



In-Depth Review of Southern Rural Water's (SRW) Q3 2024–25 MID Nutrient Monitoring Report

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Executive Summary

The Quarter 3 (Q3) 2024–25 Analysis of Macalister Irrigation District (MID) Nutrient Monitoring Data by Southern Rural Water (SRW) represents a significant milestone, reflecting crucial methodological advancements following AECOM's (2025) recent recommendations.

While these improvements have enhanced data reliability, significant anomalies and unexplained issues persist, raising questions about nutrient transport dynamics, model accuracy, and monitoring comprehensiveness. Specifically, the unexpected reduction in phosphorus loads despite higher rainfall, insufficiently explained recalculations of previous quarters, and weak correlations between rainfall, irrigation volumes, and nutrient loads necessitate urgent review.

This report provides detailed analysis of these anomalies, examines recalculations and their adequacy, evaluates SRW's response to prior FOGL (2025) recommendations, and provides clear, actionable recommendations.

1. Detailed Analysis of Anomalies and Unexplained Data Issues

The SRW Q3 report identifies notable discrepancies in nutrient load data that lack comprehensive explanations, significantly undermining stakeholder confidence and regulatory credibility.

Phosphorus Load Discrepancy: The Q3 2024–25 MID phosphorus load was substantially lower (3.73 tonnes) compared to Q3 2023–24 (43.12 tonnes), despite considerably higher rainfall in 2024–25 (216.4 mm vs. 63.8 mm, respectively) (SRW, 2025). This discrepancy is counterintuitive, as nutrient runoff is typically positively correlated with rainfall intensity and volume (FOGL, 2025). Possible explanations such as insufficient sampling of peak flow events, or changes in farming practices, fertilizer usage timing, or irrigation strategies remain undocumented. The lack of explanatory narrative or supporting data undermines the report's transparency and scientific rigor.

Negative Nutrient Load Correction: Previously reported negative phosphorus loads (–1.04 tonnes in Q1 2024–25) were corrected post-AECOM review to positive values

(2.37 tonnes), highlighting past methodological errors (SRW, 2025). This significant recalculation indicates previous sampling inadequacies or calculation errors. The Q3 report does not adequately clarify specific reasons or methods behind these corrections, limiting stakeholder understanding of the reliability of past data.

Incomplete Data Capture: The Lake Wellington Main Drain experienced access limitations during sampling, resulting in incomplete TP data collection (SRW, 2025). This missing data was addressed through infilling methods, which introduces uncertainties regarding the accuracy of reported loads. The report does not discuss potential biases or error margins introduced by these infill methods, nor their potential impacts on total phosphorus load calculations.

Recommendation: Future SRW reports would benefit from the inclusion of even basic explanations for all significant anomalies, providing some assessment of changes in rainfall patterns, agricultural practices, irrigation schedules, and explicit documentation of infilling methodologies and their implications.

2. In-depth Review of Adequacy of Quarterly Recalculations and Explanations

The recalculations for Q1 and Q2 nutrient load data, while correcting evident errors, lack detailed transparency and comprehensive explanations, critical for stakeholder trust and regulatory compliance.

Minimal Explanatory Information: The recalculation explanation offered in the report i.e., “updates to the model”—is insufficiently detailed (SRW, 2025). The significant changes, especially the shift from negative to positive phosphorus load in Q1, require precise clarification regarding the specific methodological adjustments implemented, such as data integration procedures, revised sampling protocols, or model parameter recalibrations.

Unclear Methodological Documentation: While model adjustments were presumably influenced by AECOM’s recommendations, no explicit linkage or cross-reference to specific AECOM guidance is provided. This omission diminishes clarity around the model’s current configuration and the rationale behind previous errors and their corrections.

Lack of Historical Data Consistency: The report does not address whether past annual data should also undergo recalculations to maintain historical consistency, raising concerns about longitudinal nutrient load trend analyses. Without applying updated methodologies retrospectively, historical comparisons become potentially invalid.

Recommendation: SRW should comprehensively document and explain all recalculations, providing explicit details about methodological changes, clearly linking these updates to external recommendations (e.g., AECOM), and considering retroactive recalculations of historical data to ensure longitudinal consistency.

3. Extensive Evaluation of Rainfall, Irrigation Volume, and Phosphorus Load Correlations

The correlation between rainfall, irrigation water delivery, and phosphorus loads is unclear and inconsistent, raising fundamental concerns regarding the model's sensitivity and accuracy in capturing nutrient transport dynamics.

Counterintuitive Rainfall-Nutrient Relationships: Higher rainfall in Q3 2024–25 did not correspond to increased phosphorus loads from the MID, challenging established runoff and nutrient transport relationships (SRW, 2025). While high rainfall typically enhances nutrient runoff, the Q3 report's data suggest the timing and distribution of high rainfall events or antecedent moisture conditions—that significantly influence nutrient loads yet remain unexplored.

Ambiguous Impact of Irrigation Deliveries: SRW indicates irrigation water deliveries in Q3 2024–25 (40,211 ML) were below the five-year average (57,469 ML) (SRW, 2025), yet does not analyse how reduced irrigation influenced nutrient transport dynamics. Lower irrigation deliveries could imply reduced nutrient runoff; however, without detailed event-level analyses correlating irrigation schedules and rainfall events, conclusions remain speculative.

Lack of Event-Based Nutrient Analysis: The absence of event-based or flow-weighted monitoring (as previously recommended by FOGL, 2025) severely limits the understanding of nutrient dynamics. Reliance on quarterly aggregated data masks critical event-driven nutrient transport, compromising the model's predictive capacity and management utility. This is a fundamental weakness of the MID monitoring program that needs to be addressed.

Recommendation: SRW should transition urgently to event-based, flow-weighted sampling, capturing detailed hydrological events and their direct correlation with nutrient runoff. Additionally, detailed statistical correlation analyses between rainfall, irrigation deliveries, and nutrient loads ought to be presented in future reports. As an interim measure, the 95th Percentile Flow Trigger needs to be recalibrated with up-to-date flow data to more accurately capture peak flow-load events.

4. Comprehensive Evaluation Against FOGL Recommendations

SRW's current monitoring approach only partially meets FOGL's previous recommendations (FOGL, 2025). Key deficiencies remain unaddressed, significantly limiting the program's ability to provide comprehensive and credible nutrient load assessments.

- **Flow-Weighted Sampling:** The continued reliance on fixed-interval sampling rather than adopting event-driven, flow-weighted sampling methodologies severely limits the capture of critical peak nutrient events. Event-based, flow-weighted sampling is vital because nutrient export often occurs disproportionately during intense, short-duration rainfall or runoff events. Fixed-interval sampling frequently misses these peaks, significantly underestimating actual nutrient loads. This inadequacy prevents accurate identification of critical nutrient export periods and limits effective nutrient management interventions. Without event-driven sampling, management decisions are based on incomplete data, potentially leading to inadequate or ineffective mitigation strategies and reduced overall environmental management effectiveness and/or regulatory failure (FOGL, 2025).
- **Nitrogen Monitoring:** The continued exclusive focus on phosphorus overlooks critical nitrogen dynamics, which significantly influence eutrophication processes and algal bloom occurrences in the Gippsland Lakes. Given that:
 - a) ALS has the nitrogen data from all samples collected
 - b) the cost of obtaining it is relatively low

Therefore, the failure to not include TN load data in reporting is a major shortfall of the MID monitoring program that needs to be urgently addressed. Just because regulators (the EPA in this instance) have not given nitrogen sufficient attention, does not mean waterway managers and researchers would not benefit from having access to TN load data. After all, TN load data is needed for adaptive, evidence-based and integrated coastal zone management of the Gippsland Lakes Ramsar Site. Publishing this data would support a number of *Marine and Coastal (M&C) Act 2018* and M&C Policy key principles, objectives and actions.

- **95th Percentile Flow Trigger Review:** SRW has yet to re-evaluate this critical model trigger, despite FOGL's recommendation, potentially misclassifying significant runoff events. The need to analyse flow-nutrient data to determine if the 95th percentile (or any fixed percentile) is still a valid trigger for distinguishing baseflow vs peak flow event conditions. This could involve plotting TP concentration

against flow for all events and seeing at what flow level concentrations spike. If evidence suggests nutrient runoff begins at lower flow thresholds, the model should be adjusted accordingly (or, better yet, the approach shifted to continuous simulation or flow-weighted sampling as noted).

- **Subsurface Nutrient Monitoring:** The lack of subsurface nutrient monitoring (e.g., groundwater, tile drainage) potentially omits significant nutrient sources, leading to incomplete nutrient accounting

Key Recommendations: Southern Rural Water (SRW) should urgently prioritise the full implementation of FOGL's core monitoring and assessment recommendations. This should occur in the following order of priority:

1. **Priority implementation of flow-weighted, event-based sampling protocols for the Latrobe River sites** to replace or supplement the existing fixed-interval regime. This shift is essential to accurately capture peak nutrient export events for the most critical source of TP entering the Gippsland Lakes—particularly during first flush and high-flow conditions—when the majority of phosphorus and nitrogen loads are typically mobilised. Relying on regular time-based sampling significantly underrepresents critical episodic loadings and undermines the reliability of model calibration and validation processes.
2. **Integration of nitrogen species (total nitrogen (TN), nitrate (NO₂) and ammonia NH₄) into routine nutrient monitoring**, reflecting the dual risk posed by both phosphorus and nitrogen to the ecological health of the Gippsland Lakes. The current phosphorus-only focus fails to account for nitrogen-driven algal blooms and eutrophication, especially under conditions of low-flow or post-irrigation discharge.
3. **Comprehensive re-evaluation of the model's 95th percentile flow trigger assumptions**, including a transparent review of the data sources, statistical methodologies, and hydrological justifications underpinning this threshold. The existing trigger is not likely to reflect recent changes in irrigation practices, rainfall variability, or catchment hydrology, leading to potential misclassification of flow events and underestimation of nutrient export risks.
4. **Adoption of subsurface nutrient sampling**, particularly in key drains and areas with identified legacy nutrient accumulation. Surface water sampling alone may overlook dissolved or mobilised nutrient fractions that originate from groundwater interaction or sediment resuspension, particularly under low-oxygen or post-disturbance conditions. Subsurface data would improve model robustness and management response strategies.

By implementing these measures in a coordinated and transparent manner, SRW will enhance the scientific credibility, policy relevance, and ecological effectiveness of its nutrient monitoring program and contribute meaningfully to the protection of the Gippsland Lakes Ramsar-listed values.

Include a statement of purpose and scope

As a new additional, and simple to implement recommendation, we suggest every Nutrient Monitoring Report would benefit from the inclusion of an introductory statement including the purpose and scope of the report, and applicable targets (similar to the first paragraph in the 2.0 Background section in the AECOM report). This would allow the report to stand alone without the reader having to source and reference other documents.

Conclusion

The Q3 2024–25 SRW nutrient monitoring report indicates essential methodological improvements reflecting AECOM’s recommendations, and represents a significant enhancement on past reporting. However, significant anomalies and unresolved issues in data transparency, nutrient dynamics explanations, and an incomplete response to FOGL recommendations necessitate urgent attention. Further improvements in monitoring scope, data transparency, and detailed methodological documentation will significantly enhance environmental management, regulatory outcomes and stakeholder trust in nutrient monitoring practices for the Gippsland Lakes.

Bibliography

AECOM. (2025, May). *Macalister Irrigation District Nutrient Model Review (Report P50052, Rev 0)*. Southern Rural Water.

Friends of the Gippsland Lakes (FOGL). (2025, February). *Report on Southern Rural Water’s Nutrient Monitoring Program (MID)*. FOGL Stakeholder Submission.

Southern Rural Water (SRW). (2025, May). *Analysis of MID Nutrient Monitoring Data – Quarter 3 2024–25*. Southern Rural Water.