Submission No 51

INQUIRY INTO ADEQUACY OF WATER STORAGES IN NSW

Organisation: Essential Water

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The Hon Rick Colless MLC
Chairman
Legislative Council – Standing Committee on State Development
Parliament House
Macquarie Street
SYDNEY NSW 2000

SUBMISSION TO THE INQUIRY TO EXAMINE THE ADEQUACY OF WATER STORAGE IN NSW

Mr Colless

Thank you for the opportunity to make a submission to the Standing Committee on State Development inquiry into the adequacy of water storage in NSW.

Essential Water is an operating division of Essential Energy - a NSW Government-owned corporation. Essential Water provides water supply services to a population of more than 20,000 in Broken Hill, Menindee, Sunset Strip and Silverton, and also provides sewerage services to Broken Hill.

Essential Water's objectives are to:

- Provide water and sewerage services that meet customers' needs for reliability and environmental performance;
- Maintain a water and sewerage system that is safe for the community, customers and employees and;
- Minimise the costs to Essential Water and consequent impacts on pricing for customers.

The area serviced by Essential Water is the most arid in the State. Eight years in every ten, town water supply is dependent on water sourced from the Darling River and pumped along a pipeline more than 116km to Broken Hill.

These unique operational circumstances, combined with drought conditions, cause salinity and other water quality problems in the raw water that Essential Water must treat.

Operations

Essential Water owns and operates:

- Stephens Creek Reservoir (capacity 18,800 megalitres (ML);
- Umberumberka Reservoir (capacity 7,800 ML) and;
- Imperial Lake Reservoir, an emergency water supply (capacity 670ML).

These water sources all receive and store rainfall from the local catchment area, and supply between 30 per cent and 90 per cent of local annual water needs, depending on rainfall.

Essential Water is also licensed to extract 9.975 gigalitres (GL) of water per year from the Darling River.

In addition to water storages, Essential Water also owns and operates:

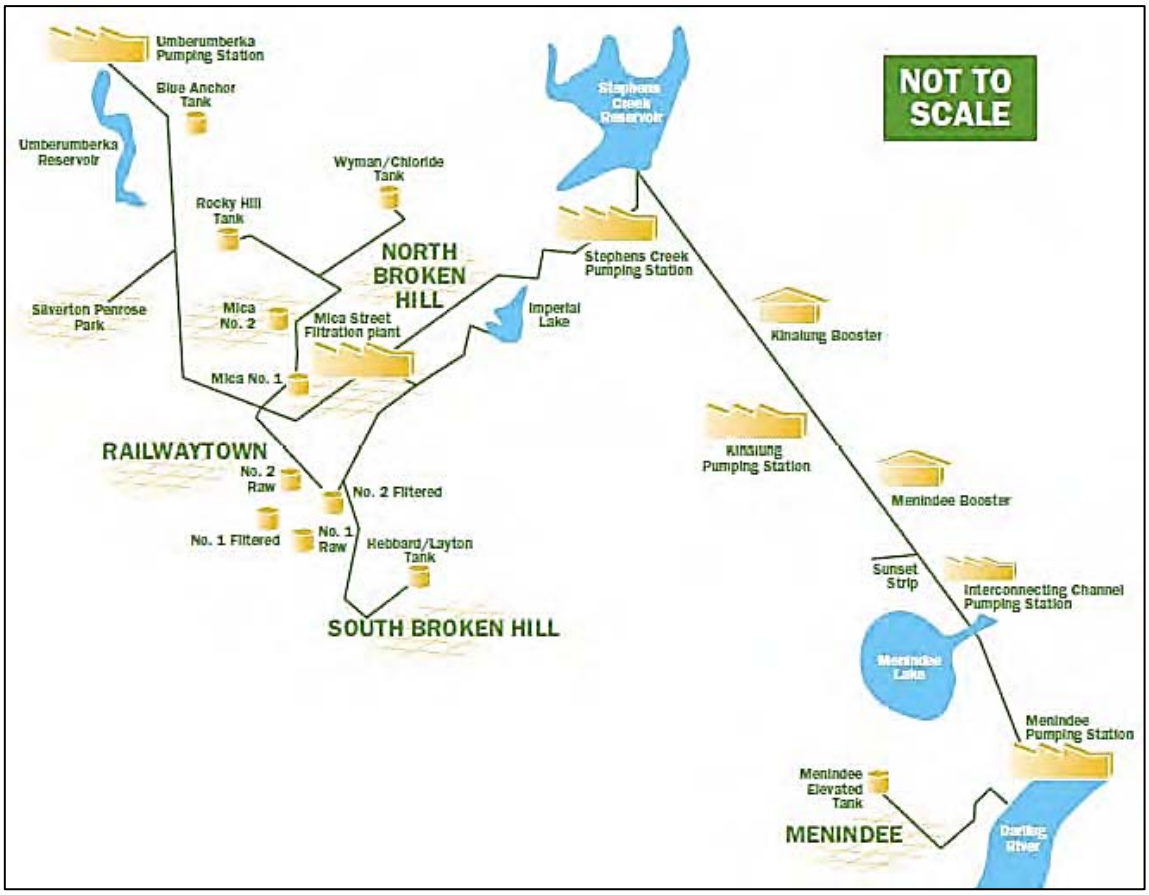
- Mica Street Water Treatment Plant (Broken Hill)
- Menindee Water Treatment Plant
- 116km steel and concrete lined pipeline from Menindee to Broken Hill
- 11 water service tanks
- 7 water pumping stations
- 577km of water and sewer mains
- 2 sewage treatment plants
- 11 sewage pumping stations.

Terms of Reference most relevant to Essential Energy

Essential Energy's submission will focus on the following four Terms of Reference:

1. The capacity of Essential Water's existing water storages to meet agricultural, urban, industrial and environmental needs
2. Models for determining water requirements
3. Storage management practises to optimise water supply
4. Proposals for the construction and/or augmentation of water storages

Figure 1 below provides a schematic diagram of the water network supplying Broken Hill and surrounding areas.



1. Capacity of existing water storages

Stephens Creek (18,800 ML)

Approximately 25 per cent of the reservoir capacity at Stephens Creek has been lost to sedimentation over the past century. Relative to many water resource catchments in other arid zones, the rate of erosion and siltation in the Stephens Creek catchment is not excessive.

Order of magnitude estimates indicate that sediment is continuing to move slowly towards the reservoir.

Umberumberka (7,800 ML)

Umberumberka Dam is used primarily to augment supply to Broken Hill during summer peak demand or as an alternative supply during maintenance and repairs elsewhere in the system. Supply from Umberumberka varies significantly, and over the past five years has contributed between 3 per cent and 30 per cent of Broken Hill's annual water supply. Therefore, it is a vital component of the Broken Hill water system.

Umberumberka Dam has lost approximately 40 per cent of its capacity due to siltation over the past century.

Imperial Lake Dam (670 ML)

Imperial Lake Dam is the smallest of the three Essential Water storage systems, and is used as an emergency storage only. It collects water from its own small catchment and water can also be transferred from Stephens Creek and Umberumberka.

2. Models for determining water requirements

Essential Water pumps water from the Darling River at Menindee to Broken Hill when required. The decision to pump from Menindee is based on a broad range of factors, including, but not limited to:

- Water demand in Broken Hill
- The time of year (summer versus winter)
- Efficiency gains and reduction of costs of pumping in off-peak times
- Overall efficient balance of supply between Broken Hill and Stephens Creek
- Maintenance of pumping stations and the pipeline
- Responding to supply outages and the need to catch-up supply in local storages
- Refreshing the pipeline to maintain water quality in the pipeline
- Maintaining supply to pipeline customers, including those at Sunset Strip.

This complex matrix of issues impacts on the quantity of water required from Menindee and the rate at which the supply is moved between Menindee and Stephens Creek and then on to Broken Hill. Eight in every ten years water supply to Broken Hill is reliant on pumping from the Darling River.

Essential Water is currently undertaking a risk based high level review of the bulk water supply within its area of operations. The review is considering water quantity and quality issues, including Essential Water's existing treatment processes and the quality of the raw water that can be successfully treated to meet the Australian Drinking Water Guidelines.

Once completed, we would welcome the opportunity to share the results of the bulk review if this is of interest to the Committee.

3. Storage Management Practices

Evaporation

Evaporation in Stephens Creek Dam is high relative to the storage volume of the reservoir. For this reason the best use for the reservoir is to obtain opportunistic savings in the cost of pumping water from the Darling River during rain events. When the water level is low water is pumped from Menindee to the reservoir.

When full the dam can supply Broken Hill with water for between 18 and 24 months. However Stephens Creek has rarely filled during the last century – it filled in 1939, 1955, 1974, 1989, 1992 and 2010 after exceptionally heavy rains.

In order to reduce losses due to evaporation, two levees have been constructed in the Stephens Creek reservoir basin. The partitions enabled control of the stored water in 'pools' that have a lower surface area to volume ratio. The levees have served to increase the overall effectiveness of the reservoir by keeping as much as possible of the water captured during rain events stored in these pools and created a lower surface area to volume ratio.

The construction of additional levees within the current reservoir area would further improve the catchment and storage of water from smaller rainfall events. While further localised storage would be more efficient by lowering the surface area to volume ratio, it is a costly exercise.

Other investigations have looked at options to reduce the 'dead water' area by installing levee transfer pipelines to better manage the flows from the outer storage areas to the inner pools. This option would help to reduce losses to evaporation and seepage but is costly and would not create any direct additional storage.

Water Quality

A major threat to the adequacy of water storages is an increasing number of blue green algae events. In 2012 Essential Water has received good inflows to local reservoirs, but unfortunately low turbidity water has resulted in algal blooms.

Recently, both Umberumberka and Stephens Creek reservoirs experienced high algal levels concurrently, requiring water to be sourced from the poorer quality Imperial Lake for a short time until supply could be established directly from the Darling River to the Mica St water treatment plant.

During the water crisis of 2002/03, at the end of an extreme drought event, the Darling River ceased to flow for around 12 months resulting in dangerously low water storages in Menindee Lakes with high salinity and organic carbons. The resultant water supplied to residents resulted in public protest.

Although the existing water treatment plant at Mica St can cope with high organic carbons and other poor water characteristics, significant expenditure is required to install brine disposal pans to operate the reverse osmosis plant.

It is fundamental to water security in Broken Hill that the water quality in the Menindee Lakes is maintained when the local reservoirs are depleted.

Pipelines

The communities of Broken Hill, Sunset Strip, Silverton and Menindee are dependent on pipelines, remote pumping stations and SCADA to maintain water supply.

The main pipeline from Menindee to Stephens Creek was constructed in 1952. Recently major failure events have begun as the pipe deteriorates. Until the pipe is eventually replaced,

possibly over the next 20 to 30 years, the number of supply interruptions will increase in conjunction with increased winter maintenance works.

Most of the pipeline from Umberumberka to Broken Hill is quite old, with the cast iron rising main between Umberumberka and Blue Anchor Tank still the original installed approximately 100 years ago. A number of kilometres of the rising and gravitational main will need to be replaced in the next 20 to 30 years.

Replacement of these important pipelines will require significant capital expenditure in the next 20 to 30 years, but is essential for long term water security.

4. Proposals for the construction and/or augmentation of water storages

Stephens Creek

The New South Wales Dam Safety Committee has classified Stephens Creek dam as having a consequence category of 'High C' for both the Sunny Day Failure and the Incremental Flood Consequence Category based on the findings of a preliminary dam break study.

With the Stephens Creek reservoir filling in early 2010, the existing levees overflowed during the significant intakes of water.

Observations made during the water intakes and flooding of the reservoir, as well as aerial surveys after two events, suggest the existing levees were damaged.

Full examination of the levees cannot be made until after the reservoir levels reduce, but it is expected that capital works will be required to reinstate the levees.

Replacement or augmentation of the existing reservoir to address the spillway concerns has not been costed at this stage.

Imperial Lake

The New South Wales Dam Safety Committee requires Essential Water to take steps to address the capacity of the spillway to cope with 1-100,000 year flood event. Imperial Lake Dam has a 'High C' consequence category for both the Sunny Day Failure and the Incremental Flood Consequence Category, based on findings from 2010 studies.

Options reports have been developed to make the dam safe, including widening the spillway and/or raising the dam wall. These scenarios represent significant structural works, and initial cost estimates are between $2 million and $4 million.

In light of the Dam Safety Committee findings, the costs of rectification, and the relatively small role of Imperial Lake, Essential Water is assessing its future requirements and need for Imperial Lake as a water storage dam. Options to decommission Imperial Lake have not been considered in detail, but decommissioning is a potential option if Imperial Lake is considered a redundant dam. Other arrangements for emergency and alternate water supply would need to be in place before decommissioning can be considered. While decommissioning costs may potentially be similar to the cost of undertaking any structural works, they would be offset by any ongoing future works that may be required.

Conclusion

Essential Water provides water services in a unique and challenging environment. Low rainfall, distances to water, ageing infrastructure and a relatively small customer base mean the costs of providing water services are unable to be fully recovered through water tariffs.

As outlined in this submission, Essential Water has a number of key areas that will be a focus in coming years, including the likelihood of ongoing upgrade and rectification work. The potential capital expenditure necessary to comply with dam safety standards is significant.

Work to improve the management and optimisation of existing storages will be undertaken by Essential Water where it is cost effective, relative to the outcomes able to be achieved in water savings and efficient storage.

Thank you for the opportunity to submit to the Committee. Essential Water would welcome the opportunity to expand on any aspects of this submission with the Committee.

Yours sincerely

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