Consolidating Outsourced Environmental Sampling to Achieve Greater Operational Outcomes

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Abstract

Environmental sampling is vital for monitoring how our sewage treatment plants interact with the receiving environment. In the past, Gympie STP was issued an Environmental Protection Order (EPO), to rectify this Council worked closely with the Department of Environment Tourism Science and Innovation (DETSI) to close out the requirements within twelve months. Key actions undertaken included a Direct Toxicity Assessment (DTA), habitat assessment and the development of a new Receiving Environment Monitoring Plan (REMP). The REMP was initially managed by external contractors; however, this function has since been transitioned to operations staff. This involved sampling the Mary River bi-onthly—and as frequently as weekly during low-flow periods.

Recognising an opportunity to better align this process with our General Environmental Duty (GED) and high standards of stewardship, we identified that transitioning this task in-house would offer both greater technical oversight and significant cost efficiencies. By commissioning and registering a dedicated council vessel, we took direct control of the sampling program. This proactive shift has been a major success: not only are we more hands-on in meeting our Environmental Authority (EA) obligations, but we have also drastically reduced operational expenditure. These savings form part of broader improvements and efficiencies being driven through operations, supporting ongoing process optimisation, improved infrastructure performance, and better service outcomes for the community

Introduction

Environmental sampling is an integral part of monitoring the impact of sewage treatment plants upon the receiving environment, mitigating risk, and ensuring long-term sustainability. Gympie Regional Council operates a standard Biological Nutrient Removal (BNR) system at the Gympie STP site, treating and discharging upwards of 3.5 to 4.5 ML daily during dry weather flows and up to a maximum of 20 ML during wet weather into the receiving Mary River environment under Environmental Authority (EA) EPPR00514813. The Mary River is a key

part of the region’s catchment system, not just a resource. It supports local ecosystems, community use, and downstream water quality. It is also part of a Great Barrier Reef catchment, where sediment and nutrient loads can affect downstream marine environments.

Given the importance of the Mary River as the receiving environment, close water quality monitoring is essential. Historically, a number of compliance breaches occurred in the effluent quality being released, resulting in the council being issued an Environmental Protection Order (EPO). The EPO required council to execute an effluent options analysis, complete a toxicity risk assessment, and develop the new monitoring program for the receiving environment both upstream and downstream of the release point.

Under the finalized REMP framework, monitoring is conducted bi-monthly during normal periods. However, under strict EA conditions, when river flows drop to 50 ML/day or less as measured downstream at the Fisherman's Pocket gauging station (ID 138007A), "low flow" conditions are triggered. Seven days into a low-flow event, a stringent Total Phosphorus limit of 0.5 mg/L takes effect, and sampling frequencies escalate to a weekly schedule.

Managing these sudden, flow-dependent frequency shifts via external contractors presented significant logistical constraints and volatile operational costs. Recognizing an opportunity to fulfill our General Environmental Duty (GED) more effectively, the water treatment operations team proposed ceasing reliance on outsourced contractors. By commissioning and registering a dedicated vessel specifically for council operations, our team assumed direct ownership of each stage of the monitoring process.

Discussion

Operational Integration and Technical Oversight

As an operator, checking in regularly on the "health" of a plant through targeted process testing is an integral part of daily duties. Because sewage treatment plants form a critical line of defence for both environmental and public health, our team believed that the same level of rigorous oversight and testing emphasis should extend directly into the environmental monitoring space.

Since transitioning the REMP sampling and testing in-house, the operational team has become more connected with the health of the Mary River. By physically navigating the river and executing the fieldwork, us operators have moved past abstract laboratory data sheets to gain a real-time, visual understanding of the waterway's health and the actual mixing behaviour of the

plant's treated effluent. All made possible with the mighty GRC Tinny. (REFER POWERPOINT)

The active REMP incorporates sample collection and field analysis across eight designated locations spanning upstream and downstream zones:

- **GP1 & GP2:** Internal plant monitoring points at the treated effluent storage pond outlet and chlorine contact tank outlet.
- **U1 & U1.1:** Upstream control sites located at the Gympie Weir and Commissioner Gully.
- **DMZ:** The critical Downstream Mixing Zone, located immediately downstream of the rocky cascade outfall (W1) and upstream of external catchment inputs.
- **D1.1, D1.2, & D1:** Downstream far-field locations including Gympie Creek/Slaughter Yard Gully, an unnamed agricultural tributary, and Eel Creek.

(Note: A detailed map illustrating these exact compliance coordinates will be displayed here in the final power point presentation).

Samples are captured at a compliance depth of 0.2 meters below the water surface and dispatched to an accredited laboratory for comprehensive analysis of key chemical parameters. These include:

- Five-day Biochemical Oxygen Demand (BOD)
- Total Nitrogen (TN) and Nitrogen species (Oxidised, Ammonia, and Organic Nitrogen)
- Total Phosphorus (TP) and Filterable Reactive Phosphorus (FRP)
- Chlorophyll 'a' and Blue-Green Algae cell counts

Crucially, on-site testing is performed simultaneously using calibrated field meters to obtain instantaneous data for Temperature, pH, Dissolved Oxygen (both mg/L and percent saturation), Electrical Conductivity, and Total Chlorine. We also document qualitative ambient observations during every run, noting weather conditions, water clarity, and scanning for unusual surface slicks, foams, films, or nuisance macrophytes.

This comprehensive data capture is vital for evaluating highly sensitive parameters like un-ionised ammonia. Because total ammonia in water exists in a dynamic equilibrium between its ionised and un-ionised forms, and since the un-ionised fraction is highly toxic to aquatic life due to its ability to readily cross epithelial membranes, tracking diurnal fluctuations in pH and temperature is essential. High pH and higher temperatures increase the toxic un-ionised fraction. Having operators gather these real-time field profiles gives us immediate warning capabilities that protect the river's highly sensitive, diverse ecosystem. This ecosystem serves as a critical habitat for several protected Matters of National Environmental Significance (MNES), including the endangered Mary River Cod, the Mary River Turtle, the White-Throated Snapping Turtle, and the Queensland Lungfish.

Overcoming Hurdles and Financial Realities

Transitioning this program in-house required navigating several strict regulatory and logistical hurdles. The newly acquired council vessel had to undergo a commercial survey and safety assessment by Maritime Safety Queensland (MSQ) to confirm its total suitability for river operations. Additionally, a qualified staff member must be on the vessel during use, while a training and development plan has been put into place for staff members who do not already hold a coxswain commercial boat operation qualification. These are all steps to mitigate the risks associated with navigating a marine controls and the river's varying flow velocities and steep, densely vegetated banks.

Once cleared for standard duty, the REMP routine was incorporated into the roster. The financial turnaround from this initiative has been clear. Previously, relying entirely on external contractors for standard bi-monthly sampling generated an average operational cost of $60,000 annually. During seasonal dry periods, when river levels dropped below 50 ML/day, this expenditure multiplied exponentially due to the mandatory shift to weekly compliance sampling.

By eliminating the outsourced contract model, Gympie Regional Council incurred a one-time capital outlay to purchase, survey, and outfit the vessel.

On an annual operational basis for the Gympie STP, this shift preserves a minimum guaranteed savings within the water division's budget. Rather than vanishing into outsourced corporate overheads, these funds are now being directly reallocated into our internal treatment plant budget, funding active process optimization, biomass health improvements, and infrastructure efficiency upgrades.

Conclusion

Transitioning the Receiving Environment Monitoring Program from an outsourced contractual model to an internal, operator-led framework has delivered profound benefits for Gympie Regional Council. Developed as part of a successful strategy to fully close out a historical Environmental Protection Order, this operational shift has transformed environmental compliance from a passive, administrative exercise into an active, hands-on model of environmental stewardship.

By owning the sampling process from the helm of our own operational vessel, our water specialists have bridged the gap between plant process control and receiving ecosystem health. Us as operators now possess a tangible, real-time understanding of how plant adjustments influence the water quality of the Mary River, directly safeguarding critical habitats for species of national environmental significance.

Furthermore, the initiative has proven to be a resounding financial success. The initial capital expenditure required to commission the council vessel has been rapidly countered by stripping away contractor premiums, securing significant, recurring financial savings. These retained operational funds are actively reinvested directly back into the treatment facility to drive ongoing process optimization and structural upgrades. Ultimately, this program demonstrates that when an operations team is empowered with direct environmental ownership, a council can simultaneously elevate its regulatory compliance, enhance its technical capability, and achieve superior economic outcomes for the community it serves.

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