if it is perceived that a variable may change significantly in the future. The value of a sensitivity analysis is that it shows:

- The sensitivity of the results to assumptions (uncontrollable variables); and
- The impact of changing controllable variables.

The DPIE Water Guidelines suggest that a number of sensitivities should be carried out to test the robustness of the plan. With regards to controllable variables, such as type of loan structure, and level of developer charges, the model enables Council to make decisions to establish the most appropriate management policies.

With uncontrollable variables, the LWU is at the mercy of change. The downside risk of an increase in interest rates, or lower than expected growth rates, or rise in energy costs, may be significant.

LWU's charging and pricing policies will also take into account corporate policies, approach to risk and the acceptability of charges to the community. Some of these risks are evident from the sensitivities presented in this section.

On-going Review

Over time, changes in model variables can have a significant impact on the model's accuracy, and this has implications for forward planning. It is recommended that the models be reviewed annually, and the financial planning be revisited regularly, preferably on a 3-yearly basis. If Council has an active capital works program that requires grant or subsidy, annual updates are recommended by DPIE Water.

9.3 Financial Model Inputs

Several variables and assumptions have been used in the development of the base case of the water and sewer fund financial models (Table 9-1 and Table 9-2). The model assumptions are based on a representative view of the impact of several factors and have been grouped into five main policy areas.

1. Revenues
2. Expenditures
3. Service Provision
4. Funding Capital Works
5. Performance Measures

The financial model variables are summarised in Table 9-1 and Table 9-2 and are discussed below.

Table 9-1: Key Input Parameters – Water Fund Financial Model

	Input Data/ Assumption
Historical Data	Essential Water's water fund income and expenditure budgets for 2019-20 and 2020-21. Note: Essential Energy, the parent organisation, maintains the cash reserves of the water supply and sewerage operations and manages capital works funding of Essential Water. Input data and assumptions for the setting up of financial model has been made in this context.
Financial Data	Average annual long-term inflation rate: 2.5% p.a. Annual Investment Interest Rate: 5.5% p.a. (default) – 0.0% p.a. adopted Annual Borrowing Interest Rate: 6.5% p.a. (default) – 3.0% p.a. adopted
Demographic Base Data (2020-21)	No. of Residential Assessments: 9,409 (1712 vacant/unoccupied) No. of Non-Residential Assessments: 798 Pensioner Assessments: 2602 (27.6%) Assessment Growth Rate – As forecast for IWCM strategy development At the adopted levels of growth rate, an average 15 new customers per year across the EW's service areas have been estimated to be connecting to water supply services. All forecast growth is through infill developments.
Opening Balances (as of June 2021)	Outstanding Loan: Nil Total Cash and Investments: Nil Minimum cash and investment (for modelling): $5 Million Term of new loans: 20 years
Revenue Splits	From 2021-22 onwards – 76.5%: 23.5% (Residential: Non-residential)
Current Charges (2021-22)	Access Charge: $343 p.a. (20mm meter size) Usage Charge: $1.88 per KL
	Typical Residential Bill (TRB) 2021-22: $915 p.a. (Based on an estimated average residential consumption of 304 KL/year)
	No Sec.64 Developer Charges for water services. All forecast growth is through infill developments; hence no DC revenue is expected throughout the forecast period.

* - For larger than 20 mm meter size water connections, the annual access charges increase by the square of the proportion of larger meter sizes to 20 mm. Refer to the current approved IPART pricing determination details.

Table 9-2: Key Input Parameters – Sewer Fund Financial Model

	Input Data/ Assumption
Historical Data	Essential Water's sewer fund expenditure budgets (derived as a % of total water and sewer operating expenditure) and the sewer income budgets for 2019-20 and 2020-21. Note: Essential Energy, the parent organisation, maintains the cash reserves of the water supply and sewerage operations and manages capital works funding of Essential Water. Input data and assumptions for the setting up of financial model has been made in this context.
Financial Data	Average annual long-term inflation rate: 2.5% p.a. Annual Investment Interest Rate: 5.5% p.a. (default) – 0.0% p.a. adopted Annual Borrowing Interest Rate: 6.5% p.a. (default) – 3.0% p.a. adopted
Demographic Base Data (2020-21)	No. of Residential Assessments: 9,217 (1,748 vacant/unoccupied) No. of Non-Residential Assessments: 768 Pensioner Assessments: 2129 (22.99%) Assessment Growth Rate – As forecast for IWCM strategy development At the adopted levels of growth rate, an average 15 new customers per year across the Council's service areas have been estimated to be connecting to water supply services. All forecast growth is through infill developments in Broken Hill.
Opening Balances (as of June 2021)	Outstanding Loan: Nil Total Cash and Investments: Nil Minimum cash and investment (for modelling): $2.5 Million Term of new loans: 20 years
Revenue Splits	From 2021/22 onwards – 74.8%: 25.2% (Residential: Non-residential)
Current Charges (2021-22)	Residential: Availability Charge (Vacant): $560 p.a. Availability Charge (Occupied): $560 p.a. Non-residential: Availability Charge (Vacant): $623.45 p.a. Availability Charge (Occupied – 20mm): $624 p.a. Usage Charge: $1.37 per KL
	No Sec.64 Developer Charges for sewerage services. All forecast growth is through infill development; hence no DC revenue is expected throughout the forecast period.

* - For larger than 20 mm meter size water connections, the annual access charges increase by the square of the proportion of larger meter sizes to 20 mm. Refer to the current approved IPART pricing determination details.

9.3.1 Revenue

Charging Structure

The projection of typical residential bills (TRBs) for water supply and sewerage for the first five forecast years have been set to reflect EW's pricing proposal submission to IPART and are in real (2021-22) dollars. The forecast TRBs should be increased in line with the CPI (consumer price index) on an annual basis.

Bulk Water Supply Revenue

Bulk water supply revenue of an average $5.65 Million per year for supply of raw water to mines has been considered.

9.3.2 Expenditure

Capital Works

The capital work expenses form a significant component of the inputs. The capital works program adopted for financial modelling includes all the capital works for the preferred IWCM Scenario as incorporated in the 30-year Total Asset Management Plan (refer to Section 8.1).

Recurrent Costs

The financial models for water supply and sewerage consider a number of ongoing recurrent costs from historic input details. By default, the model increases historical operation and maintenance expenses pro-rata assessment growth. This has been overridden where Council has provided revised estimates, for example, where the IWCM action plan requires new initiatives or where new works require additional operating resources as described in Section 8.2.

9.3.3 Service Provision

Growth Projections

The assessment growth forecast for the IWCM strategy development has been used for the financial forecasts. At the adopted levels of growth rate, an average 15 new customers per year across the EW's service areas have been estimated to be connecting to water supply and sewerage services.

The growth has been assumed to occur only in Broken Hill through infill developments. The same growth rates have been adopted for water supply and sewer fund models.

Expected life of assets

The default average life of the system assets is based on the weighted average of long-lived structures and shorter-lived mechanical plant. These average lives of system assets adopted by Essential Water for its IPART submission have been used. For new systems assets, the useful lives are 98 years and 89 years for water and sewerage respectively.

Depreciation is a non-cash expense, which is dependent upon asset lives. The age of assets directly affects the level of future asset renewal works, which are part of the capital works program.

9.3.4 Funding Capital Works

Some, or all, capital works can be funded directly from accumulated cash reserves. To overcome intergenerational equity issues, it is a general practice to fully fund renewal programs out of internally generated cash (where practicable) and to borrow only for funding new capital acquisitions.

Funds which are surplus to requirements can be used to further reduce or eliminate borrowing requirements, and to reduce interest payments.

Loans are taken out as required to maintain the adopted minimum cash levels for the water and sewer funds.

Subsidies/Grants for Capital Works

Financial assistance in the form of grants for capital works may be received under various funding programs by the State and Federal Governments such as the Restart NSW or the National Stronger Regions Fund (NSRF). The Program's guidelines, published by the Department of Primary Industries and Infrastructure NSW and Commonwealth Department of Infrastructure and Regional Development, define the extent of the available grants/ subsidies.

The financial model for the water fund has not considered any State Government grant/ subsidy for any of the planned capital works over the 30-year planning horizon.

The financial model for the sewer fund has considered that Government grant/ subsidy of $7.337 Million for the Wills Street WWTP will be available.

9.4 Assumptions and Limitations of the Model

The projections of the financial models are mainly based on the previous two years historical financial records. Allowance is made for new initiatives, future rate forecasts, and maintenance of sustainable Levels of Service (LOS) as identified and adopted by Council.

The net operating results in the financial projections should be seen in light of the fact that the depreciation shown in the operating statement is not a cash item. The financial model manages the cash flow and keeps a running tally of the cumulative depreciation so that the LWUs can appreciate the potential future liability for maintaining the value in the system and the LOS. By forward planning and making optimum use of existing assets, a more cost effective and efficient service should result.

Typical Residential Bills are used as the performance indicators representing overall revenue requirements from residential customers. This should not be confused with the pricing structure. Pricing, that is, the distribution of charges according to consumption or special customer groups, is the subject of a separate revenue planning exercise. Tariff structure for the services will need to take into account corporate policies, approach to risks such as lower than adopted growth rates, increase in interest rates, and the acceptability of charges to the community.

Financial model is not a substitute for normal budgeting, (i.e., short-term financial planning). The model assumes that all expenses and income occur at the beginning of the year and it is therefore not appropriate to track cash flow throughout the year. It is important, however, to align the budgeting process within the framework of the long-term financial plan.

The Total Asset Management Plan (refer to Section 8) shows the long-term capital, operational and maintenance expenditures used in the models for projecting the financial position over the next 30 years. Models will require updating as more accurate expenditure schedules become available.

9.5 Financial Model Outcomes – Water Supply

9.5.1 Projected Financial Position

All costs and revenues in the input data and the model outcomes are in 2021-22 dollars unless stated otherwise. The first year of model projections is 2021-22 and CPI should be applied to the forecasts accordingly. The financial projections should be reviewed annually with respect to material changes to the proposed capital works program and/or to any of the underlying assumptions.

The preferred IWCM scenario of the water fund financial model does not consider any Government grant or subsidy for any of the planned capital works.

The water supply TRBs have been set to reflect EW's pricing proposal for the 5-year period from 2022/23 to 2026/27 submitted to IPART. The model forecasts demonstrate that EW can maintain the TRB of $990 p.a. for all the remaining forecast years from 2027/28 onwards. The Typical Residential Bill (TRB) forecasts by the model for the next 30 years is presented in Figure 9-2 below.

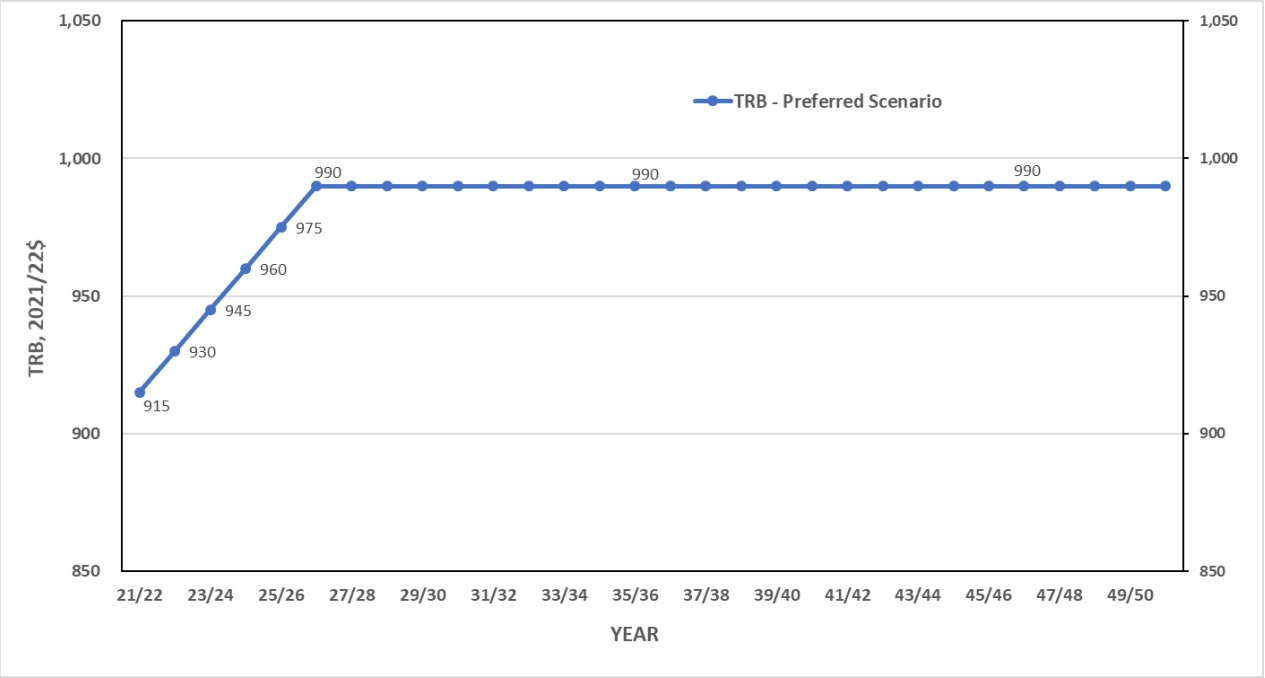

Figure 9-2: Typical Residential Bill for Water Supply

Essential Energy, the parent organisation, maintains the cash reserves of the water supply operations and manages capital works expenditure of Essential Water by way of contributing funds as required. Hence, the financial model forecasts have been made to present the level of additional funding required to be contributed by Essential Energy for the planned capital works as borrowings by EW. The model considers that all such additional capital funding as borrowing to be repaid by EW over a 20-year period at an interest rate of 3% p.a.

The model also considers that net revenues accumulated over the forecast period will also be retained by the parent organisation. The cumulative net operating revenue from water supply operations of EW is shown as cash and investments.

The projected level of capex funding by the parent organisation (Essential Energy) and the cumulative cash and investments at the end of each forecast year are presented in Figure 9-3.

More detailed financial forecast output data for water fund are presented in Appendix E.

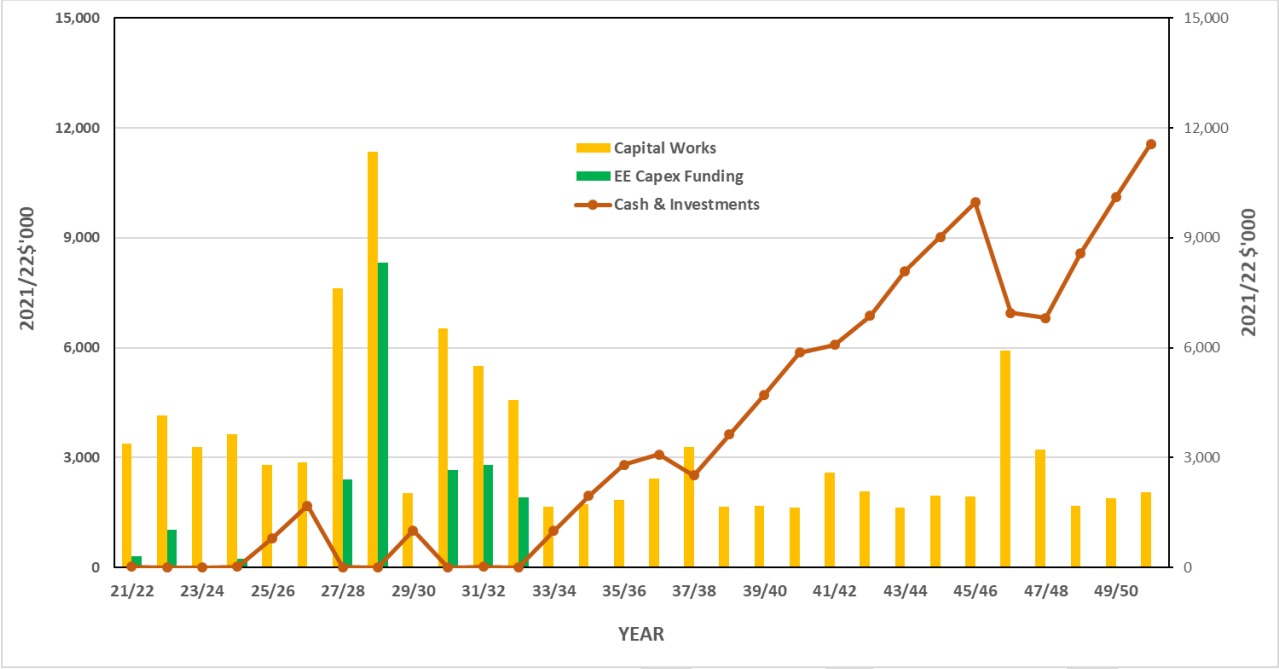

Figure 9-3: Cash & EE Funding Projections - Water Supply

9.5.2 Sensitivity of Financial Projections

Sensitivity of the model forecasts were analysed for higher than estimated capital costs of future capital works. The impact the water supply TRB forecasts, EE funding requirements and cash levels as summarised in Table 9-3 and in Figure 9-4 and Figure 9-5.

Table 9-3: Sensitivity Analysis – Water Fund

Sensitivity	Values of Variables for Analysis	Effect on Forecasts compared to the Preferred Scenario
Higher capital work costs	Estimated costs of capital works during the planning period increase by 20%	The TRB after the IPART determination period needs to be increased by $70 to $1,060 p.a. in 2027-28 and to be maintained at that level for the remainder of the forecast period. Will also require an additional capex funding by Essential Energy, the parent organisation.

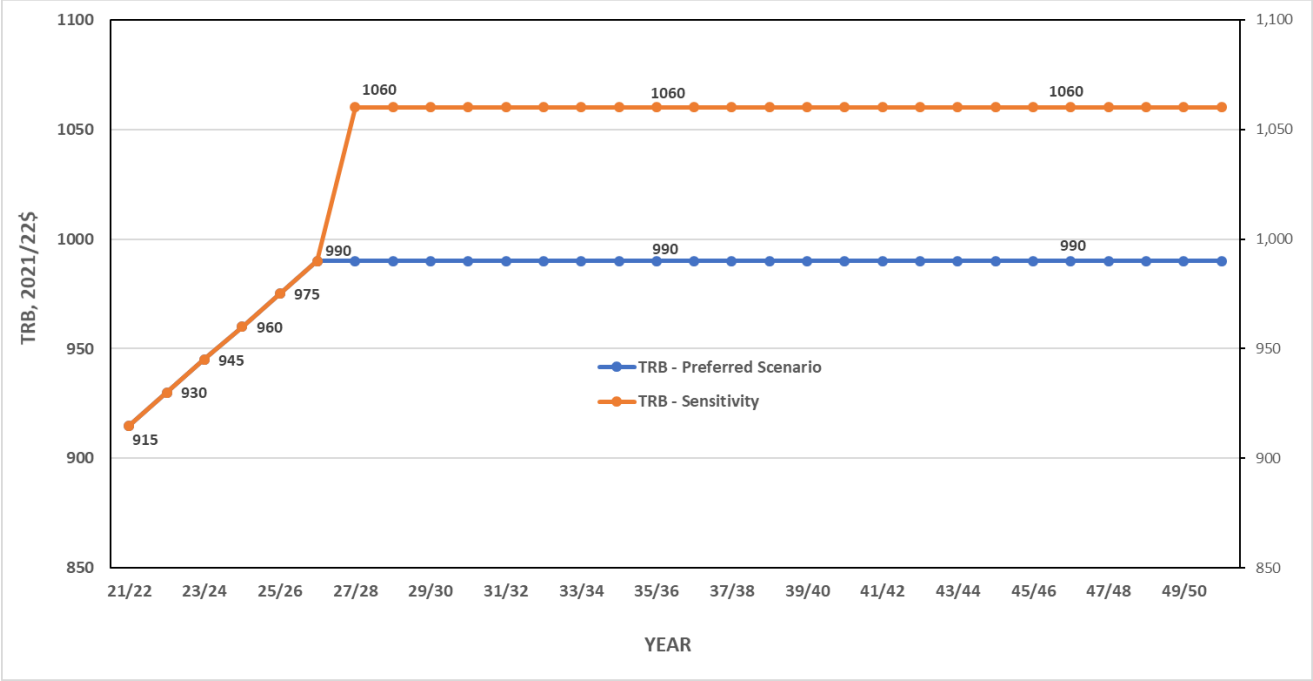

Figure 9-4: Sensitivity of TRBs - Water Supply

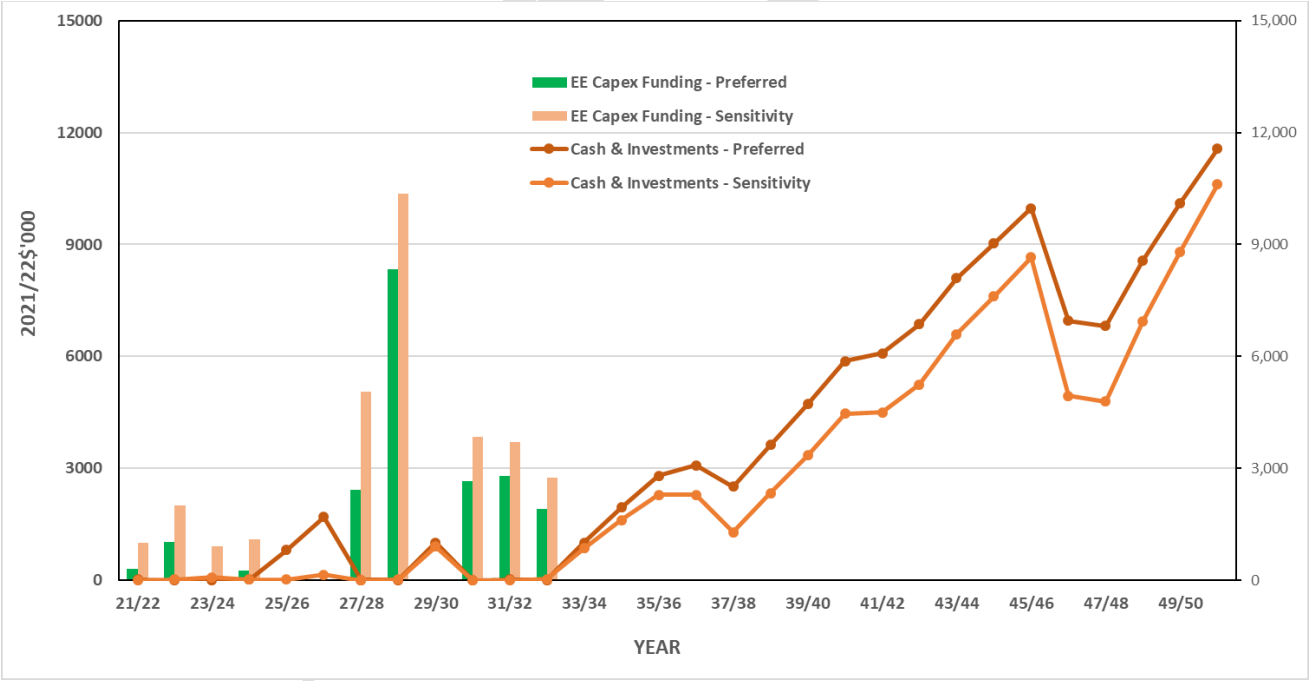

Figure 9-5: Sensitivity of EE Funding & Cash and Investment Levels - Water Supply

9.6 Financial Model Outcomes – Sewerage

9.6.1 Projected Financial Position

All costs and revenues in the input data and the model outcomes are in 2021-22 dollars unless stated otherwise. The first year of model projections is 2021-22 and CPI should be applied to the forecasts accordingly. The financial projections should be reviewed annually with respect to material changes to the proposed capital works program and/or to any of the underlying assumptions.

The IWCM scenario of the sewer fund financial model considers a Government grant of $7.337 Million for the Wills Street WWTP.

The sewerage TRBs have been set to reflect EW's pricing proposal for the 5-year period from 2022/23 to 2026/27 submitted to IPART. The model forecasts demonstrate that EW can maintain the TRB of $609 p.a. for all the remaining forecast years from 2027/28 onwards. The Typical Residential Bill (TRB) forecasts by the model for the next 30 years is presented in Figure 9-6.

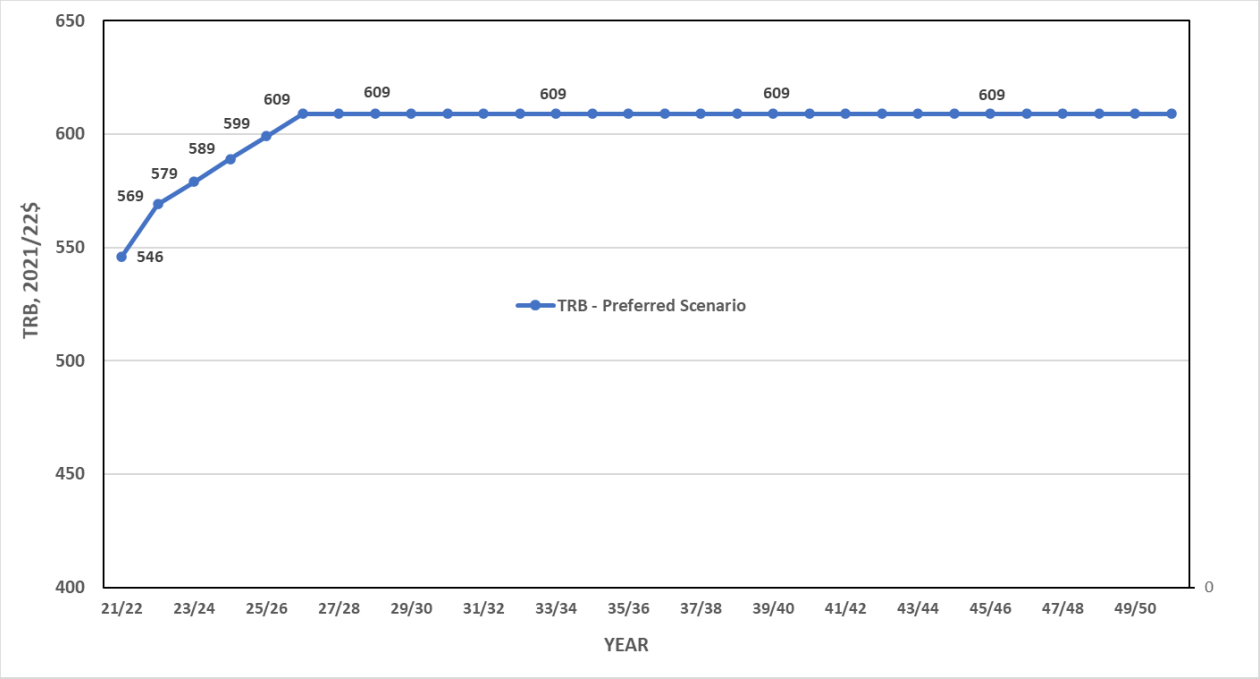

Figure 9-6: Typical Residential Bills for Sewerage

Essential Energy, the parent organisation, maintains the cash reserves of the wastewater operations, and manages capital works expenditure of Essential Water by way of contributing funds as required. Hence, the financial model forecasts have been made to present the level of additional funding required to be contributed by Essential Energy for the planned capital works as borrowings by EW. The model considers that all such additional capital funding as borrowing to be repaid by EW over a 20-year period at an interest rate of 3% p.a.

The model also considers that net revenues accumulated over the forecast period will also be retained by the parent organisation. The cumulative net operating revenue from wastewater operations of EW is shown as cash and investments.

The projected level of capex funding by the parent organisation (Essential Energy) and the cumulative cash and investments at the end of each forecast year are presented in Figure 9-7.

More detailed financial forecast output data for sewer fund are presented in Appendix F.

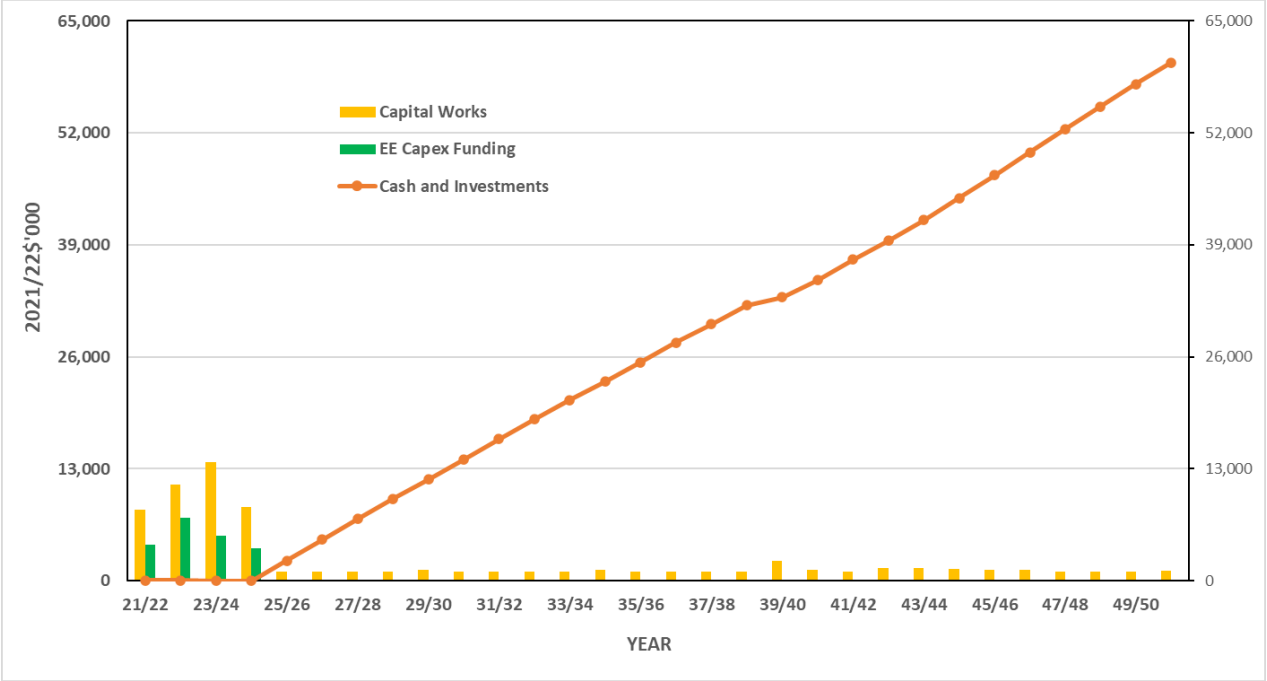

Figure 9-7: Cash & EE Funding Projections - Sewerage

9.6.2 Sensitivity of Financial Projections

Sensitivity of the sewer fund model forecasts were analysed for lower growth rates and the impact on the sewerage TRB forecasts as summarised in Table 9-4 and in Figure 9-8.

Table 9-4: Sensitivity Analysis – Sewer Fund

Sensitivity	Values of Variables for Analysis	Effect on Forecasts compared to the Preferred Scenario
Higher capital work costs	Estimated costs of capital works during the planning period increase by 20%	No impact on the TRB after IPART determination period. However, increase in additional capex funding by Essential Energy, will be required during the first 5-year period.

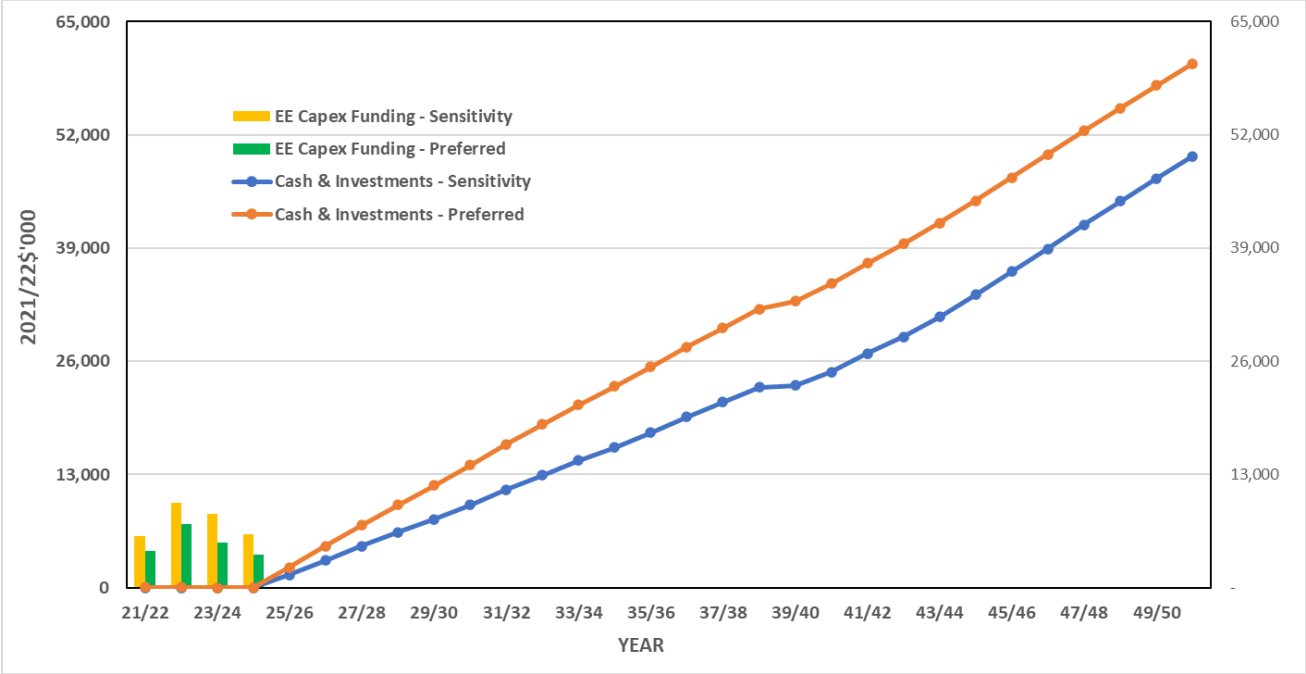

Figure 9-8: Sensitivity of EE Funding & Cash and Investment Levels - Sewerage

Appendix A Bulk supply agreement between Essential Water and Water NSW

Appendix B Customer Charter

Appendix C Customer Notification - Non-potable supply

Appendix D Costing of IWCM options

D.1 Silverton Non-potable Supply

Broken Hill to Silverton

ITEM	DESCRIPTION	[UNIT]	[QTY]	[RATE]	AMT	PRESENT WORTH ($K)			2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
				$ / Unit	$K	4%	7%	10%																																
Pipe cost (supply and lay)																																						
	Broken Hill to Silverton PE 110mm	m	28806	$ 135	$ 3,900	$2,964	$2,429	$2,001	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 3,900	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Silverton reticulation PE 110mm	m	7000	$ 180	$ 1,260	$958	$785	$647	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,260	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Services																																						
	Customer connections	each	51	$ 2,047	$ 104	$79	$65	$54	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 104	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pumping Stations																																						
	Broken Hill 10 kW	Item	1	$ 68,000	$ 68	$52	$42	$35	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 68	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Chlorinator																																						
	Silverton	Item	1	$ 80,000	$ 80	$61	$50	$41	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 80	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Chlorination monitoring system																																						
	Silverton	Item	1	$ 80,000	$ 80	$61	$50	$41	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 80	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Reservoir																																						
	0.4 ML	Item	1	$ 968,000	$ 968	$736	$603	$497	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 968	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Prime Costs					**$6,461**	**$4,910**	**$4,023**	**$3,315**	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ 6,461**	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **
	General Contingency	% of Prime Cost	30%		$1,938	$1,473	$1,207	$995	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 1,938	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Direct Costs					**$8,399**	**$6,383**	**$5,230**	**$4,310**	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ 8,399**	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **	**$ - **
	Design & Preconstruction Activities		10%		$840	$664	$560	$474	$ -	$ -	$ -	$ -	$ -	$ -	$ 840	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction Activities		10%		$840	$638	$523	$431	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 840	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL CAPITAL COST					**$10,079**	**$7,685**	**$6,313**	**$5,215**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$840**	**$9,239**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
OPERATION & MAINTENANCE COSTS																																						
	Pumping Cost																																					
	Broken Hill	$/KWh	$0.26			$45	$28	$18	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4
	Regular inspections																																					
	Silverton	Cost per visit	$1,000.00	1 visit per week		$589	$366	$238	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52	$ 52
	Maintenance and renwals																																					
	Maintenance Civil	% of Capital Cost	0.50%		$906	$455	$289	$191	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38	$ 38
	Maintenance Mech + Elec + Telem	% of Capital Cost	4.00%		$422	$212	$134	$89	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18	$ 18
	Renewals - Telemetry, every 10 years								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 100	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 100
	Renewals - Mechanical and Electrical (20y)								$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 339	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	TOTAL OPERATION & MAINTENANCE COSTS				$3,259	$1,599	$994	$646	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$55**	**$112**	**$112**	**$211**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$551**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$211**
	TOTAL PRESENT VALUE				**$13,337**	**$9,284**	**$7,308**	**$5,861**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$840**	**$9,294**	**$112**	**$112**	**$211**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$551**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$112**	**$211**

D.2 Menindee water supply reliability

Menindee Reservoir

ITEM	DESCRIPTION	[UNIT]	[QTY]	[RATE]	AMT	PRESENT WORTH ($K)			2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
				$ / Unit	$K	4%	7%	10%																																
Reservoir																																						
	1 ML	Item	1	$ 629,702	$ 630	$451	$361	$290	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 84	$ 530	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Prime Costs					**$614**	**$451**	**$361**	**$290**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 84**	**$ 530**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
	General Contingency	% of Prime Cost	30%		$184	$135	$108	$87	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 25	$ 159	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Direct Costs					**$798**	**$586**	**$469**	**$377**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ 109**	**$ 689**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
	Design & Preconstruction Activities		10%		$69	$52	$43	$35	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 69	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction Activities		10%		$69	$50	$40	$32	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 69	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL CAPITAL COST					**$936**	**$689**	**$552**	**$445**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$178**	**$758**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
OPERATION & MAINTENANCE COSTS																																						
	Maintenance and renwals																																					
	Maintenance Civil	% of Capital Cost	0.50%		$87	$42	$25	$16	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4	$ 4
	TOTAL OPERATION & MAINTENANCE COSTS				$87	$42	$25	$16	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**
TOTAL PRESENT VALUE					**$1,023**	**$731**	**$577**	**$461**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$178**	**$758**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**	**$4**

D.3 Broken Hill sewage treatment

Broken Hill STP

ITEM	DESCRIPTION	[UNIT]	[QTY]	[RATE]	AMT	PRESENT WORTH ($K)			2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
				$ / Unit	$K	4%	7%	10%																																
Broken Hill																																						
	STP	Item	1	$ 21,952	$ 21,952	$20,759	$16,525	$10,692	$4,510	$6,455	$ 7,737	$3,250	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Prime Costs					**$21,952**	**$20,759**	**$16,525**	**$10,692**	**$4,510**	**$6,455**	**$ 7,737**	**$3,250**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
	General Contingency	% of Prime Cost	30%		$6,586	$6,228	$4,957	$3,208	$1,353	$1,937	$ 2,321	$ 975	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Direct Costs					**$28,538**	**$26,987**	**$21,482**	**$13,899**	**$5,863**	**$8,392**	**$10,058**	**$4,225**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
	Design & Preconstruction Activities		10%		$2,854	$2,699	$2,148	$1,390	$ 586	$ 839	$ 1,006	$ 423	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
	Construction Activities		10%		$2,854	$2,699	$2,148	$1,390	$ 586	$ 839	$ 1,006	$ 423	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL CAPITAL COST					**$34,245**	**$32,384**	**$25,779**	**$16,679**	**$7,035**	**$10,070**	**$12,070**	**$5,070**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
OPERATION & MAINTENANCE COSTS																																						
	Maintenance and renwals																																					
	Maintenance				$1,280	$667	$437	$301	$ -	$ -	$ -	$ -	$40	$40	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
	Renewals								$ -	$ -	$ -	$ -		$ -	$ -	$ -	$30	$ -	$ -	$ -	$ -	$50	$ -	$ -	$ -	$ -	$50	$ -	$ -	$ -	$ -	$50	$ -	$ -	$ -	$ -	$20	$30
	TOTAL OPERATION & MAINTENANCE COSTS				$1,510	$807	$576	$457	**$0**	**$0**	**$0**	**$0**	**$40**	**$40**	**$50**	**$50**	**$80**	**$50**	**$50**	**$50**	**$50**	**$100**	**$50**	**$50**	**$50**	**$50**	**$100**	**$50**	**$50**	**$50**	**$50**	**$100**	**$50**	**$50**	**$50**	**$50**	**$70**	**$80**
TOTAL PRESENT VALUE					**$35,755**	**$33,191**	**$26,355**	**$17,136**	**$7,035**	**$10,070**	**$12,070**	**$5,070**	**$40**	**$40**	**$50**	**$50**	**$80**	**$50**	**$50**	**$50**	**$50**	**$100**	**$50**	**$50**	**$50**	**$50**	**$100**	**$50**	**$50**	**$50**	**$50**	**$70**	**$80**

Appendix E Financial Model Forecast Outputs – Water Supply

Appendix F Financial Model Forecast Outputs – Sewerage

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Document No. PWF-3006b June 2020