



Showcase of optimisation projects at Gold Coast Water

Thurs 14th Aug

Stapylton Effluent Reuse Main:
Receives Class B RW from
Beenleigh Sewage Treatment Plant (Logan)

Beenleigh Sewage Treatment Plant
(Currently treats Stapylton flows)

BEENLEIGH AREA -
EXCISED 2008

Logan City

Redland City



Pimpama Sewage Treatment Plant

Coombah Sewage Treatment Plant

Queensland

Infrastructure Summary (2014)			
Capacity	ML/d	000 EP	
Coombah	- 70	303	
Marrimac	- 57	204	
Elanora	- 23	99.5	
Pimpama	- 9	68	
*** 24.4 to Stapylton			
No. of Sewage Treatment Plants	- 4		
No. of Sewerage Pump Stations	- 530		
Kilometres of Sewer Mains	- 3,180		
Advanced Recycled Water Treatment Plant (Pimpama)	- 1		

Northern Recycled Water
Release Main

Southern Recycled Water
Release Main

Gold Coast Water's commitment

Gold Coast Water's commitment is to provide safe and reliable water and sewerage services to the Gold Coast, to protect our communities' health and lifestyle and help build future prosperity and opportunities.

Gold Coast Water is committed to meeting its primary objective whilst:

1. protecting the health and safety of ourselves and the community
2. performing regulatory requirements
3. preventing unacceptable impacts on the environment and the community and
4. planning, developing, operating and maintaining our assets efficiently and effectively

To do this, Gold Coast Water needs to find **innovative** ways to carry out business.

Optimisation Projects at Gold Coast Water

1. Optimisation projects (implementation in the short term)

- Energy efficiency projects (Coomababah STP, Merrimac with 'case study')
- Biosolids dewatering optimisation (Dehydri Twist results, Dewaterability testing)

2. Medium Term investigations

- Cogeneration delivery models
- Settleability optimisation (Biomag trials)



Selection of Energy Optimisation projects

Pimpama energy projects

- UV disinfection over-dosing – 62mJ/cm² vs 30mJ/cm²
- Switch it off

Elanora energy projects

- New cogen (now running!!)

Merrimac energy projects

- Blower replacement project (one stage)
- Intermittent mixing trial (case study)
- Odour control efficiency investigation (13% of power consumption)

Selection of Energy Optimisation projects

Merrimac Intermittent Mixing trial

- Intermittent mixing (switching mixers on and off rather than running 24 hrs) has been implemented across many plants as a cost effective way to decrease energy use, while maintaining effluent quality
- Gold Coast Water began a trial in June 2013 to investigate potential benefits at Merrimac STP (Stages 4 and 5). This was estimated to save \$60,000 per year.
- June 3-4, 2013: Some Stage 4 mixers operated in intermittent mode for a few hours.
- June 6, 2013: All Stage 4 mixers in the anaerobic/anoxic zones were switched to intermittent operation; operating on and off for alternate twenty minute intervals continually. Effluent quality, the aeration basin suspended solids and mixer operation were monitored.

Selection of Energy Optimisation projects

Merrimac Intermittent Mixing trial

- July 3 2013: No problems were observed with the Stage 4 mixers, so Stage 5 aerobic/anaerobic mixers were switched over to intermittent operation (mixers adjacent to a faulted mixer left in continuous operation).
- October, 2013 a review of the trial was carried out. Evidence of electricity savings, with no issues with the mixers, effluent quality or solids accumulation in bioreactors.
- Electricity consumption savings for the July and August were 74 MWh and 60 MWh respectively (expected saving ~56MWh/month)
- December, 2013 a number of mixers in both Stages 4 and 5 failed. On removing the mixers several issues were discovered attributed to (or exacerbated by) the intermittent mixing trial.

Selection of Energy Optimisation projects

Merrimac Intermittent Mixing trial

Stage 5: For three of the mixers the guide rails had sheered at the point where the brackets holding the mixers were welded onto the guide rails.



Selection of Energy Optimisation projects

Merrimac Intermittent Mixing trial

Stage 4: Gear boxes showed large areas of wear which stopped the motor spinning the mixers even though the SCADA showed them operating. Intermittent operation thought to add to the wear by the force of the mixers large blades.



Selection of Energy Optimisation projects

Merrimac Intermittent Mixing trial – what went wrong?

- Risk of guide rails sheering was identified before the trial by O&M, however, it was expected that the guide rails were designed with the structural integrity to withstand the added force. This was not the case.
- Both mixer manufacturers were contacted prior to the trial and assured that the mixers could operate on 30 starts per minute (with the direct drive starter). Although this may be true, the effect on the life of the motors was not considered.
- Positive results of intermittent mixing trials from other water utilities had brought a sense of security in the trial. Since the failures of the Stage 5 guide rails have occurred, another utility has reported similar problems.

Selection of Energy Optimisation projects

Merrimac Intermittent Mixing trial – lessons learnt

- Greater care should be taken in listening and investigating concerns of staff with the alternate operation of equipment
- Equipment manufacturers may not understand the trial conditions or the operational life expected from the assets
- Although the trial started with a risk assessment and trialled a single mixer, it would have been a much lower risk to operate this way for a longer length of time (6 months) before rolling out the trial
- Trials always come with risk!

Selection of Energy Optimisation projects

Merrimac Intermittent Mixing trial – way forward

Soft starters installed on one mixer in Stage 4 and one mixer in Stage 5 for trial

Two galvanised shafts have been fabricated for Stage 5 (currently being trialled under intermittent mixing conditions)

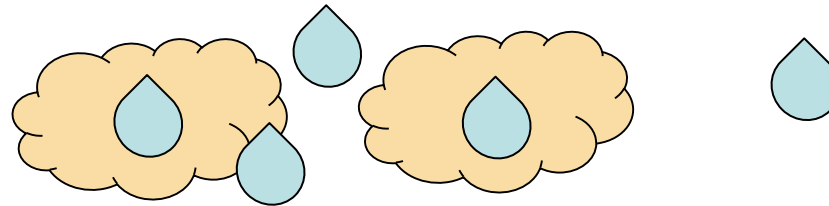
Trials will go for longer than 6 months, with condition checks and monitoring!!!

Spend to save ...

Dewatering Optimisation projects

Biosolids dewatering investigations:

- Dewaterability testing: free water content vs interstitial (capillary forces) vs surface (adhesive forces) vs intracellular



- Alternate dewatering technologies: Dehydris Twist Trial – Merrimac

Dewatering Optimisation Studies

- This data acknowledgement to UQ AWMC. Gold Coast Scientific Services developing in-house method.
- Typically Coombabah has worst dewaterability despite good %VS
- Opportunities for improvement

Figure 2 shows a comparison of results from lab-scale dewaterability testing with solids analysis from full-scale dewatered cake samples. In all samples, the lab-scale analysis predicted higher dewaterability than that currently achieved at GCCC WWTPs.

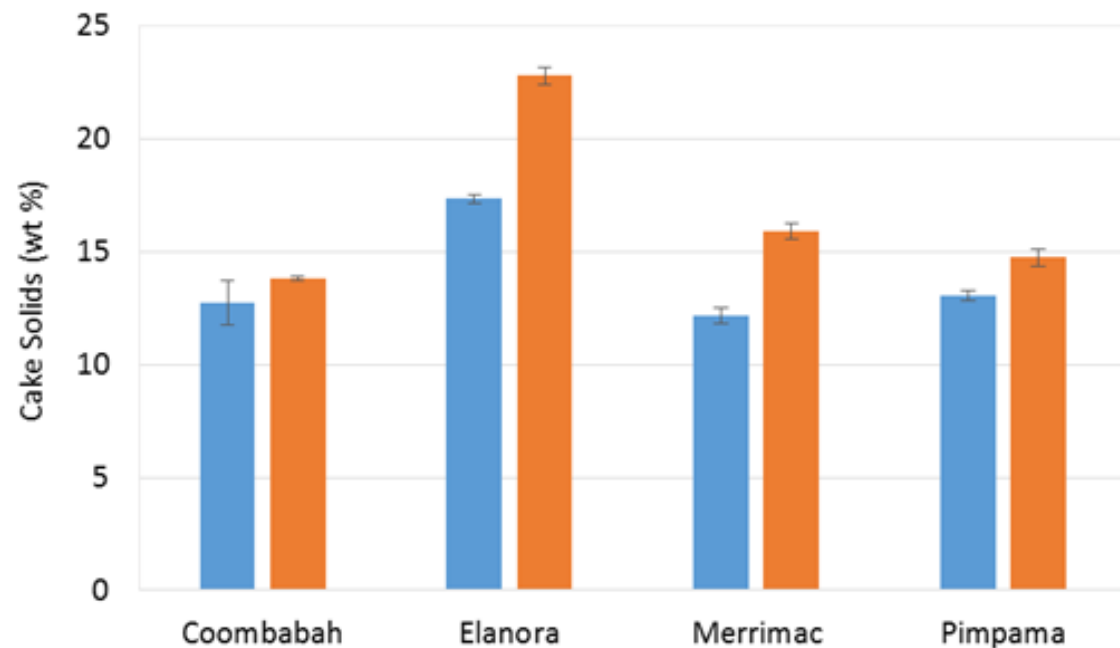


Figure 2: Comparison of results from lab-scale dewaterability testing with solids analysis from full-scale dewatered cake



CUSTOMER: GCW-SC-Process Engineering

Parameter	2015B3297 DehydriS Twist Cake T12 Repeat	2015B3298 Belt Press Feed T13	2015B3299 DehydriS Twist Filtrate T13	2015B3300 DehydriS Twist Cake T13	2015B3301 Belt Press Feed T14	2015B3302 Belt Press Feed T16 + T17	2015B3303 DehydriS Twist Filtrate T16	2015B3304 DehydriS Twist Cake T16	UNITS	Level of Reporting	PROC. REF.
Date Collected	02/06/2015	03/06/2015	03/06/2015	03/06/2015	03/06/2015	04/06/2015	04/06/2015	04/06/2015			
Time Collected	1530	1200	1230	1300	1530	0830	0830	0830			
pH		6.1	5.5		6.5	6.3	6.1			0.03	APHA 4500 H+
Ammonia Nitrogen											
Oxidised Nitrogen											
Orthophosphate Phosphorus											
Total Nitrogen											
Total Phosphorus											
Total Suspended Solids			130				250		mg/L	2	APHA 2540 D
Volatile Suspended Solids			130				190		mg/L	2	APHA 2540 E
Total Solids	26.7	1.24		26.2	1.64	2.02		23.6	% wwt	0.03	APHA 2540 G
% Volatile Total Solids	75.5	75.0		74.8	76.5	72.7		73.9	VS % TS	3	APHA 2540 G



Figure 2 - Picture: DehydriS™ Twist Pilot Unit

Medium-term initiatives

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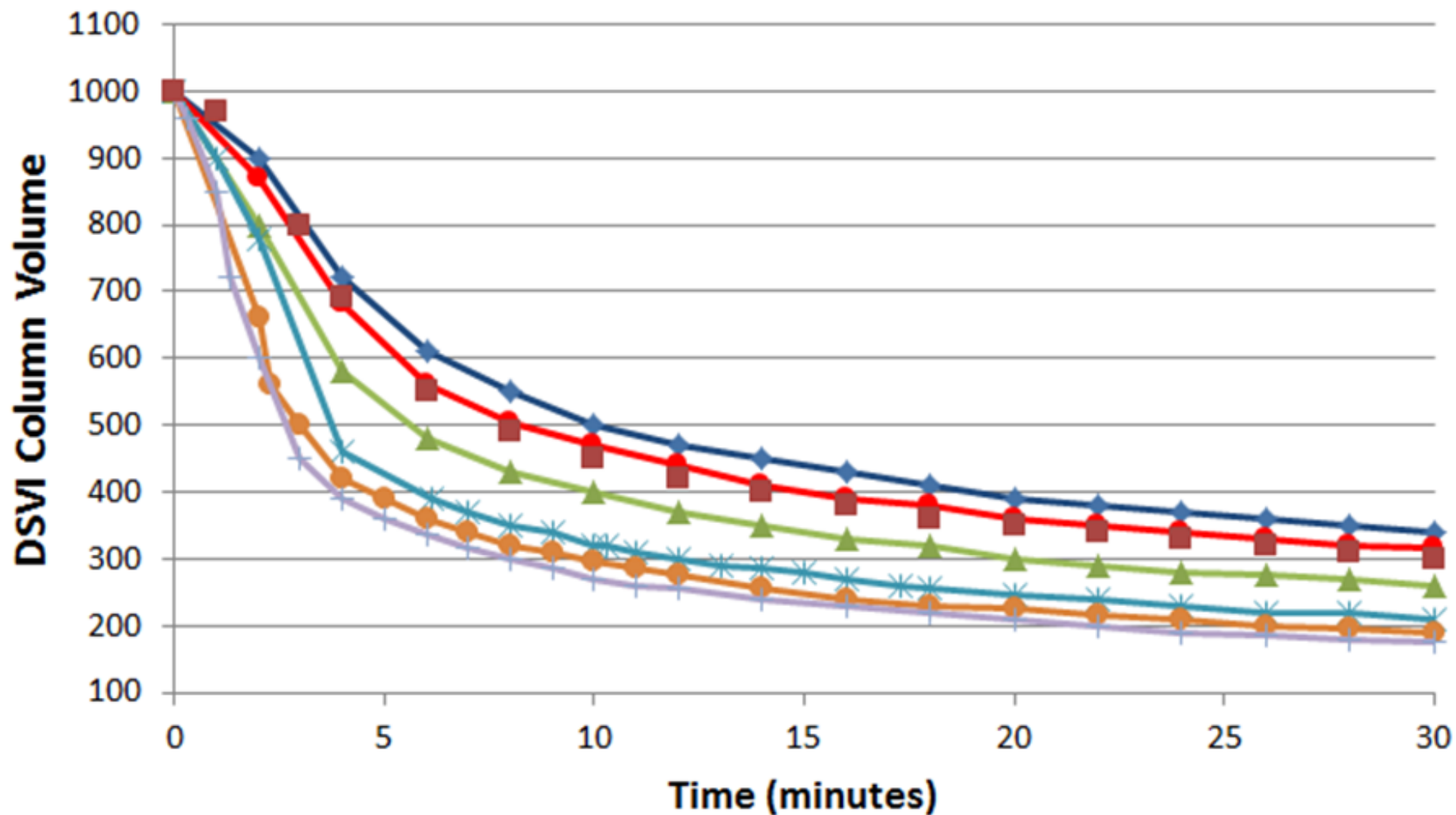
Medium-term initiatives

Alternate Upgrade options

- Coombabah designed for 3xADWF for 750L/ET/d (currently 530L/ET/d). Capacity a factor of both hydraulic and biological load. (@750L/EP then Coomb approx. 92ML/d, @530L/EP the capacity <66ML/d)
- Reduced sludge age (then new bioreactors)
- New bioreactors
- Primary Tanks
- Biomag (prelim study)
- MBR retrofit

M

Bio





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Contact details

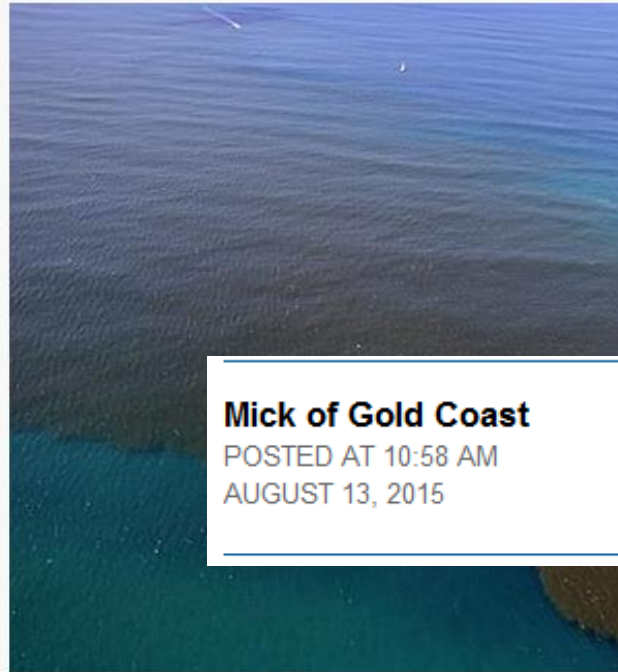
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Are they serious? Council says there's no evidence Seaway stain was real and it might be cloud shadow

State Govt investigates damage to the Seaway

NICHOLAS MCELROY • GOLD COAST BULLETIN • AUGUST 12, 2015

NICHOLAS MCELROY • GOLD COAST BULLETIN • AUGUST 13, 2015 12:00AM



Mick of Gold Coast

POSTED AT 10:58 AM

AUGUST 13, 2015

Plume in water and desal plant starting up... Coincidence???

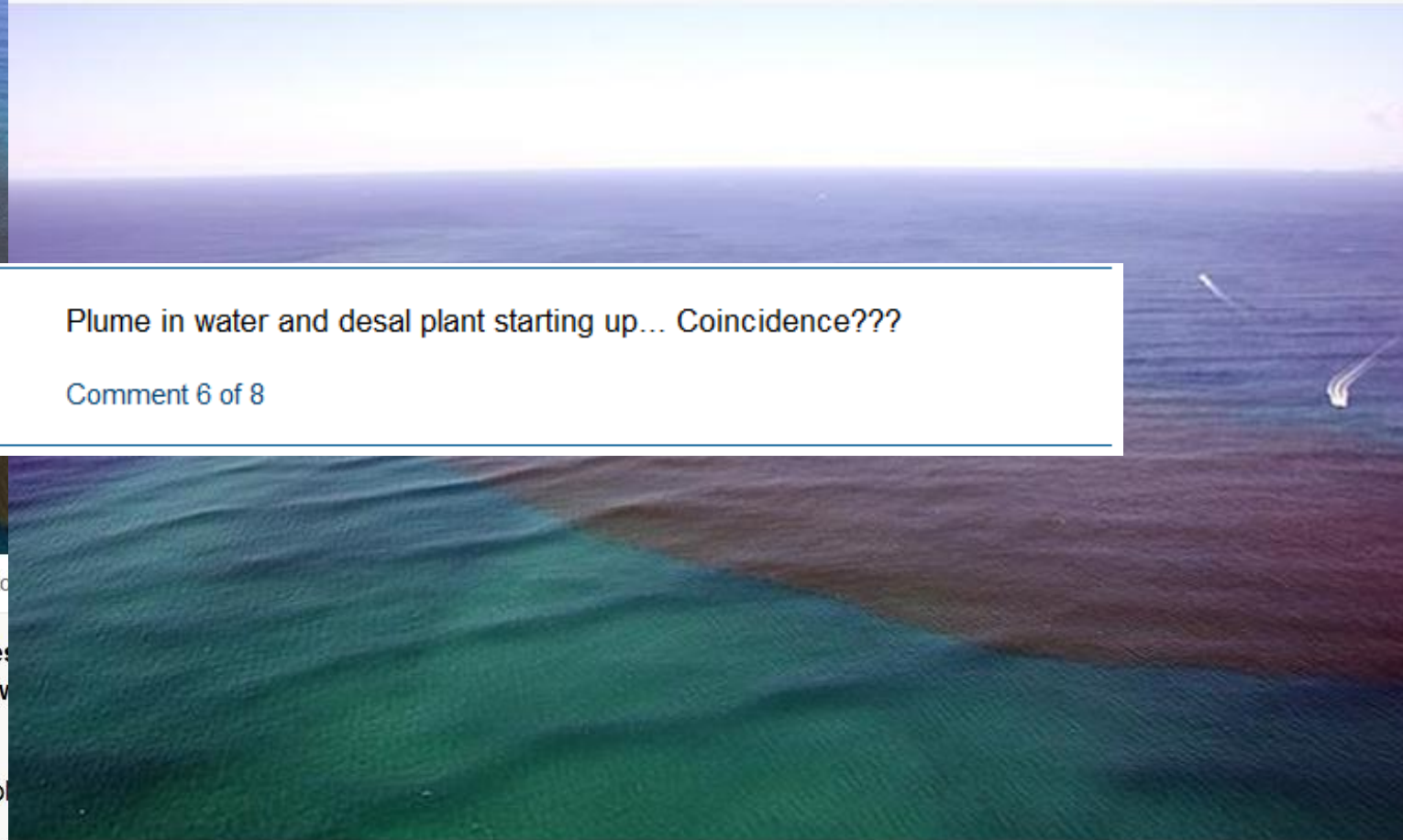
[Comment 6 of 8](#)

The dirty brown plume spewing out of the Seaway. Photo: Richard Gosling

THE State's environmental watchdog is investigating the water that engulfed half the Gold Coast Seaway out to sea.

Council and waterways experts have been unable to explain the phenomenon.

Each day the council pumps 94 million litres of effluent from four sewage treatment plants into the Seaway or



One of the photos we took from a helicopter on Monday of the plume of dirty brown going out to sea from the Seaway. A Gold Coast City Council rep yesterday said there was no evidence this plume happened and suggested it may be the shadow of a cloud. Photo: Richard Gosling