Vinpac and ABC water reuse project – Case Study

Paul Grafton
Vinpac International

Introduction

- Paul Grafton
  - Quality Assurance Manager
- Companies involved:
  - **Vinpac International Pty Ltd**
    - Provider of packaging solutions to the wine industry
    - Includes wine making services, laboratory, bottling, warehousing and packaging materials
  - **Adelaide Brighton Cement Ltd**
    - Leading integrated construction materials and lime producing company
    - Angaston plant produces 280,000 tonnes of cement and lime products for the construction industry

Vinpac International site

Pipe to Dam

Adelaide
Brighton
Cement works
Vinpac
International site
Pipe to Dam

Adelaide Brighton Cement works

Water Plant

The Vinpac Problem

- Vinpac’s Angaston facility produces approximately 30 million litres of waste water annually.
- Original treatment methods included the use of evaporation lagoons at a neighbouring site, owned by the mutual parent company. This was no longer suitable due to the volume of water produced.
- The water is high in organic material, this combined with the flow rate makes it unsuitable for discharge to the local municipal water treatment plant.

The ABC Problem

- A high consumer of water in a dry state
- Desire to reduce the consumption of mains water but engineering solutions are highly expensive and can only reduce the consumption so far
  - ABC has further reduced their mains water consumption with the capture and reuse of stormwater from the ABC site, with this water being used for the same process as the Vinpac supplied water

Vinpac's options

- Build a water treatment facility to improve the water to a level suitable for
  - irrigation to crops and vineyards
  - disposal to sewer; or
  - use at ABC
- Truck the water offsite for disposal via pasture irrigation or hydrating compost

Option assessment

	Set up cost	Ongoing costs	Environmental benefit	Risk
Irrigate	$$$$$	$$$	+ + +	X X
Sewer	$$$$$	$$$	+	X X
Truck	$	$$$$	+ + +	X X
ABC	$$$	$$	+ + +	X

Formal agreement

- Vinpac and ABC personnel met and agree on a set of specifications for the water and a plan for the implementation of the project
- EPA contacted to ensure that the project will be acceptable to the licence held by ABC
- Trial of water conducted to ensure that the water quality does not impact on the quality of the product produced by ABC
- ABC EPA licence amended to include the provision for the use of Winery Waste water and Wash water

Plant construction

- Plant designed to
  - Collect and treat 200,000L of water per day
  - Deliver 200,000L of water to ABC over a 10 hour period
  - Store up to 2 weeks of water at a daily rate of 200,000L
  - Adjust the pH of the water
  - Operate 24 hours a day, 7 days a week without human intervention
  - Collect and treat peak storm related flows of water

Design and outfit

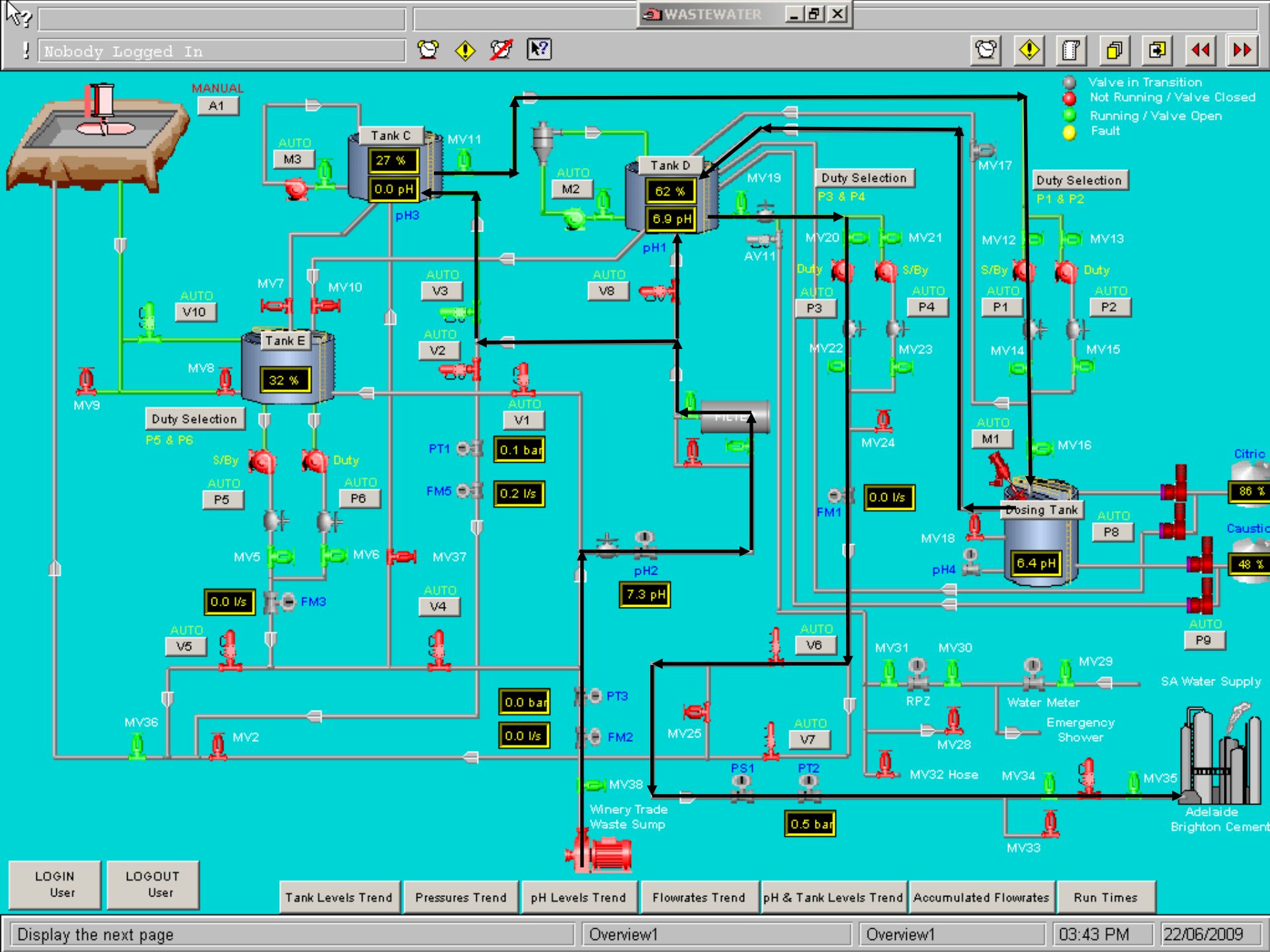
- 2 x 250,000L steel storage tanks, fitted with poly lining
- 1 x 3,800,000L poly lined dam
- 1 x 22,000L in ground tank for solids separation and over flow protection
- 1 x 4,500L dosing and mixing tank for pH control
- 80mm and 100mm uPVC pipe used throughout facility
- 2 x 2,200L chemical tanks
- Bunded area can contain 380,000L

Design and outfit

- 6 x flow meters
  - 4 x at the plant
  - 2 x inline at the Vinpac sumps
- pH is measured in 4 separate locations
  - Mixing tank
  - Inline from Vinpac
  - 2 x water storage tanks
- Level detectors used in 5 of the tanks
  - 3 x water tanks, 2 x chemical tanks
- 10 x automatic valves
- 38 x manual valves
- 3 x pressure transducers

Design and outfit

- 13 x pumps at the plant
  - 3 x mixing pumps
  - 4 x dosing pumps
  - 2 x transfer pumps (submersible)
  - 4 x transfer pumps (inline)
- 4 x pumps at Vinpac
  - 2 x mono pumps
  - 2 x submersible pumps

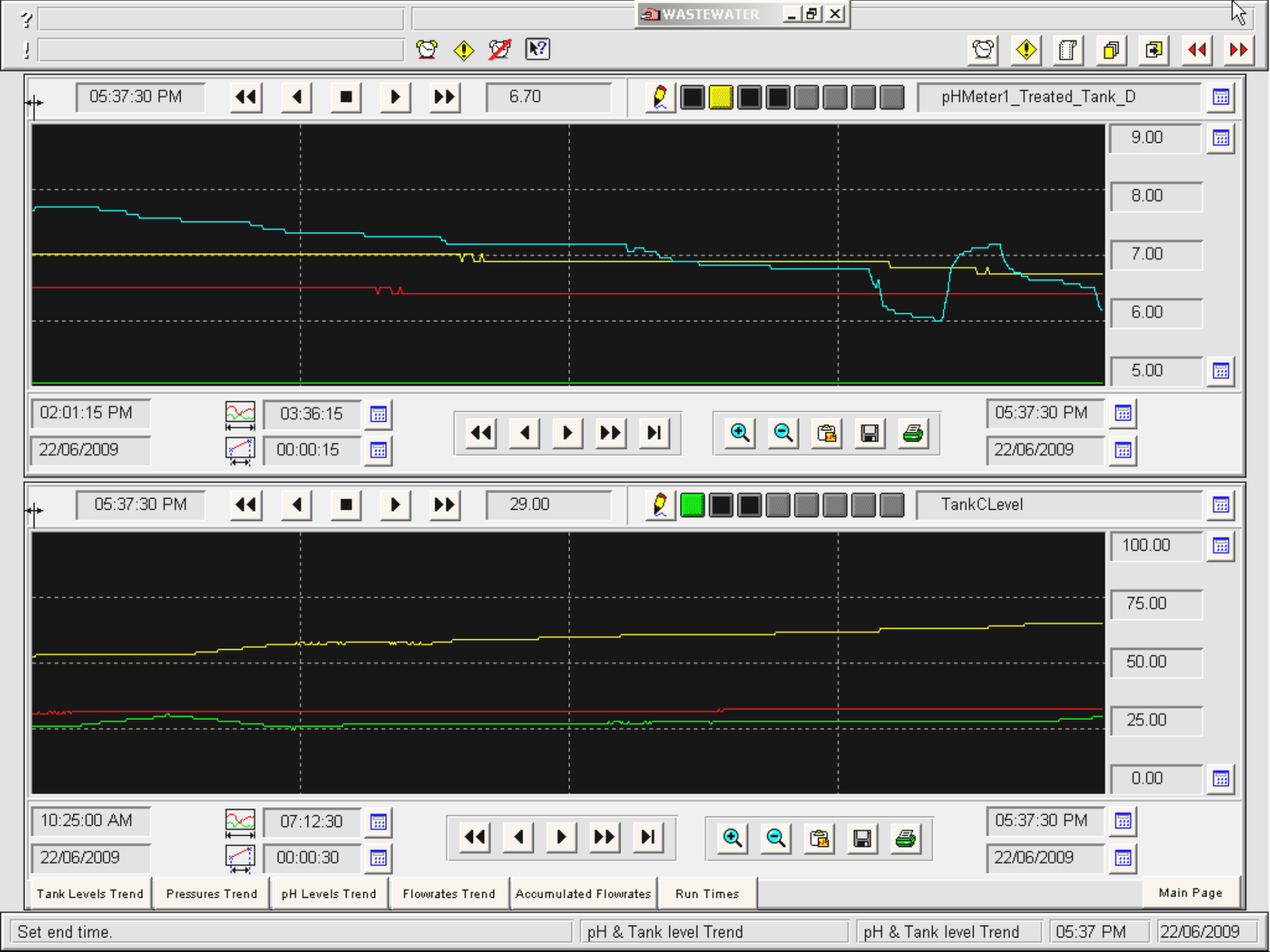

WASTEWATER
Nobody Logged In
Valve in Transition
Not Running / Valve Closed
Running / Valve Open
Fault
MANUAL
A1
Tank C
27 %
0.0 pH
pH3
MV11
AUTO
M3
Tank D
62 %
6.9 pH
pH1
MV19
AV11
AUTO
M2
Duty Selection
P3 & P4
Duty Selection
P1 & P2
MV17
MV20
MV21
MV12
MV13
Duty
S/By
S/By
Duty
AUTO
P3
AUTO
P4
AUTO
P1
AUTO
P2
MV22
MV23
MV14
MV15
AUTO
V10
MV7
MV10
AUTO
V3
AUTO
V8
AUTO
V2
Tank E
32 %
MV8
MV9
Duty Selection
P5 & P6
S/By
Duty
AUTO
V1
PT1
0.1 bar
AUTO
P5
AUTO
P6
FM5
0.2 l/s
MV24
AUTO
M1
MV16
Dosing Tank
6.4 pH
pH4
MV18
FM1
0.0 l/s
AUTO
P8
Citric
86 %
Caustic
48 %
MV5
MV6
MV37
pH2
7.3 pH
0.0 l/s
FM3
AUTO
V4
AUTO
P9
AUTO
V5
AUTO
V6
MV31
MV30
MV29
SA Water Supply
RPZ
Water Meter
Emergency Shower
MV28
MV32 Hose
MV34
MV35
MV33
Adelaide Brighton Cement
MV36
MV2
0.0 bar
0.0 l/s
PT3
FM2
MV25
AUTO
V7
PS1
PT2
MV38
Winery Trade Waste Sump
0.5 bar
LOGIN User
LOGOUT User
Tank Levels Trend
Pressures Trend
pH Levels Trend
Flowrates Trend
pH & Tank Levels Trend
Accumulated Flowrates
Run Times
Display the next page
Overview1
Overview1
03:43 PM
22/06/2009

ABC System controls

- Pump is controlled via pressure transducer in the line and feed back of valve position (open/closed)
- Valve assembly in line is controlled from the ABC Central Control room, which can also monitor the:
  - water level in the storage tank (Tank D)
  - flow rate in the pipe
  - pH of the storage tank

Monitoring and control

- CitectSCADA® controlled system connected to the Vinpac and ABC networks via wireless links
- Citect® system remotely monitored via Timbuktu Pro® installed on various desktop PCs
- Various screens set up for monitoring and recording data over time
  - Flow rates
  - pH levels
  - Tank levels
- Data is graphed to allow ease of trend analysis


WASTEWATER
05:37:30 PM
6.70
pHMeter1_Treated_Tank_D
9.00
8.00
7.00
6.00
5.00
02:01:15 PM
22/06/2009
03:36:15
00:00:15
05:37:30 PM
22/06/2009
05:37:30 PM
29.00
TankCLevel
100.00
75.00
50.00
25.00
0.00
10:25:00 AM
22/06/2009
07:12:30
00:00:30
05:37:30 PM
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Pressures Trend
pH Levels Trend
Flowrates Trend
Accumulated Flowrates
Run Times
Main Page
Set end time.
pH & Tank level Trend
pH & Tank level Trend
05:37 PM
22/06/2009

Accumulated Flowrate Totals

LOGIN User | LOGOUT User

Flow Meter 1 Tank D to Dam

0.0 kl	Yesterday
198 kl	Acc Total

Flow Meter 1 Tank D to ABC

0.0 kl	Yesterday
72143 kl	Acc Total
691.7 kl	Last Week
3359.2 kl	Batch

Reset

Flow Meter 2 Vinpac to Tank C

20.8 kl	Yesterday
73290 kl	Acc Total
333.9 kl	Last Week
1405.4 kl	Batch

Reset

Flow Meter 2 Vinpac to Tank D

2.5 kl	Yesterday
22569 kl	Acc Total
326.9 kl	Last Week

Flow Meter 3 Tank E to Tank C

0.0 kl	Yesterday
9113 kl	Acc Total

Flow Meter 3 Tank E to Dam

0.0 kl	Yesterday
2085 kl	Acc Total

Flow Meter 5 Vinpac to Dam

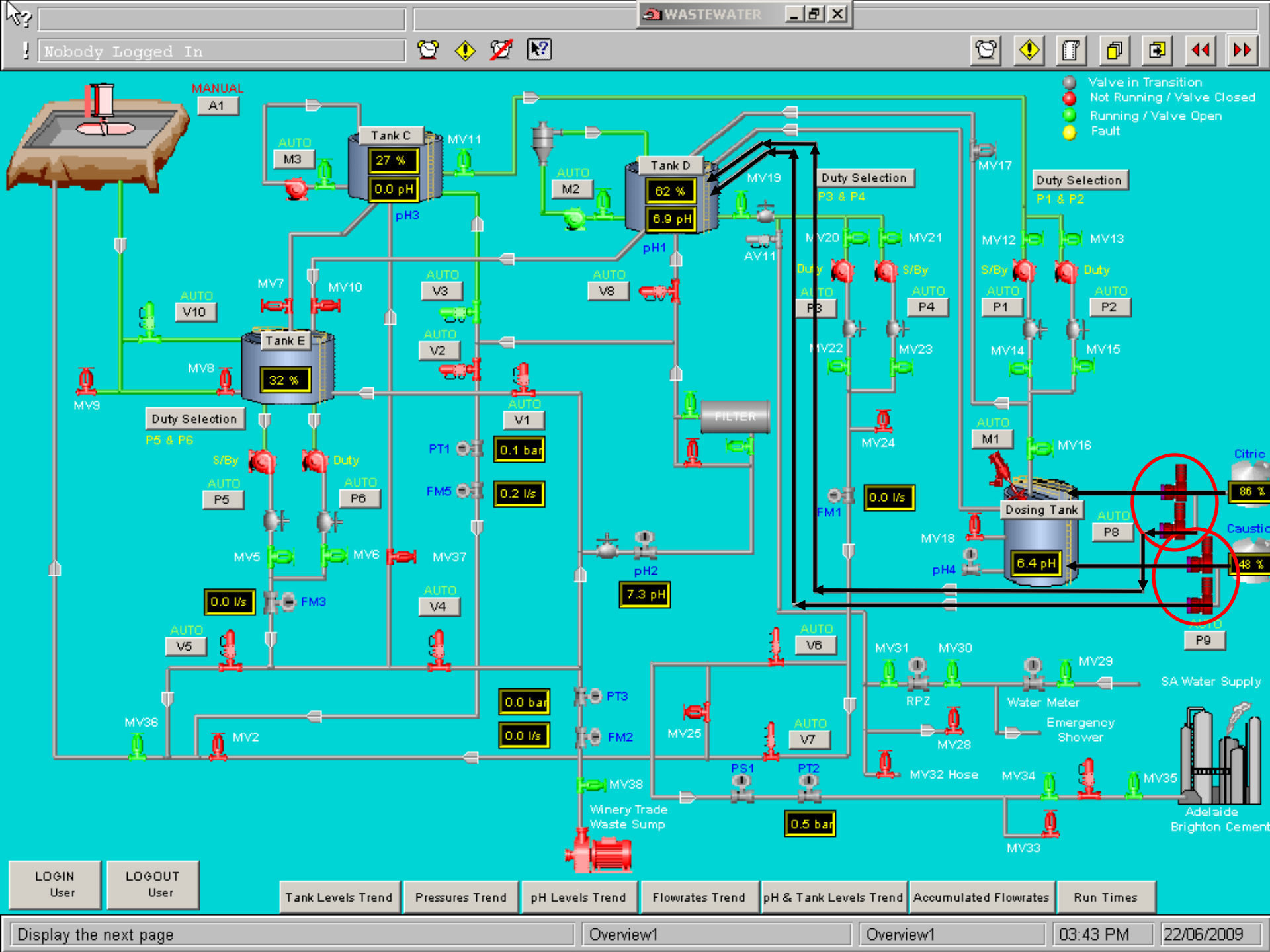
0.2 kl	Yesterday
14652 kl	Acc Total

Daily totals are from midnight to midnight

Weekly totals are from Sunday midnight to Sunday midnight

Monitoring and control

- pH dosing system is controlled via a feedback loop from the in tank (both dosing tank and Tank D) pH probes to ensure that the pH in Tank D is kept within the agreed parameters
- The equipment used includes Prominent dosing pumps, ABB AX400 pH controllers and ABB probes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S/By
S/By
Duty
AUTO
P3
AUTO
P4
AUTO
P1
AUTO
P2
MV22
MV23
MV14
MV15
MV7
MV10
AUTO
V10
AUTO
V3
AUTO
V8
AUTO
V2
Tank E
32 %
MV8
MV9
FILTER
MV24
AUTO
M1
MV16
Duty Selection
P5 & P6
AUTO
V1
PT1
0.1 bar
S/By
Duty
AUTO
P5
AUTO
P6
FM5
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FM1
0.0 l/s
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pH4
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AUTO
P8
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Caustic
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MV5
MV6
MV37
pH2
7.3 pH
0.0 l/s
FM3
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AUTO
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Modifications

- Ultrasonic sensors replaced with pressure pads
  - Warm water and cold ambient conditions resulted in condensation on the surface of the sensors
  - Condensation caused false high readings and alarms
- Bacterial growth
  - Original scope called for rapid turn over of the water to prevent odour formation
  - Currently required to dose the system with Bromochloro-5-5,Dimethylhydantoin to prevent unpleasant odour formation
  - Bacterial growth also lowers the pH of the storage tank after initial pH adjustment and required the installation of additional dosing pumps

Modifications

- Bacterial Growth
  - The growth of the organisms in the water has also resulted in higher than expected sludge production
  - This has resulted in Vinpac being required to empty the tanks and de-sludge them 4 times per year

Summary

- This project highlights
  - Cooperation can bring mutual rewards
  - A seemingly difficult problem can be solved by thinking outside the norm and looking at the region in a holistic manner
  - One persons trash is another persons treasure
- Annual water savings equate to 151 average South Australian households annual consumption

Other Environmental Projects

- Vinpac currently divert over 76% of our solid waste to recycling
- This will increase with the installation of a compactor unit to increase the efficiency of collection and transport of paper and cardboard waste
- Within 12 months Vinpac plan to divert all solid waste away from landfill
  - Any waste that cannot be recycled/reused will be sent to a ‘waste to energy’ project