TEAM EFFORT ENABLING RAPID REPURPOSING AND COMMISSIONING OF HSLOW DOSING LINE AT LUGGAGE POINT RRC

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KEYWORDS

HSLOW: High Strength Liquid Organic Waste; Carbon dosing; Nutrient; RRC: Resource Recovery Centre

ABSTRACT

Urban Utilities (UU) is presenting a successful case of repurposing and recommissioning an existing asset originally designed for a different process to support licence compliance during a critical operating period. The system was adapted and partially reconfigured to enable continuous carbon dosing of High Strength Liquid Organic Waste (HSLOW) into the anoxic zones of the biological bioreactors of the Luggage Point Resource Recovery Centre (RRC). A key factor to the project's success was the close collaboration between managers, engineers, subcontractors and operators. Clear communication, shared ownership of risks, and rapid decision-making enabled the system to be delivered, tested, and commissioned in record time. Operator involvement throughout the design and commissioning phases ensured the solution was practical, safe, and aligned with day-to-day operational needs.

Following recommissioning, operators have continued to use the system for carbon dosing, actively balancing process performance, compliance limits, and operational constraints. This outcome demonstrates how cross-functional collaboration and pragmatic engineering can safely extend the value of existing assets while achieving regulatory objectives.

1.0 INTRODUCTION

Luggage Point RRC is in Brisbane, Queensland, Australia, and is designed to treat approximately 60% of Brisbane's wastewater. The plant has a design capacity of 170 ML/day, with a current average dry-weather flow of 140 ML/day. The primary purpose of Luggage Point RRC is to reduce contaminant concentrations prior to reuse and/or discharge into Moreton Bay, thereby protecting public health and the environment from harm and ensuring ongoing licence compliance.

The facility incorporates a biological treatment process based on nitrification and denitrification for nitrogen removal. Primary and secondary sludges generated through this process are anaerobically digested to support energy recovery via biogas production. Historically, HSLOW was implemented to enhance biogas generation; however, this application was later discontinued due to operational constraints.

The HSLOW that usually comes to Luggage Point RRC is from brewery and soft drinks (up to 50% sugar solutions) and the dairy processing industry, providing a good, readily biodegradable carbon source.

On the other hand, the biological process has traditionally required an external carbon source to maintain effective nitrogen removal performance. As a result, ethanol was previously dosed at approximately 60 L/h using carrier water or subnatant from the DAF unit (Dissolved Air Flotation). This was also discontinued following the implementation of the side-stream Anammox process, which minimises the demand for an additional carbon source.

In recent times, population growth, ageing infrastructure, cost constraints and unexpected load variations have created increased operational pressure, resulting in the need for an urgent response strategy to sustain compliance (with the catchment "Bubble Licence"). This has included the reconsideration and reintegration of a suitable carbon dosing strategy to support stable biological treatment performance and ensure continued licence compliance.

Since ethanol dosing was discontinued in 2021, reinstating the system would have required a significant number of engineering, procurement, and commissioning steps, resulting in lead times incompatible with the urgent compliance demand. As a result, an alternative and innovative solution was required.

The selected concept involved repurposing the existing HSLOW facility, previously used to enhance biogas production in the anaerobic digesters, to instead function as an organic carbon source for the biological bioreactors. This approach provided a practical and timely alternative to ethanol reinstatement, enabling faster implementation while maintaining process performance objectives.

The repurposing of HSLOW required the installation of a pipeline connection from the HSLOW storage tank, as well as the modification and partial reuse of an existing disused service water pipeline section to connect to the subnatant pipeline sub-branch (**Figure *1***). In addition, minor modifications were made to the former ethanol dosing infrastructure to establish a suitable HSLOW injection point into the post-anoxic zone of the bioreactors. This configuration enabled a rapid and controlled transition to an alternative carbon dosing strategy aligned with operational requirements.

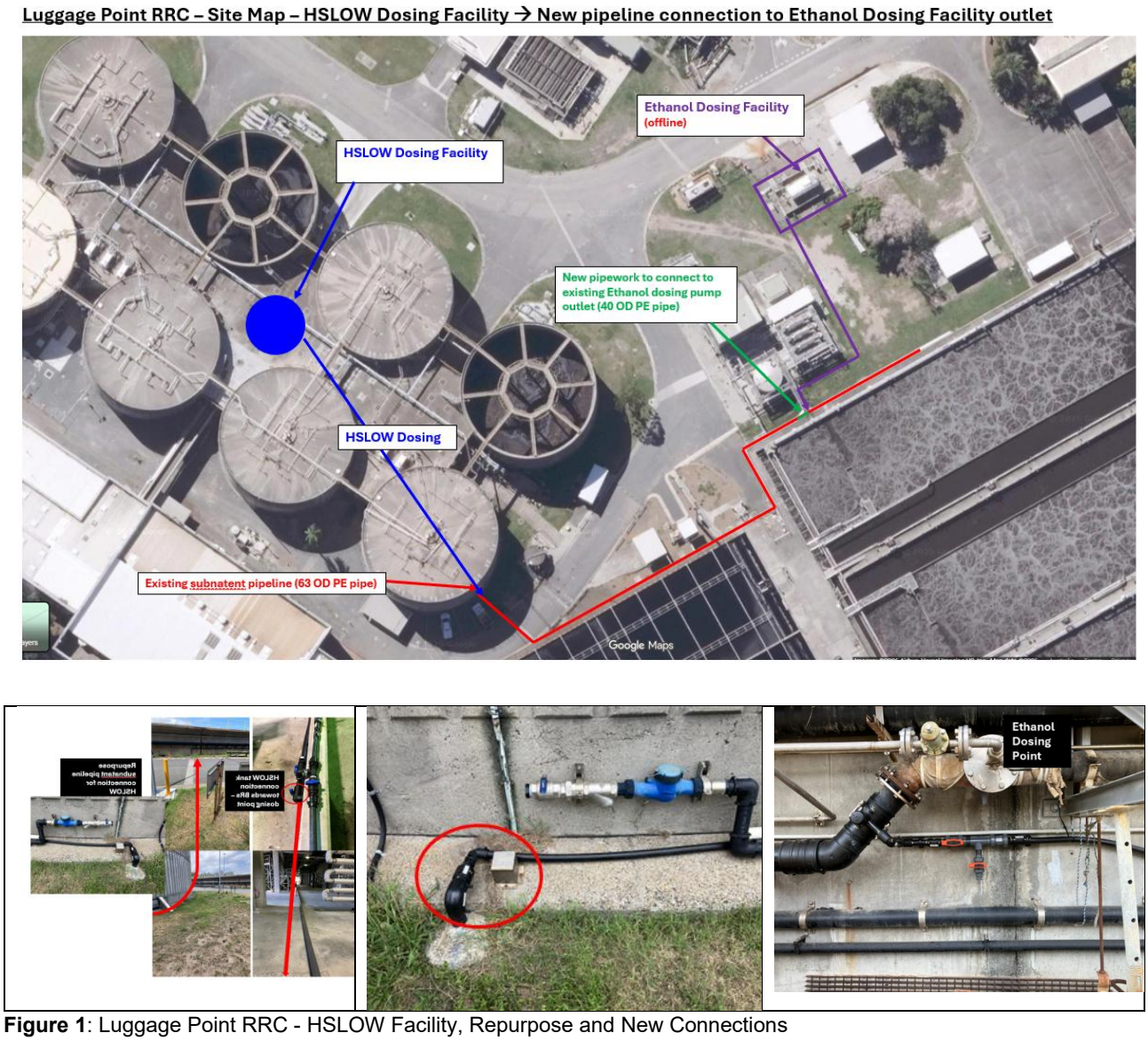

Figure 1: Luggage Point RRC - HSLOW Facility, Repurpose and New Connections

2.0 DISCUSSION

2.1 Implementation of HSLOW

The implementation of the HSLOW carbon dosing program, as illustrated in the Gantt chart (Figure 2) follows a structured, staged delivery approach spanning identification, planning, execution, and transition to ongoing operations. The program commenced in December 2025 with early licence risk identification and critical process reviews, ensuring that compliance drivers and operational constraints were clearly defined from the outset. This was followed in January 2026 by an intensive planning and assessment phase, including operational response planning, HAZOP studies, infrastructure evaluation, and HSLOW repurposing assessments, which collectively established the technical and risk basis for implementation. During the same period, staged trials and testing activities, including interim inlet works and bioreactor dosing trial evaluation, were undertaken to progressively build operational confidence and validate performance under controlled conditions. The operational trial conducted at the inlet works showed less efficiency in comparison to the direct dosing in the post-anoxic zone of the biological bioreactors.

Commissioning activities were then executed to enable safe introduction of HSLOW dosing into the bioreactors, supporting a controlled transition from concept to live operation. From February 2026 onwards, the program shifted into transition and standard operations, with HSLOW dosing becoming embedded into routine practice, while continuous optimisation and performance monitoring continued.

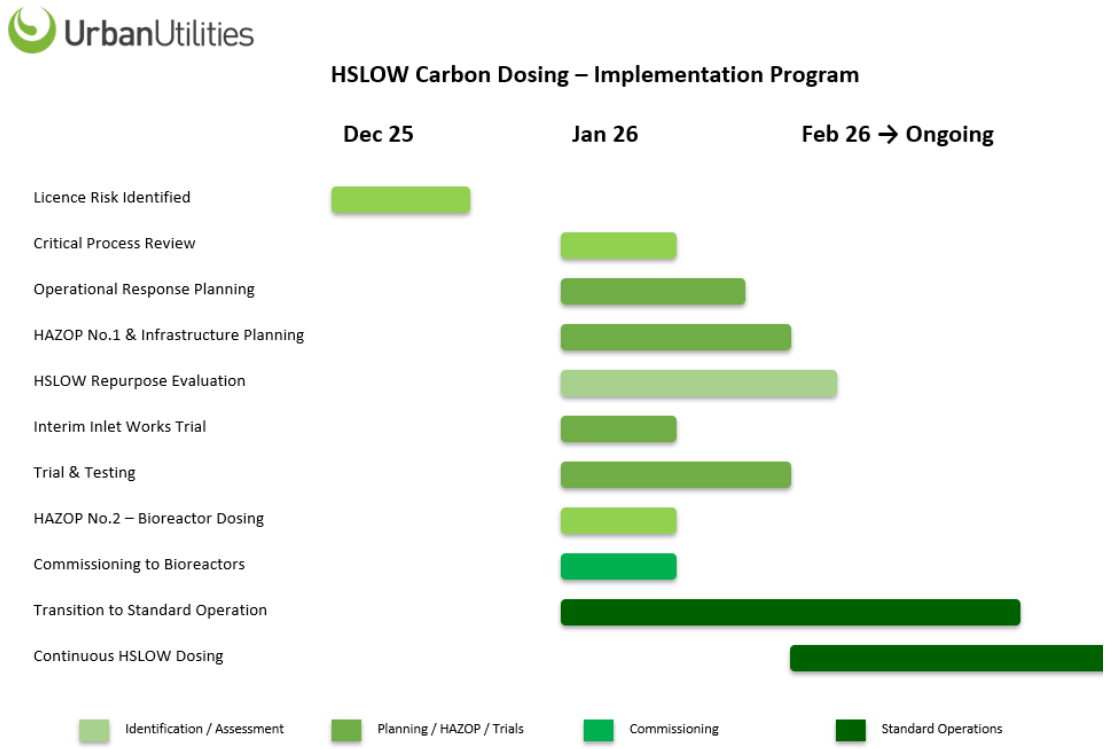

Figure 2: HSLOW Carbon Dosing – Implementation Program – Gantt Chart

2.2 HSLOW Continual Operation

The HSLOW implementation has successfully established a supplementary carbon dosing system using imported industrial liquid organic wastes to support the biological treatment process. To optimise treatment performance and achieve the desired carbon loading, the HSLOW stream is supplemented with sugar, providing an additional readily biodegradable carbon source that enhances process effectiveness and nutrient removal outcomes. **Figure *3*** shows a 12-month nitrogen performance trend against the licence conditions, where it can be seen the process carbon deficiency before the implementation of HSLOW and the positive impact afterwards, while a total nitrogen concentration below an average of 7.5 mg/L is maintained.

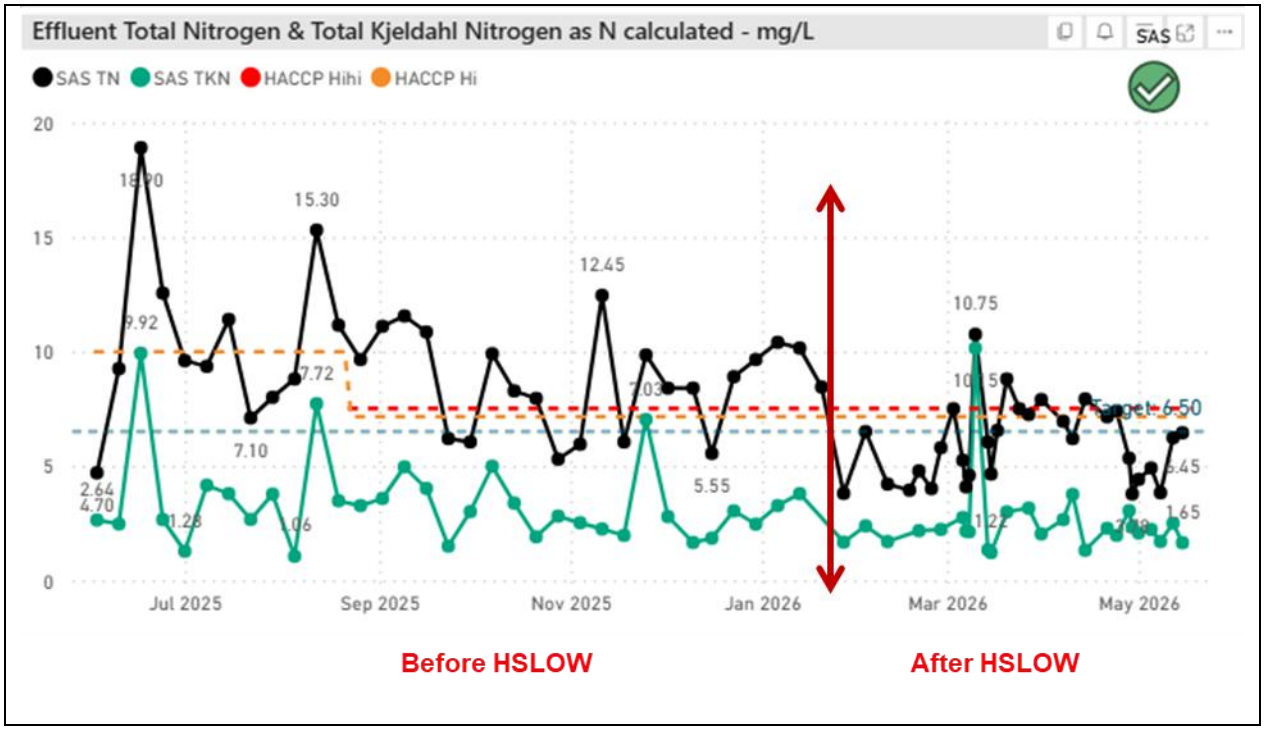

Figure 3: Effluent Nitrogen Performance Trends before and after the implementation of HSLOW

Following commissioning, the ongoing operation of the system has been integrated into routine plant activities and is managed by the Operations team. Operators are responsible for the manual preparation of the HSLOW solution, including transferring the imported waste and sugar mixture into the dosing tank (Figure 4). Once prepared, dosing is automatically controlled through the existing plant control system, ensuring consistent delivery of the carbon source to the treatment process while minimising operational intervention.

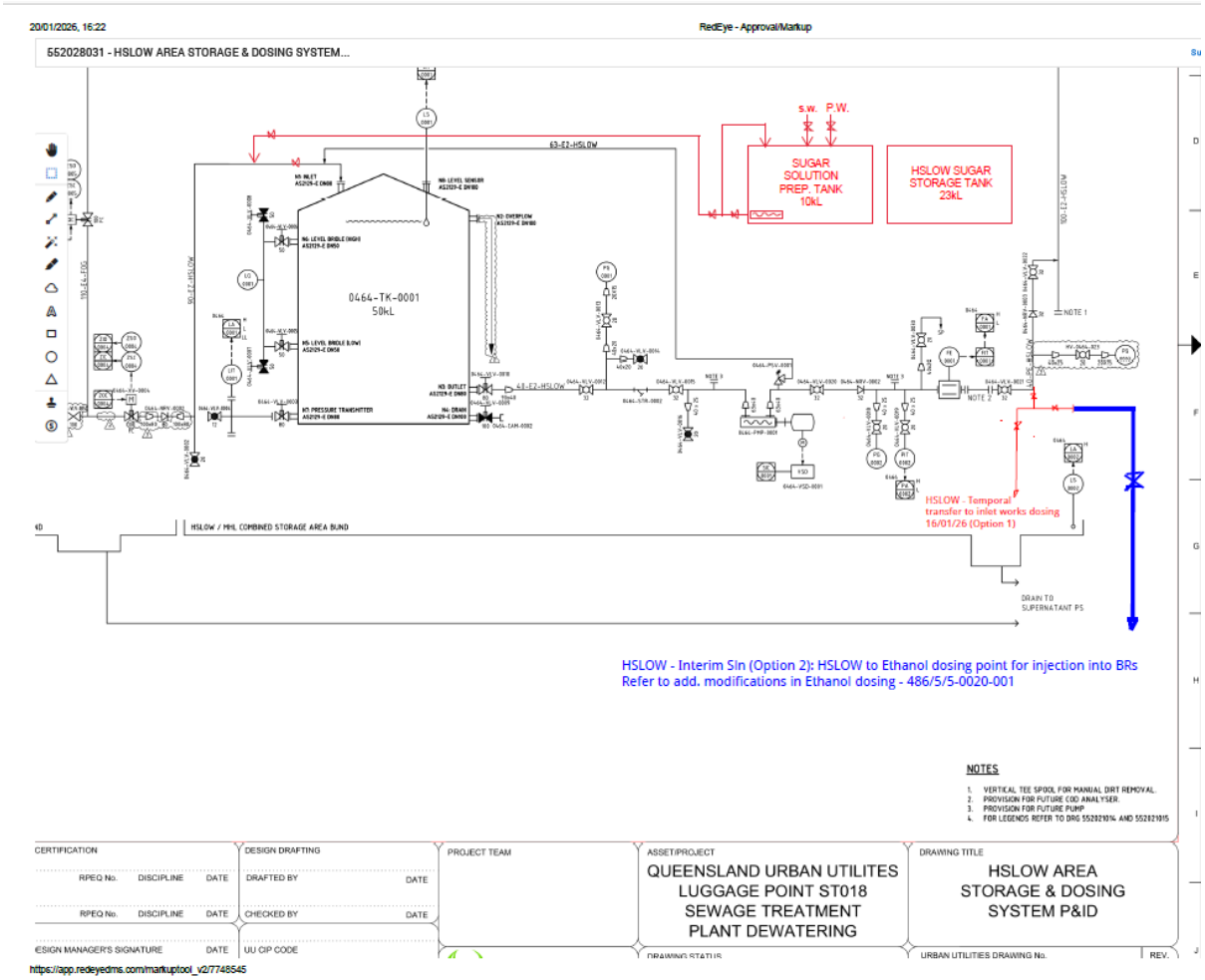

Figure 4: Modification of HSLOW P&ID showing temporal modifications to repurpose the system

3.0 CONCLUSION

The repurposing and rapid deployment of HSLOW as a carbon dosing strategy provided a significant enhancement to the performance of the biological treatment process, directly supporting improved system stability and compliance outcomes.

Due to critical licence requirements resulting in a highly constrained timeframe , the initiative required a thorough end-to-end evaluation from concept development through to implementation. This ensured that technical viability, operational readiness, and appropriate risk management were all rigorously addressed.

A strong and effective collaboration between operations, engineering, and management teams was fundamental to the success of the project, enabling accelerated yet controlled decision-making and execution. Key governance and assurance processes, including HAZOP studies and staged operational trials, were completed to build confidence in the solution and support a safe and controlled transition into full-scale operation. This iterative approach ensured risks were appropriately understood and managed while maintaining delivery momentum.

The project demonstrated a strong integration of technical expertise and behavioural capability, with effective teamwork, communication, and shared ownership playing a central role in achieving successful outcomes. Overall, this initiative is a clear example of alignment with the UU Six Behavioural Capability Framework which was evidenced through measurable critical operational performance improvements and successful licence compliance delivery.

Key lessons learned from the project delivery included:

- Clear ownership and accountability across stakeholders enabled delivery within tight timeframes.
- Early engagement facilitated the prompt resolution of issues at the appropriate level.
- A shared understanding of priorities, next steps, and risks supported effective project execution.

- Knowledge of asset condition and operational limitations informed decision-making.
- Continuous communication and timely decisions were essential to maintaining progress.

4.0 ACKNOWLEDGMENTS

The delivery of the Ethanol Facility would not be possible without the support of:

- The Luggage Point RRC Operations team;
- The Process Technology and Production Excellence Engineering teams;
- The Infrastructure Planning and Delivery Engineering team;
- Delivery partners and contractor delivering the pipeline modifications.