



WASTEWATER NETWORK PERFORMANCE BENEFITS FROM ROLLING OUT DERIVED FLOW AT HUNTER WATER

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NEXT WATER 2025 CONFERENCE - SMART SOLUTIONS FOR RESILIENT SERVICE DELIVERY

KEY POINTS



Hunter Water developed a pump performance measurement technique that:

- doesn't require the installation of flowmeters or any extra instrumentation
- was relatively cheap to roll out to all our pump stations
- is profoundly improving how we maintain our sewage pumps
- is the basis for a number of tools to help operators spot issues in the network
- has improved our planning cycle and capital spend

INTRODUCTION



A little about Chris Farragher

- Twenty-four years working at Hunter Water
- Specialist in control scheme design / process control, especially for reducing energy consumption and energy cost

A little about Hunter Water

- Services over 600 000 people
- Operates 491 wastewater pumping stations at last count

What is Derived Flow?

- Derived Flow uses on-site calculations based on well level and well dimensions to measure the performance of individual pumps, avoiding the need for flow meters
- Derived Flow is installed at *all* Hunter Water pump stations which is allowing Hunter Water to morph its workflows to use the information to make its wastewater network more resilient and more efficient.

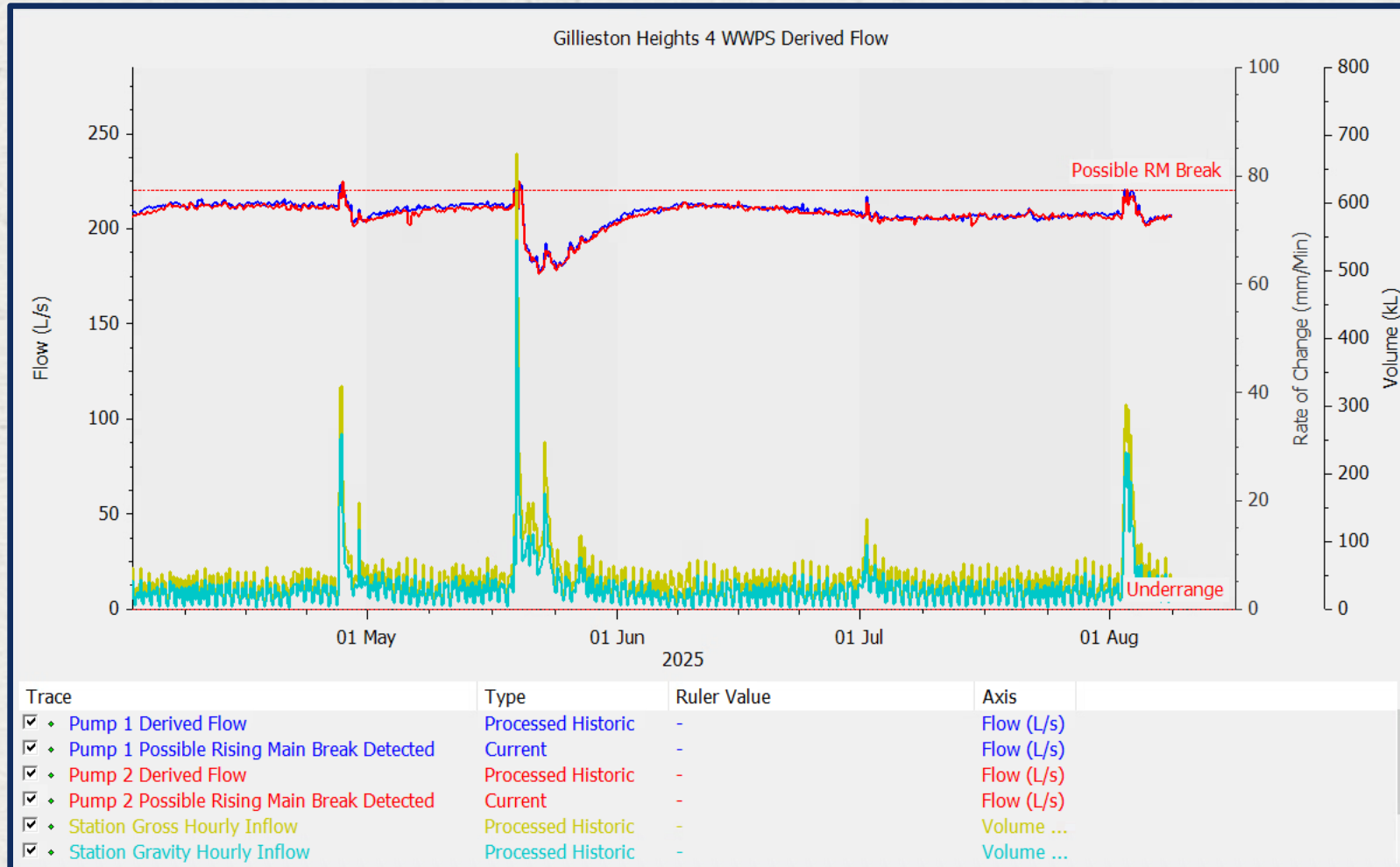
A sneak peak at the conclusion

- / believe Derived Flow is the future for all wastewater networks that use pump stations that have wet wells

INTRODUCTION



What does Derived Flow look like?



WHY WE DEVELOPED AND ROLLED OUT DERIVED FLOW



Hunter Water doesn't generally install flow meters at wastewater pump stations

- Reasonably high capital cost
- Generally poor operational record when installed on rising mains at Hunter Water
- A fleet of almost 500 flow meters to maintain, repair and replace would be a significant burden



WHY WE DEVELOPED AND ROLLED OUT DERIVED FLOW



Derived Flow fills the gap in operational data

- Most of the operational information that could be obtained from installing flowmeters
- For low cost

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- It is rare to unheard of to have flow meters at *all* of a utility's wastewater pumping stations. *What would you do if your utility had flow data available at every pump station?*

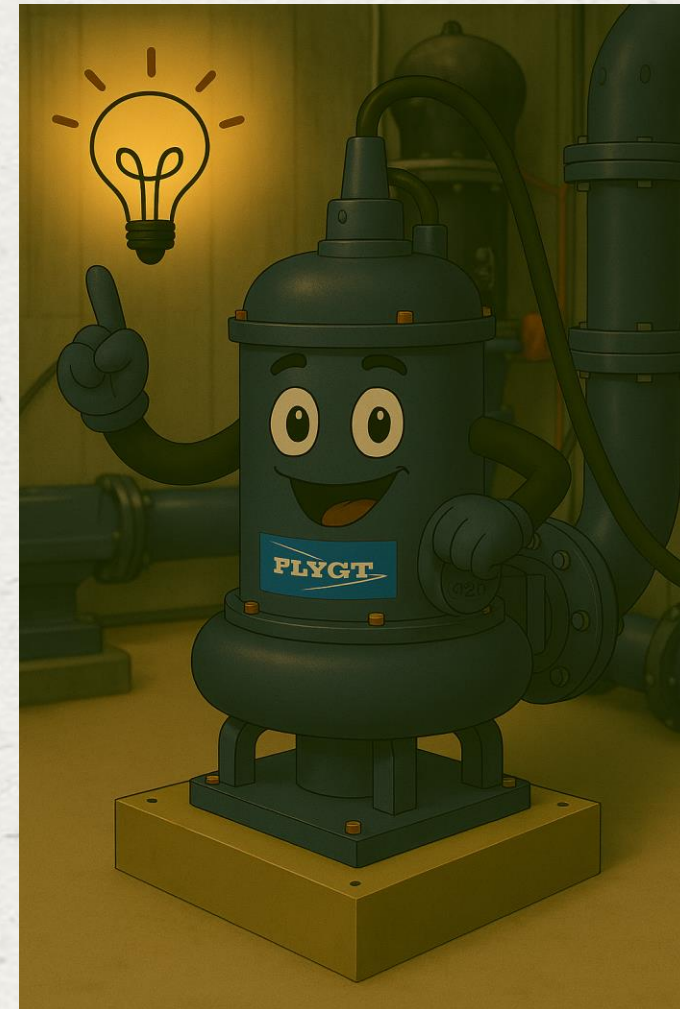
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WHERE FLOW PERFORMANCE DATA IS USEFUL



Hunter Water *had* a culture of making do with not knowing the performance of the pumps

- Assumption that a pump is operating at its design duty when assessing inflow, which usually exaggerated the result
- Uncertainty if an increase in pump run times is due to increased inflow (e.g. infiltration) or pump wear
- Maintenance of submersible pumps based on yearly inspection rather than pump performance

Some simple changes that have occurred since Derived Flow was rolled out

- Network Planning routinely checks pump performance rather than assume the pump is at full performance.
 - i. Capital spending is now improved with accurate network flows informing decision making
 - ii. Inaccurate or outdated asset data is being purged from our systems – Derived Flow shows when asset performance in the field doesn't match modelled performance
- Systems are in place where Derived Flow is driving interventions for pumps based on exception e.g. a sudden and persistent drop in flow performance
- Starting with smaller pumps, maintenance schedules are being modified to remove the need for annual lifting and inspection

WHERE FLOW PERFORMANCE DATA IS USEFUL

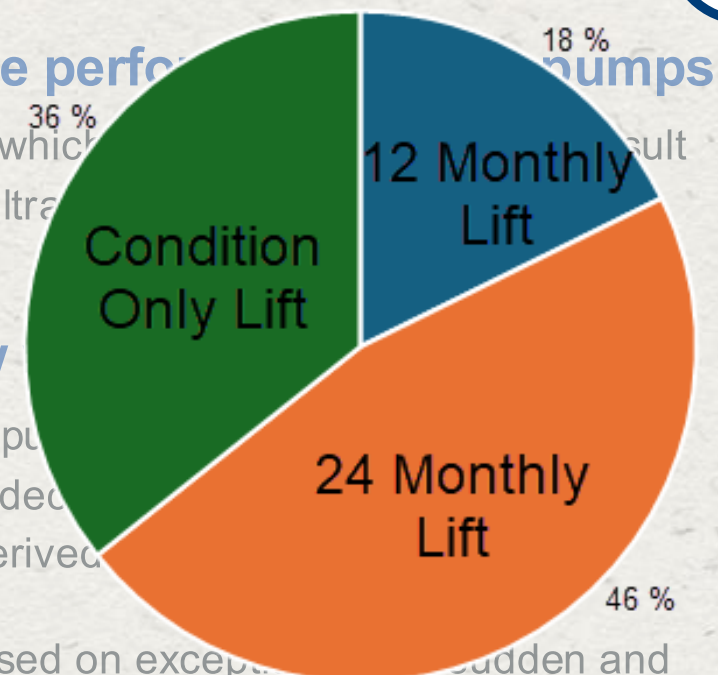


Hunter Water *had* a culture of making do with not knowing the performance of pumps

- Assumption that a pump is operating at its design duty when assessing inflow, which results in a 36% increase in pump run times
- Uncertainty if an increase in pump run times is due to increased inflow (e.g. infiltration)
- **Maintenance based on yearly inspection rather than pump performance**

Some simple changes that have occurred since Derived Flow

- Network Planning routinely checks pump performance rather than assume the pump is operating at its design duty
 - i. Capital spending is now improved with accurate network flows informing decisions
 - ii. Inaccurate or outdated asset data is being purged from our systems – Derived Flow performance in the field doesn't match modelled performance
- Systems are in place where Derived Flow is driving interventions for pumps based on exceptional sudden and persistent drop in flow performance
- **Starting with smaller pumps, maintenance schedules are being modified to remove the need for annual lifting and inspection.**



WHERE FLOW PERFORMANCE DATA IS USEFUL



Benefits from Derived Flow that were unlooked-for

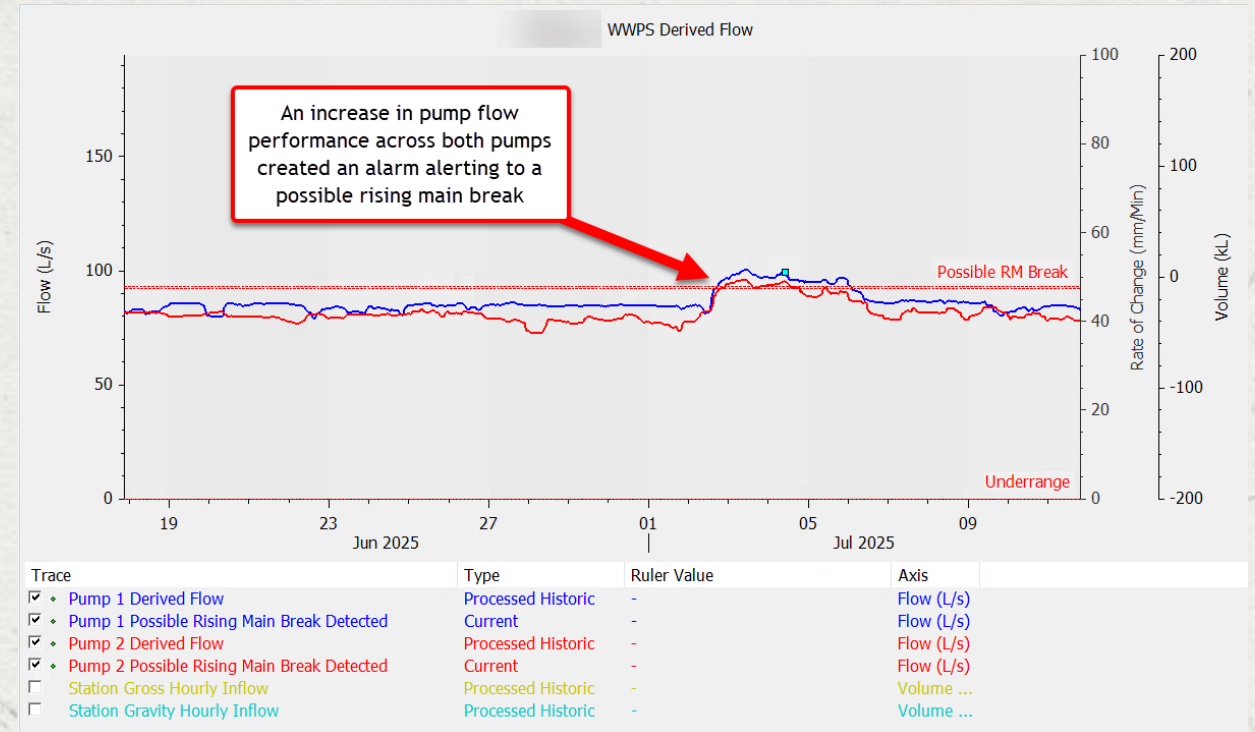
- Shows when reflux valves (non return valves) are leaking
- Reveals when air is accumulating in a rising main and helps evaluate the impact.
- Confirmed for us that minimum velocities are important in pump station pipework lest the pump suffers.
- Now used to detect rising main breaks by responding to sudden increases in pump flow rate

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Hunter Water has added network monitoring that is only possible by monitoring all pumped flows

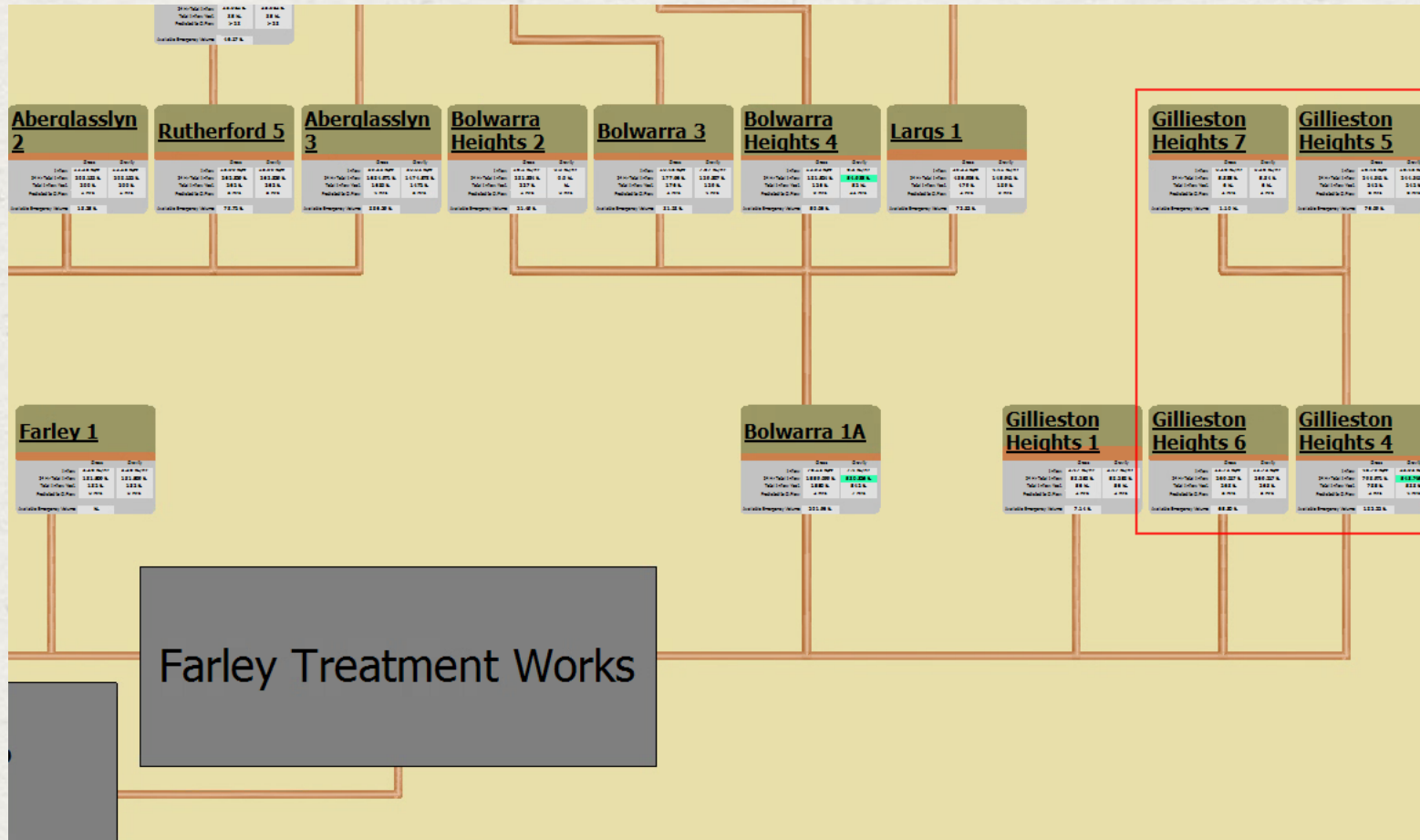
- Mass flow through *all* pump stations is measured each hour, local to the station*.
- Hourly data is used by SCADA to calculate the gross flow through each pump station and the gravity flow from that station's gravity catchment
- Monitoring of the 24-hour total gravity flow provides alerts to rising main breaks and catchment blockages i.e. whenever flow is going missing from the system.

* Accurate mass balance is only available in dry weather

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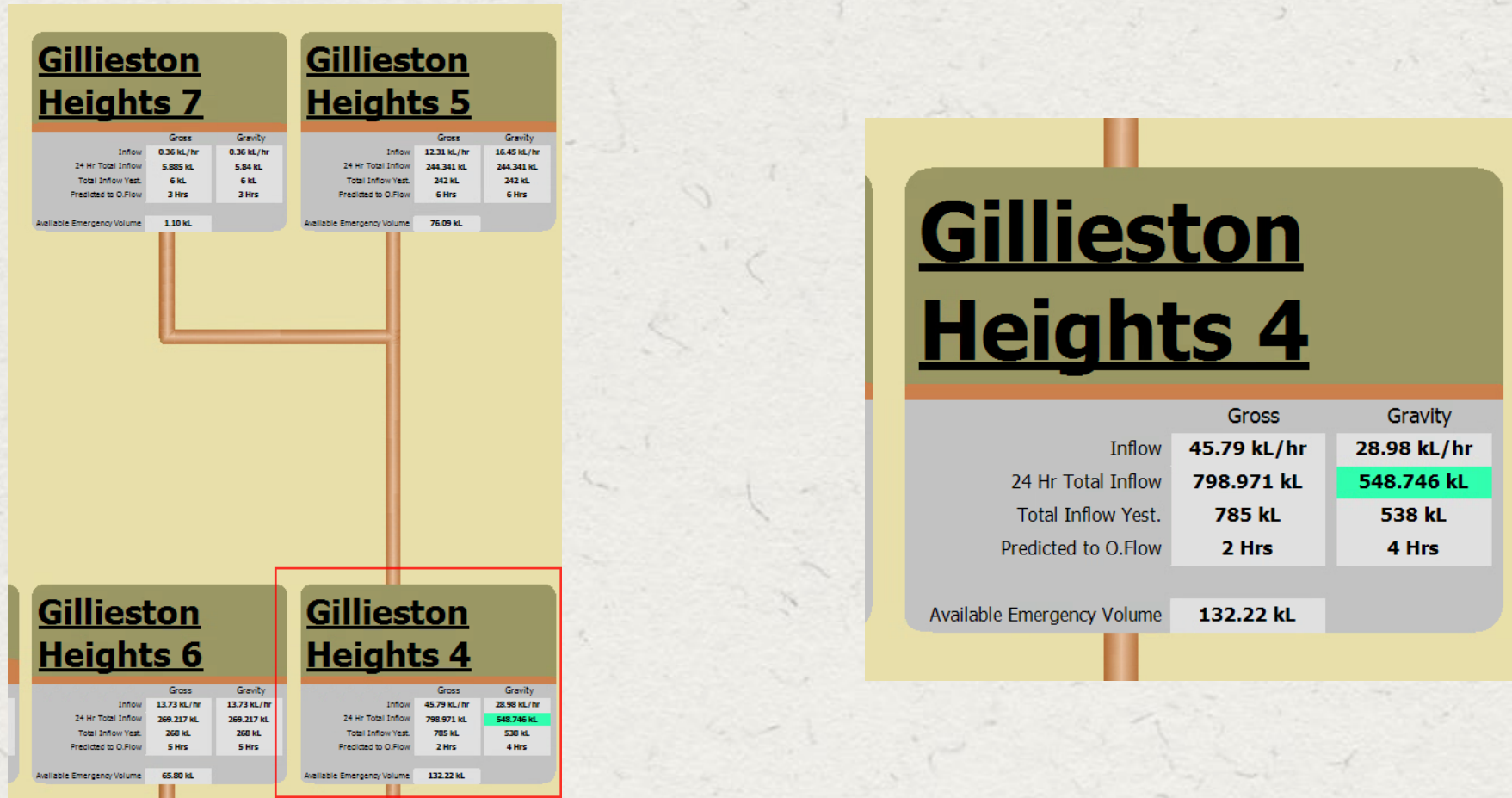
Hunter Water has added network monitoring that is only possible by monitoring all pumped flows



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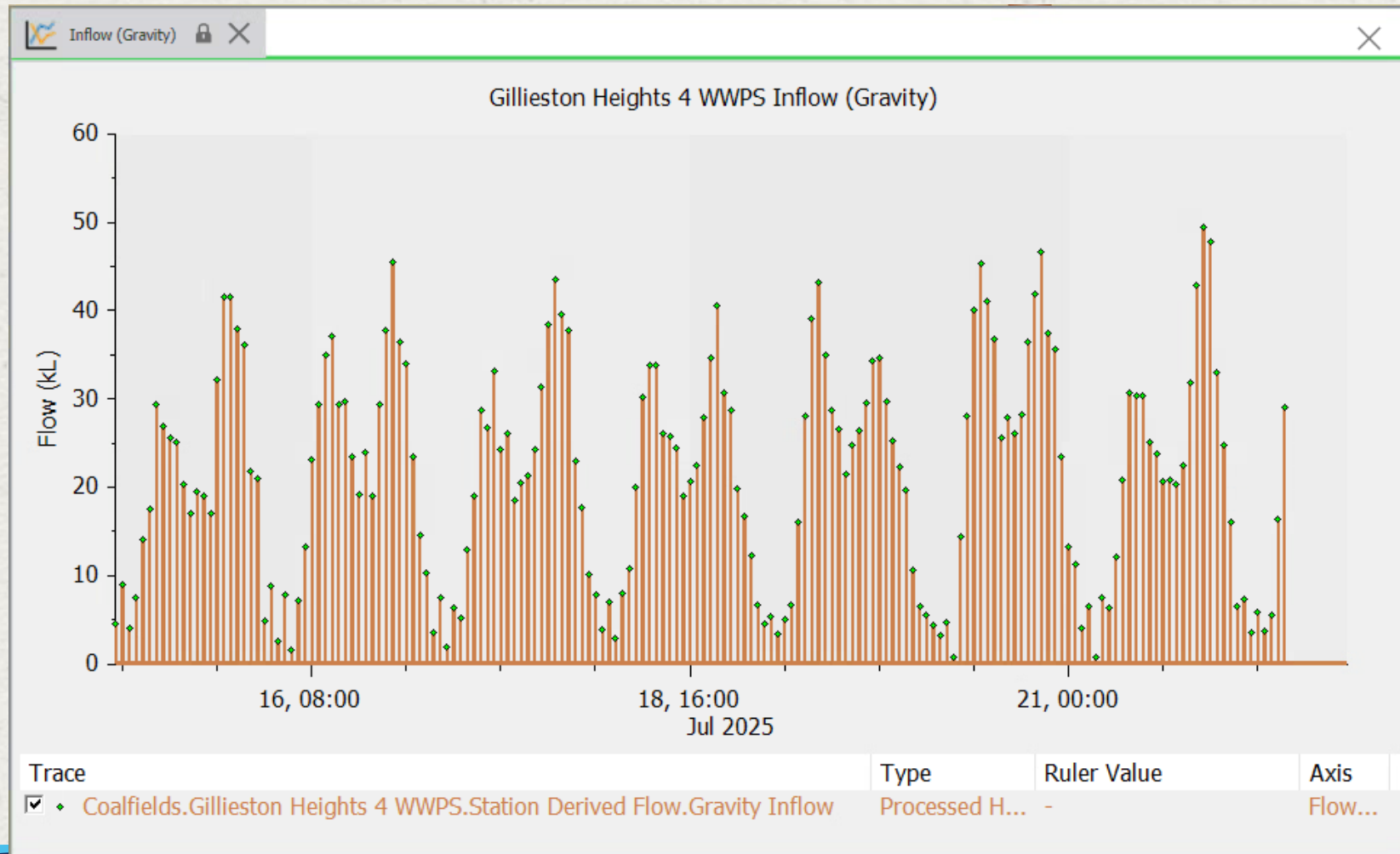
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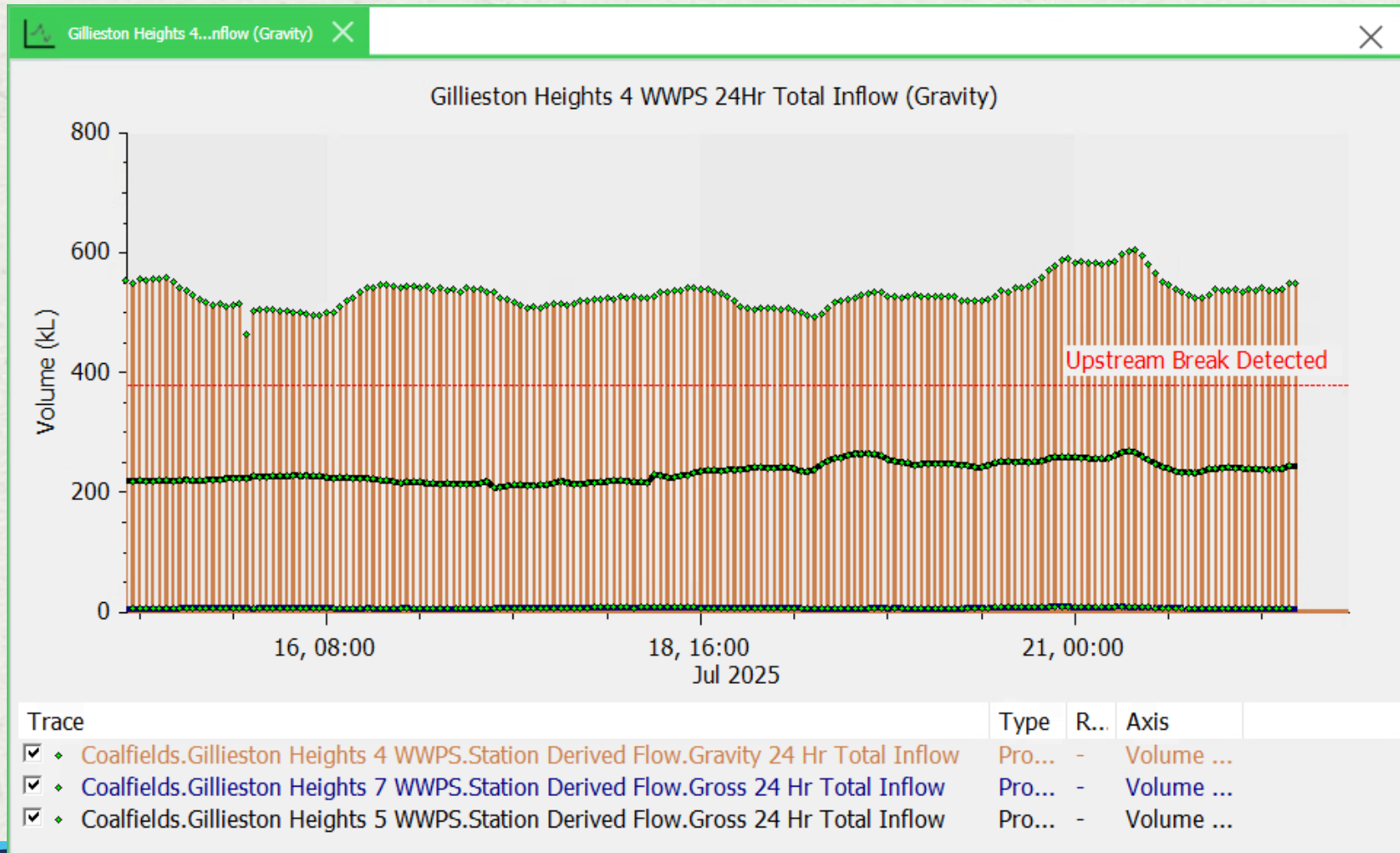
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CONCLUSION



Derived Flow has been a worthwhile investment

- Derived Flow has plugged what I consider to be the most important data gap in wastewater network management, for a fraction of the initial and ongoing cost of installing flowmeters at every pump station.
- Hunter Water has evolved into a business that operates with the full knowledge of the performance of its pumps and the volumes of sewage moving through its network – live.
- / believe this is the future for all wastewater networks that use pump stations that have wet wells.

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THANK YOU

Any questions?

<https://info.awa.asn.au/water-e-journal/wastewater-network-performance-benefits-from-rolling-out-derived-flow-at-hunter-water>

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