

WHEN TO ACT: A PRACTICAL DECISION-SUPPORT FRAMEWORK FOR REGIONAL WATER RESTRICTIONS

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ABSTRACT

Running out of water is a real and immediate risk for many regional communities.

Drought and water restriction triggers cannot simply be copied across systems or transferred from metropolitan to regional contexts, as broad-brush approaches often overlook the unique pressures, constraints and operating realities of regional utilities.

The B-Section water supply system in NSW delivers drinking water to six towns across three regional water utilities, including Parkes Shire Council (PSC). The system is long, remote, and partially inaccessible, meaning leaks can take days for operators to detect and locate.

Ground-truthing hydraulic modelling in local knowledge produced an operational decision framework that defined practical triggers for implementing water restrictions. Triggers included residential and bulk-water demands, reservoir alarms, pump run times, weather forecasts, local activities, Council resourcing and communication with neighbouring utilities. Escalation tiers, corresponding actions, and indicative water restriction level bands were defined.

The framework was applied during the 2025-2026 summer, helping operators manage peak demands and maintain supply.

This paper presents a PSC case study focused on the B-Section system. The project's success was grounded in a boots-on-the-ground approach and trusted collaboration with local operators, demonstrating the need for region appropriate approaches to managing water restrictions and strengthening supply resilience.

1.0 INTRODUCTION

Half of NSW is expected to be in a drought category by the end of this October. Drought is characterised by prolonged periods of dry conditions, impacting environments, industries, economy and people. The Millenium Drought 1997-2010 demonstrated a decade-long exhaustion of water, and the Tinderbox Drought 2017-2020 brought an intense shock of severe dry conditions that preceded the Black Summer fires. More recently, during the summer of 2025-2026, many regional communities again were affected by drought. For regional water utilities, running out of water is a real and immediate risk.

Parkes Shire Council (PSC) has experienced critical water shortages, and their B-Section water supply system is particularly vulnerable. The B-Section delivers drinking water to six rural towns across three regional water utilities; Forbes Shire Council (FSC), PSC, and Lachlan Shire Council (LSC). FSC sources and treats water from the Lachlan River and the Lachlan River bore field. The treated water is then pumped to Turner's Hill Reservoir. From this reservoir, PSC owns and operates a 148 km section, delivering drinking water to the towns of Gunningbland, Bogan Gate, Trundle, Tullamore, and farmland in between. To maintain the quality of the water across the long pipeline, it is rechlorinated in Forbes (after Turner's Hill Reservoir) and later in Trundle. At a boundary in Albert, PSC hands over the water to LSC to deliver drinking water to the towns of Albert and Tottenham. A schematic of the B-Section system is shown in Figure 1.

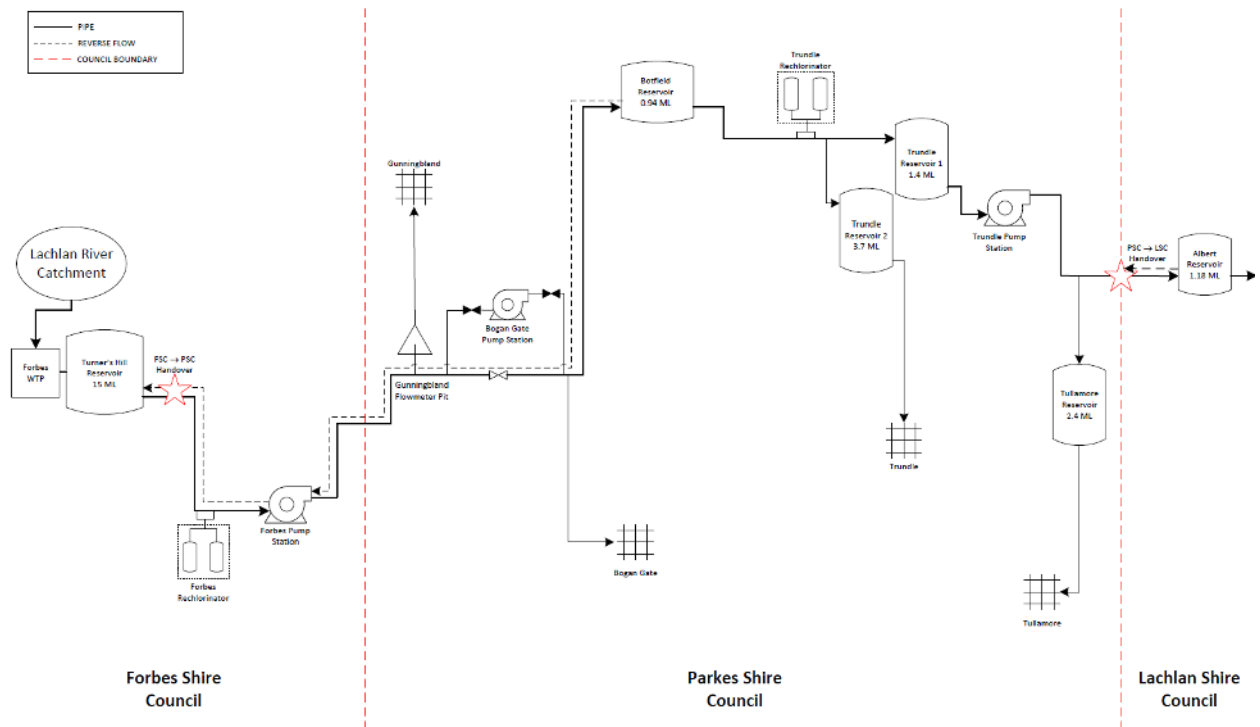


Figure 1: *B-Section water supply system schematic*

The B-Section is long, remote, and partially inaccessible, meaning leaks can take days for operators to detect and locate.

During the Tinderbox Drought, the B-Section ran out of water. PSC had no formal decision-making process in place for assessing water demand and implementing water restrictions. However, drought and water restriction triggers cannot simply be copied across systems or transferred from metropolitan to regional contexts, as broad-brush approaches often overlook the unique pressures, constraints and operating realities of regional utilities.

The aim of this project was to develop an operational decision framework that defines practical triggers for implementing water restrictions on the B-Section.

The project was separated into the following stages:

1. Historical assessment of “no water” scenarios.
2. InfoWorks WS Pro hydraulic modelling.
3. Water restriction triggers development and ground-truthing.
4. Application of the operational decision framework during the 2025-2026 summer.

2.0 DISCUSSION

2.1 Historical assessment of “no water” scenarios

To develop practical water restriction triggers, the unique pressures, constraints and operating realities of the system have to be understood. For the B-Section, the Botfield Reservoir drives the system. It is a balance tank at the highest elevation that supplies water downstream and upstream. Therefore, the “no water” scenarios for PSC can be indicated by the Botfield water level dropping.

Analysis of SCADA data found that Botfield’s water level dropped below 40% eighteen times from 2019 to 2024. However, this would occur all year round, not just in summer. To give these

scenarios meaning, each scenario was workshopped with local operators. It was found that:

- Half of the time Botfield dropped below 40% was due to pipe breaks.
- 30% of the time Botfield dropped below 40% was due to the Forbes pumps failing to start.
- 20% of the time Botfield dropped below 40% was due to increasing water demand.

These findings indicate that increasing water demand is a key driver for implementing water restrictions on the B-Section. However, they also demonstrate the value of establishing early intervention triggers. The same indicator used to identify increasing water demand can also provide early warning of pipe breaks, pump failures, or other operational issues. This highlights that water restriction triggers can serve a dual purpose: supporting drought response while also improving day-to-day operational awareness of system performance.

Focussing on the increasing water demand scenarios, the worst-case scenario found was the 2019-2020 summer of the Tinderbox Drought. Following almost three consecutive years of drought, the drought conditions in Parkes became severe. In December 2019, PSC provided free access to standpipes to allow farmers to resupply water. As a result, some farmers were carting multiple trucks per day. The standpipes were located within the towns, and an average demand of 10.8 L/s was recorded, while the average summer demand is 7.1 L/s. As shown in Figure 2, to meet this high demand, the pumps at Forbes and Trundle were running continuously and near their flowrate limits of 18 L/s and 8 L/s respectively for 40 days, Botfield Reservoir emptied, and supply to LSC was unable to be maintained shown by the Albert Reservoir water level also dropping.

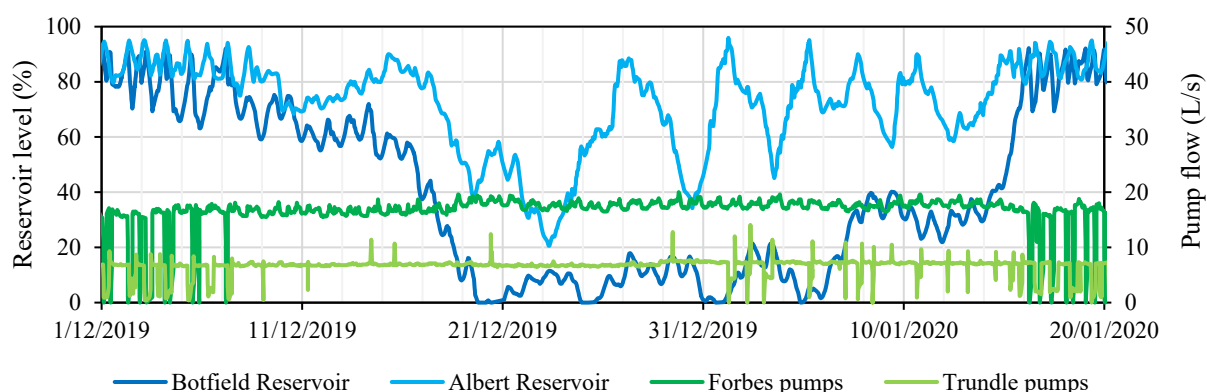


Figure 2: *B-Section reservoir levels and pump flowrates during the 2019-2020 summer*

Importantly, the system failure was not caused by a single asset reaching capacity or a storage threshold. Decision-making frameworks for water restriction triggers need to consider the behaviour of the entire supply system rather than relying on a single trigger.

2.2 InfoWorks WS Pro hydraulic modelling

The historical “no water” scenarios due to increasing water demand were modelled in InfoWorks WS Pro to analyse increasing water demand across the B-Section and investigate system performance. Modelling found that the scenarios generally spanned across three risk tiers:

1. Alert level: Reservoirs can hold sufficient water levels, while pumps may run longer.
2. Increasing risk: Reservoirs may struggle to hold sufficient water levels and start to drop, while pumps may run longer.
3. Peak risk: Reservoirs may start to deplete, and pumps may continuously run.

Model outputs from the 2019-2020 summer scenarios are provided below.

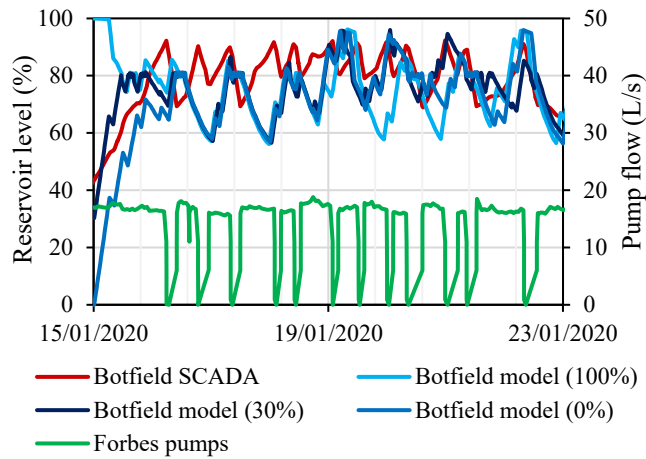


Figure 3: *January Botfield Reservoir levels comparing the 2019-2020 summer SCADA data with modelled outputs*

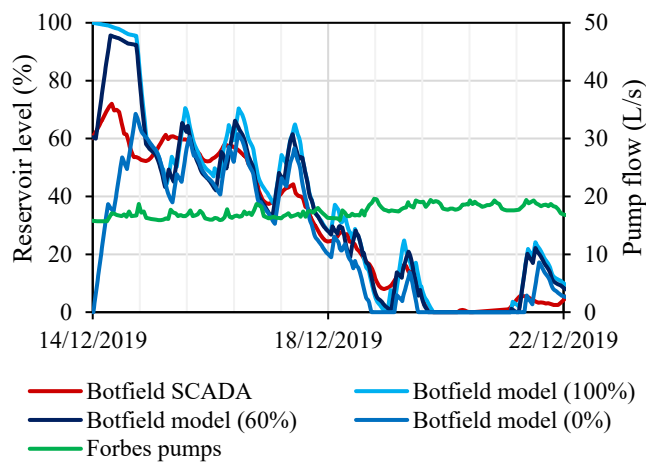


Figure 4: *December Botfield Reservoir levels comparing the 2019-2020 summer SCADA data with modelled outputs*

In this scenario:

- Modelling found that PSC water demand was 10.6 L/s.
- Botfield was able to recover within a day. Modelling showed that recovery is possible irrespective of starting water level.
- Forbes pumps had longer run times to maintain the Botfield Reservoir water level.

This scenario represents “increasing risk” where reservoirs may struggle to hold sufficient water levels (could start to drop but could recover) and pumps may need to run longer to maintain water levels.

In this scenario:

- Modelling found that PSC water demand was 13.1 L/s.
- Botfield emptied within six days. Modelling showed that Botfield would have emptied irrespective of starting water level.
- Forbes pumps were continuously running to maintain the Botfield Reservoir water level.

This scenario represents “peak risk” where reservoirs may start to deplete and pumps may continuously run.

2.3 Water restriction triggers development and ground-truthing

Ground-truthing the hydraulic modelling in local knowledge produced an operational decision framework that defined practical triggers for implementing water restrictions on the B-Section. The framework is shown in Figure 5. The main triggers are:

- Botfield Reservoir – If Botfield’s water level is 70%, this triggers an investigation into a potential pipe break or other network issue. Once ruled out and if Botfield does not recover to 70% overnight, water demand is increasing.
- Water demand – Triggers if water demand increases into the following risk tiers:
 1. Alert level: PSC average water demand > 9 L/s.
 2. Increasing risk: PSC average water demand > 11 L/s.
 3. Peak risk: PSC average water demand > 13 L/s.
- Albert Reservoir – If Albert’s water level is 70%, this triggers an investigation into a potential pipe break or other network issue. Once ruled out and if Albert reaches 50%, water demand is increasing and this triggers PSC to contact LSC so they can determine the need to supplement Albert Reservoir from their own water supply system.

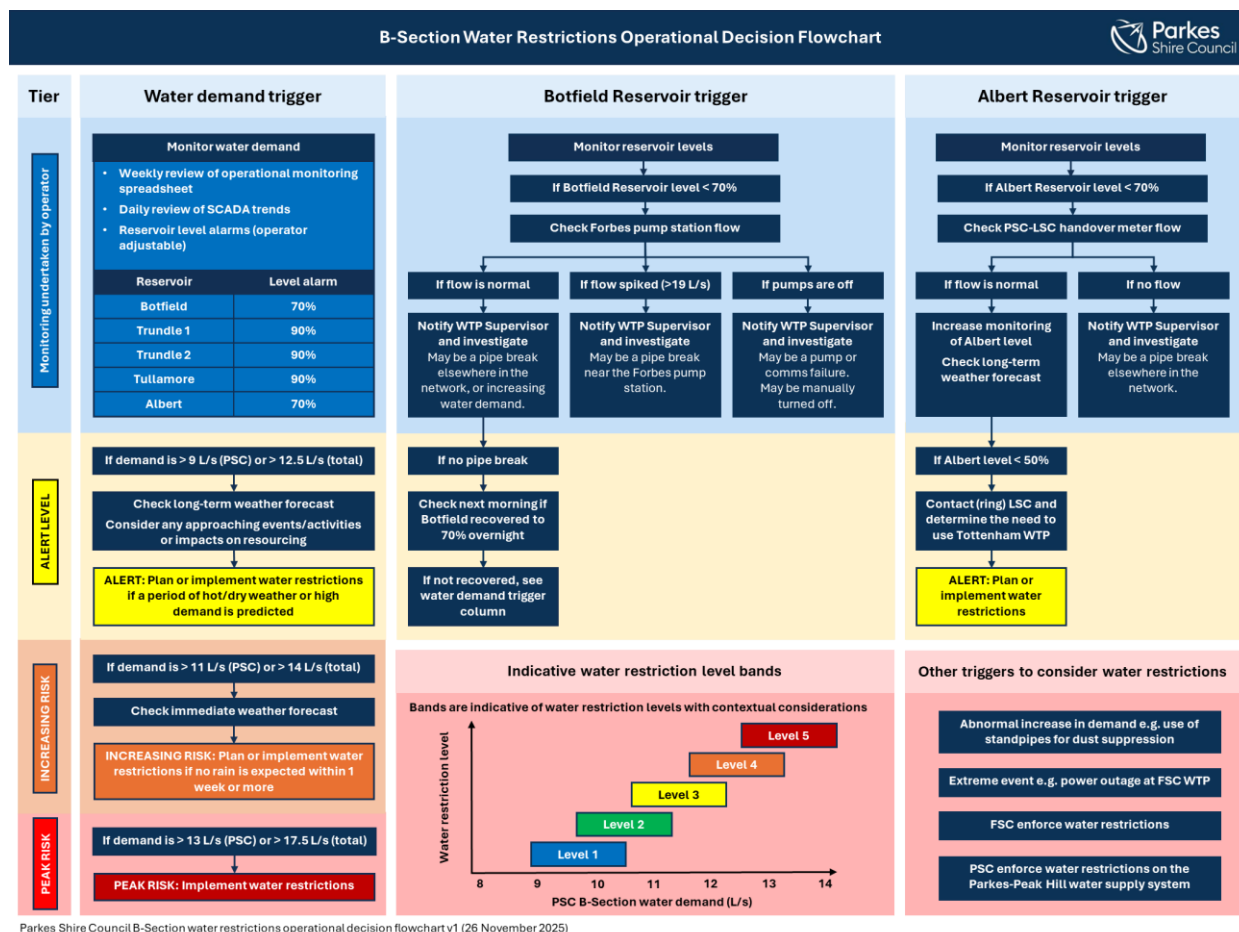


Figure 5: *B-Section water restrictions operational decision flowchart*

A key outcome of the ground-truthing process was that system behaviour alone was not sufficient to support operational decision-making. While system behaviour remains an important indicator, discussions with operators highlighted the need to incorporate broader operational context, including weather forecasts, known local activities, communication with neighbouring utilities, and staffing availability. The resulting framework therefore demonstrates the importance of grounding theory in operational knowledge to ensure drought response approaches are region appropriate.

2.4 Application of the operational decision framework during the 2025-2026 summer

The operational decision framework was successfully applied during the 2025-2026 summer. To support its application, an Excel-based tool was developed that plotted average water demand from routine flowmeter readings, against the framework risk tiers. As shown in Figure 6, the tool provided operators with a simple method for identifying demand trends and monitoring changes in system risk.

As demand increased over the 2025-2026 summer, the framework provided a common language for communicating risk between operators and management. This enabled earlier consideration of water restrictions before reservoir levels reached critical thresholds. At the hot and dry peak of the summer, water demand increased significantly across the system. However, Figure 7 shows that reservoir levels were maintained more effectively than comparable historical scenarios, and the B-Section did not run out of water.

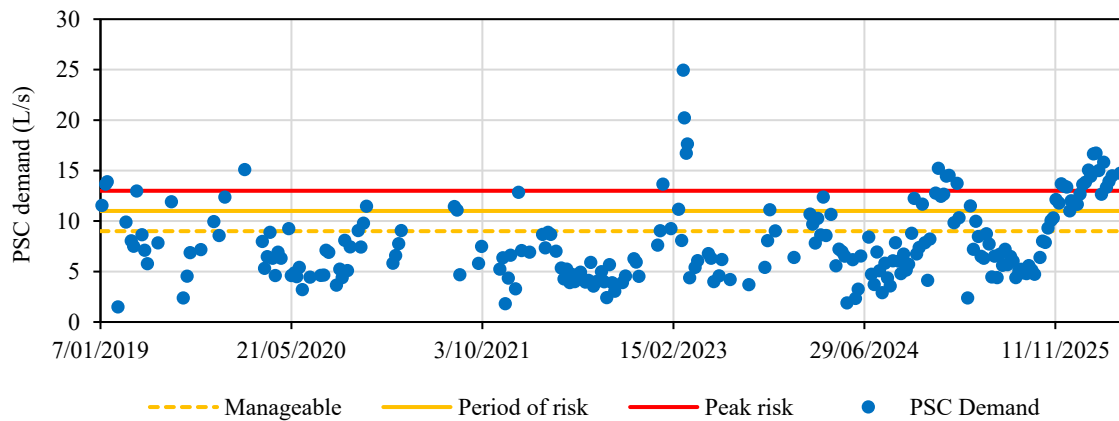


Figure 6: *B-Section average water demand against framework risk tiers*

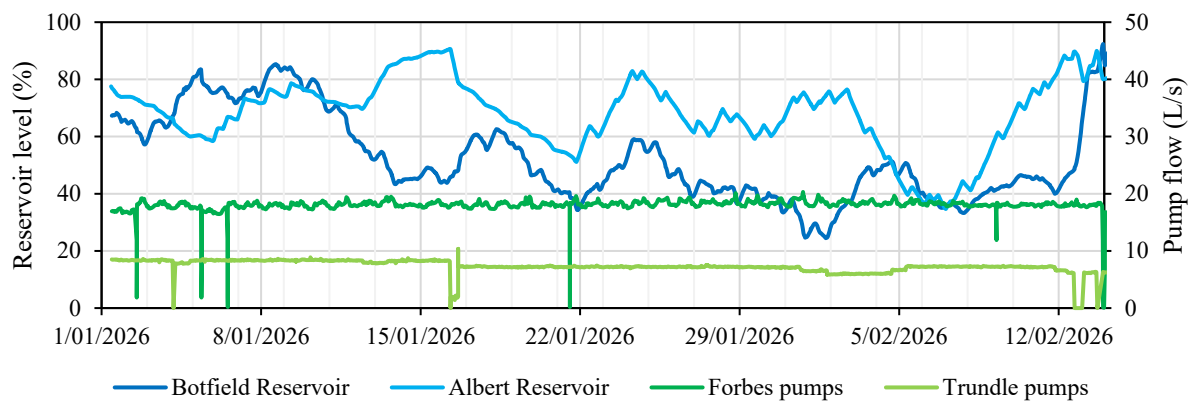


Figure 7: *B-Section reservoir levels and pump flowrates during the 2025-2026 summer*

Early intervention triggers provide operators options before issues become 3 am emergencies, and this case study demonstrated that triggers do not need to be complex. Developing practical water restriction triggers for regional utilities starts with three questions:

1. What are the critical operating constraints of the system?
2. When would operators become concerned about system performance?
3. Can those indicators be visualised to support timely decision-making?

3.0 CONCLUSION

This PSC case study demonstrated that practical water restriction triggers are most effective when they reflect the unique operating constraints and broader context of a water supply system. Ground-truthing hydraulic modelling in local knowledge produced an operational decision framework that supported earlier intervention and managed the 2025-2026 summer supply risks. While the triggers presented in this paper are unique to the B-Section, the approach provides a practical example for other regional utilities seeking to strengthen drought preparedness and water supply resilience.

4.0 ACKNOWLEDGEMENTS

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5.0 REFERENCES

Atom Consulting, 2025, B-Section water restrictions decision support tool report.
 Department of Primary Industries and Regional Development, 2026, Drought Forecast, available from https://www.dpird.nsw.gov.au/climate_applications/state-seasonal-update/drought-forecast