




Orange media upgrade –
to the heart of the matter

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Icely Road Water Filtration Plant

- supplies Orange ~ 40,000 pop and ~ 15,500 connections
- raw water sourced from Suma Park Dam
(inputs = rural catchment, bores, urban stormwater & Macquarie River)
- built in 1962 originally with 4 filters (4 more added in 1986)
- process components:
 - pre-ozonation
 - flocculation (aluminium chlorohydrate & filter aid)
 - horizontal clarifiers (4)
 - **filters (8)**
 - ozone contact / BAC filters (3)
 - chlorination
- 4 operators, supervisor, consultant advice for process engineering

where we were in early 2013

- **post std filter turbidity ~ 0.3 NTU's**
- backwash ~ every 20 hrs (air scour 5 min & backwash 8 mins)
- media top-up yearly
- full filter overhaul not scheduled
- monitoring – good data individual filter turbidity meters (Hach 1720E's)
- final turbidity i.e. post ozone/BAC ~ 0.15 – 0.2 NTU's



where we wanted to be

< 0.15 NTU please!

Table 21: Pathogen log reduction values estimated and validated at time of Blackmans Swamp Creek Stormwater Harvesting Scheme Risk Assessment Workshop

Process step	Microbial pathogen group and conservatively estimated log reduction value assigned to process step when operating within critical limits (for claims > 1 log ₁₀) or within nominal target criteria (for claims ≤ 1 log ₁₀).		
	Protozoa	Viruses	Bacteria
Holding pond	0.5 ^e	0.5 ^e	0.5 ^e
Batch pond	0.5 ^e	0.5 ^e	0.5 ^e
Suma Park Dam	1.0 ^e	1.0 ^e	1.0 ^e
Coagulation-flocculation-sedimentation-filtration	4.0 ^v	1.0 ^e	2.0 ^e
Ozonation	0.5 ^v	4.0 ^v	4.0 ^e
Chlorination	0.0 ^v	4.0 ^v	4.0 ^e
Total log reduction achieved	6.5	11.0	12.0
Log ₁₀ reduction values required ^{1*}	4.9	5.5	5.4
Margin of safety [*]	1.6	5.5	6.6

where we are now

- **post std filter turbidity ~ 0.06 – 0.08 NTU's**
- backwash ~ every 30-40 hrs (air scour 3 min & backwash 5 mins)
- 6 yearly media replacement recognised in asset management plan
- final turbidity i.e. post ozone/BAC ~ 0.04 – 0.07 NTU's

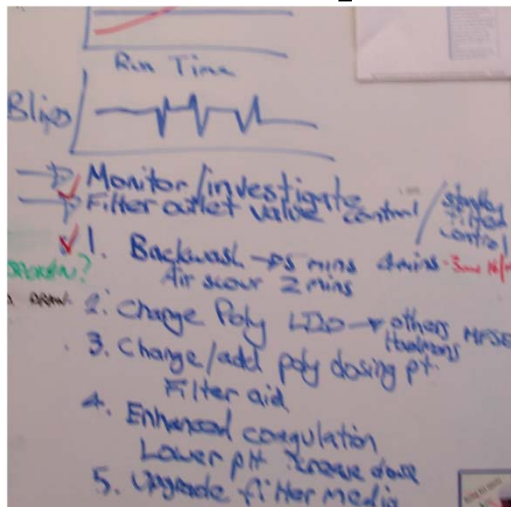


where we are now

Turbidity Critical Control point

What is being measured?	Turbidity	
Where/how is it being measured?	Individual filter effluent AND combined filter effluent. Monitored online and checked regularly by operator. Alarmed to operator.	
What is the control point?	Filtration	
What are the hazards?	Pathogens (4 log ₁₀ <i>Cryptosporidium</i> reduction credit as per USEPA 2006 Table IV.B-3 and Table IV.D-1), Alga cells, Turbidity, Metals.	
Operating Target	Adjustment Limit	Critical Limit (combined filter effluent only)
<0.15 NTU, with <0.1 NTU at 95%ile monthly	>0.3 NTU for more than 15 minutes	>0.5* NTU
<ul style="list-style-type: none"> Monitored on-line and regularly checked by operators Daily water quality checks of process steps throughout plant Automatic backwash system Regular equipment checks and calibration Low level alarm set at 0.15 NTU High level set at 0.3 NTU Operate to SW1221313 CWT 2010, Turbidity and Pathogens 	<ul style="list-style-type: none"> Operator respond to alarm and fix problem immediately Check on performance of coagulation – operational target of <1 NTU, and critical limit of >3 NTU Check raw water turbidity Make required adjustments to coagulation (SW1221312) Check dosing pumps and coagulant quality and chemical feeders for proper operation and feed rates Initiate backwash Determine if one or all filters – take off line if possible Notify Supervisor when available 	<ul style="list-style-type: none"> Contact Supervisor (0419 267 869) or Water Treatment Manager (0419 019 729) Shut down plant <p>If this Critical Limit is exceeded the Public Health Unit will be notified as soon as practicable on Phone: 02) 6330 5941 Mobile: 0428 400 526 (ask for public health officer on-call) *Exception of >0.8 NTU applies through until 1 March 2015</p>

how we got there - the plan



how we got there *- the HR frame*

- operator (18 years) recently appointed Team Leader to work through action list
- unsuccessfully trialled:
 - more backwash schedules
 - changes to ACH & polymer aid dosing rates and aid dosing location
- Aug 2013 we bit the bullet and got to the heart of the matter
 - jumped to action 5 “upgrade filter media”
 - Team Leader led replacement of media as guided by supervisor



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how we got there *- the technical frame*

- old media removed with sucker truck (Polpure)
- Issues Paper (CWT) - 7 pages of optimal spec
- carbon, sand and garnet sourced from River Sands (Qld)
- crane placed 1 tonne bags (bark blower not efficient)
- cleaning old nozzles not efficient so new from Techpro (Sydney)
- cleared backwash pipework
- continued to use Hardman’s Alchlor Gold & N1900 filter aid

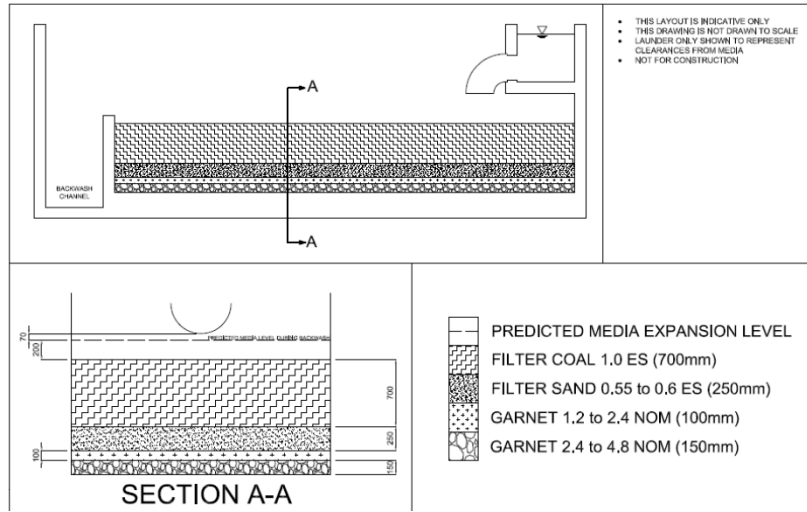
following awesome results:

- operators introduced backwash to waste for filter ripening period (2 filters so far)



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how we got there - the technical frame



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how we got there - the technical frame



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rewards



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Thank you

Further information:

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