

WATERWAYS ARE BEING MONITORED.

DO NOT POLLUTE OUR ENVIRONMENT. STORMWATER ONLY.



Environment
Protection

1300 EPA VIC (1300 372 842)



Melbourne
Water



Contaminated Industrial Stormwater Networks - Live Monitoring and Pollution Detection

Stormwater Victoria Conference

June 2019 – Heath Baker, Melbourne Water

Background – A legacy of pollution



May
2018

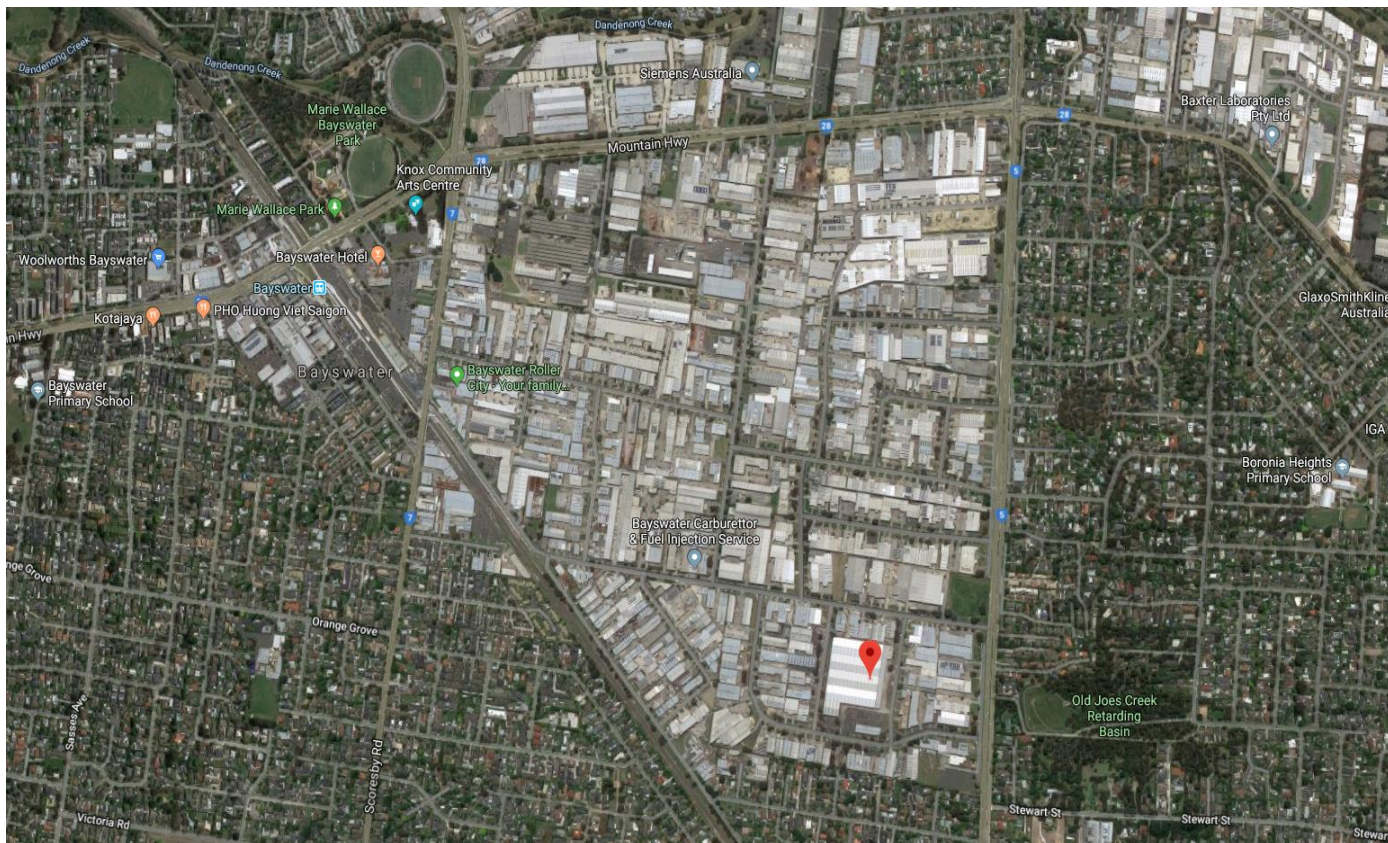
<https://twitter.com/7newsmelbourne/status/998320868781539328>

Industrial area challenges

- Business turnover
- Business Type
- Legacy contamination
- 'not my backyard' culture
- After hours
- Education / Knowledge
- Old buildings and infrastructure
- Heavy vehicle movements



Focus area



- Old Joes Ck
- Dandenong Creek Catchment
- ~9km from source
- 30km east of Melbourne CBD
- Metals, pesticides, hydrocarbons, surfactants

Multi agency blitz



MW, EPA, SEW,
KCC



2 full day blitz's
Dry weather
'Follow the flow'
& Research data

Multi agency blitz



Live flow and quality monitoring – Trunk and drainage monitoring

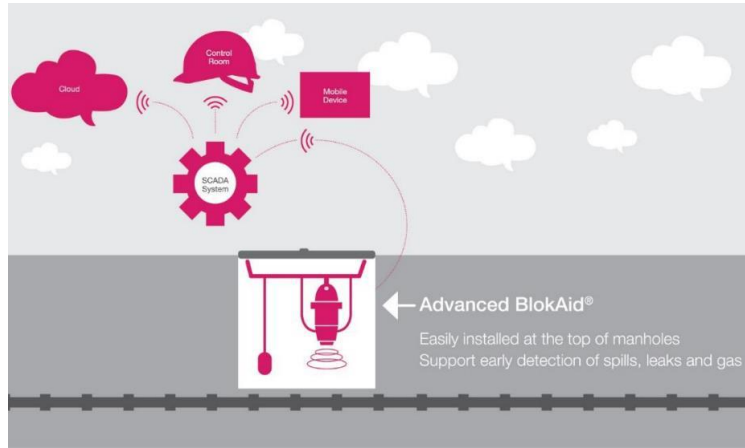


Ultrasonic -
Large dia.
network



Arduino -
Small dia.
network

Ultrasonic (BlokAid) - Incorporating sewer monitoring and alarm technology (Trunk)



- Monitor stormwater drain level, calculated flow and H₂S/VOC gas in real time



Ultrasonic benefits & installation



- Tested
- Lower cost
- Cloud based – 3rd party access
- Surface installation
- Less confined space issues
- Easily removable and relocatable

BlokAids in the network



- Trend flow patterns
- Overlay BoM rainfall data
- Seasonal trends
- Blockage alerts
- Early EPA notifications

Incoming data

Little Bunglook Creek

P13240-00043

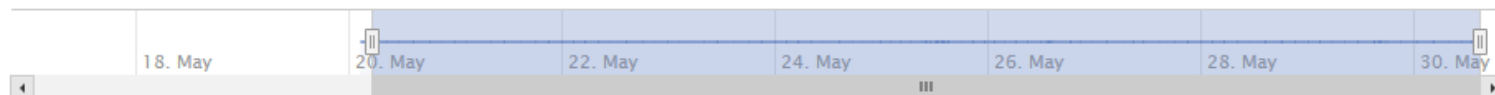
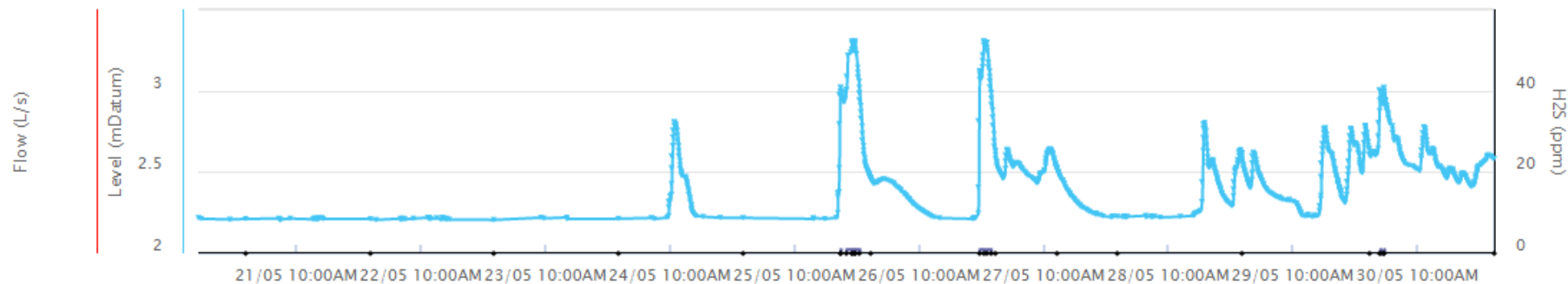


Manhole: 0406/MH001 [Bayswater Industrial Estate]

Last 14 days 0

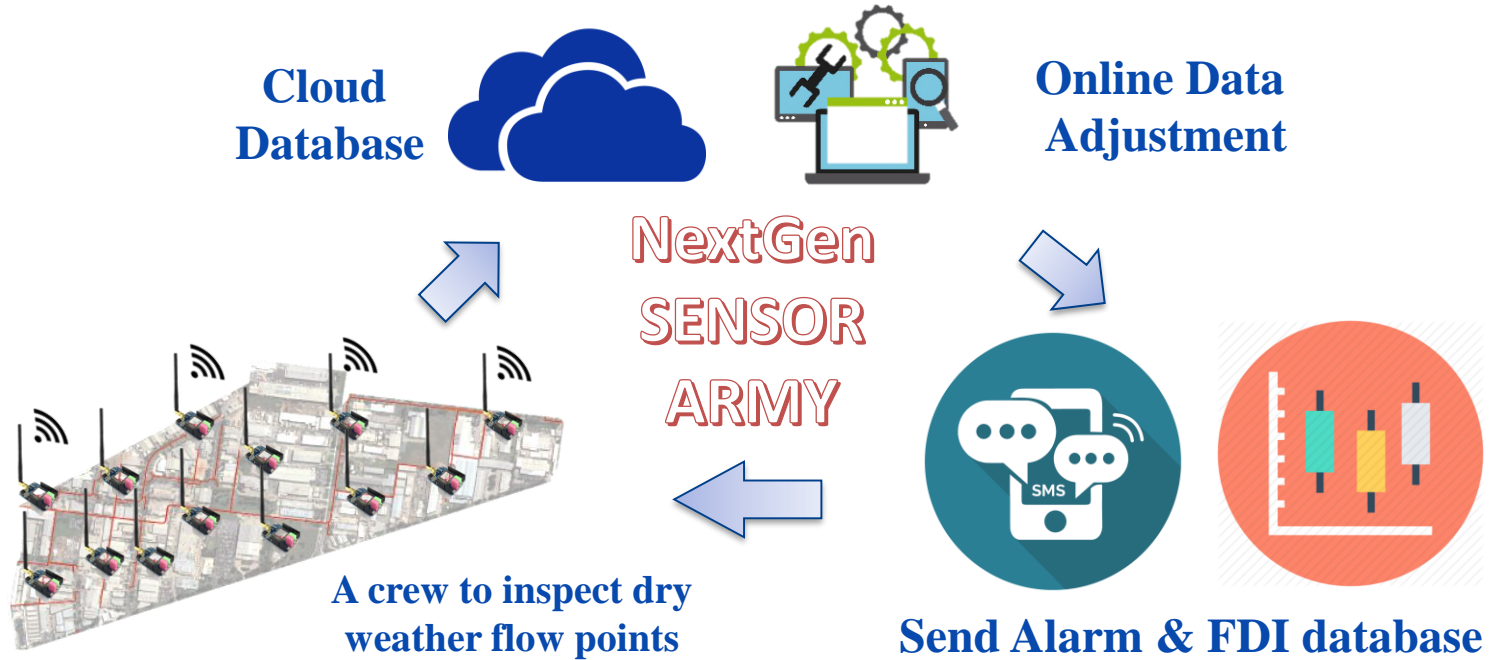


Zoom 6h 2d 7d 2w 1m All



● 0406/MH001 HighLevel Alarm ● 0406/MH001 Comms Alarm ● 0406/MH001 Spill Alarm ● 0406/MH001 LowBattery Alarm — 0406/MH001 Level
— 0406/MH001 EstimatedFlow — 0406/MH001 H2S

The Arduino 'Army' – Low cost, high spatial resolution (small dia. Network)



Arduino-based sensors - Background

Background

- Low cost sensors - Cost approx. \$100/unit
 - Many units with reasonable accuracy vs. one or two units of high accuracy.

Aims and objectives

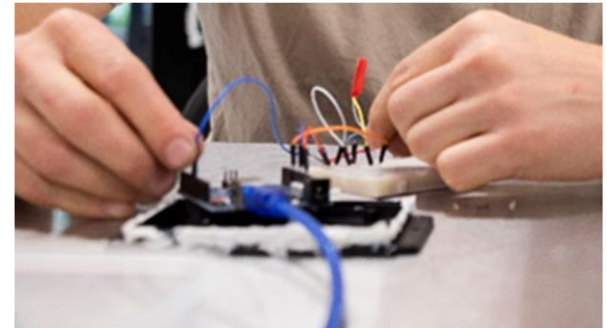
- Locate 'hot spots' with Ultrasonic (BlokAid) units
- Develop, test and deploy an 'army' of Arduino-based low cost water quality sensors to help track and mitigate sources of pollution

Development of Arduino sensors

- **Our objective - develop sensors with the following properties:**
 - water quality parameters (to begin with EC and temperature)
 - water flow estimates (to begin with, just depth of water)
 - cheap and ALL open source
 - send data to cloud continuously
 - Alarm capability
 - easy to install without confined space entry
 - long battery life

Making the sensors

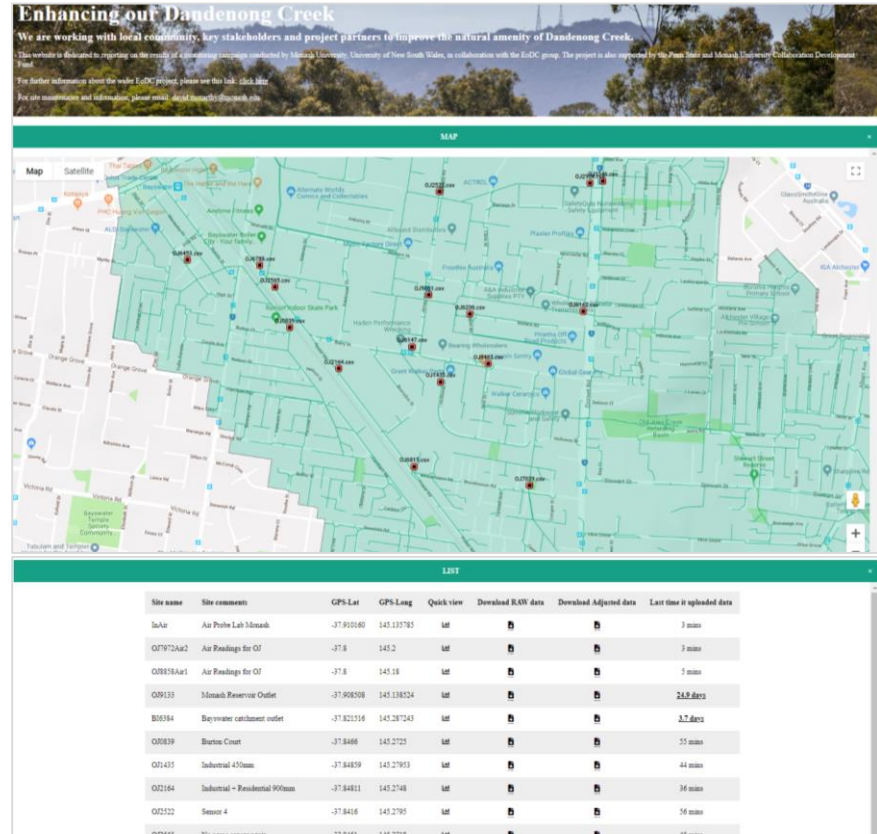
- Each unit (currently) contains the following main parts:
 - Arduino Mother board
 - SIM Card
 - Battery 7.2v 10Ah
 - EC probe
 - Depth sensor with built in temperature
- 10 sec. data read intervals
- Battery lasts around 2-4 weeks



Website platform

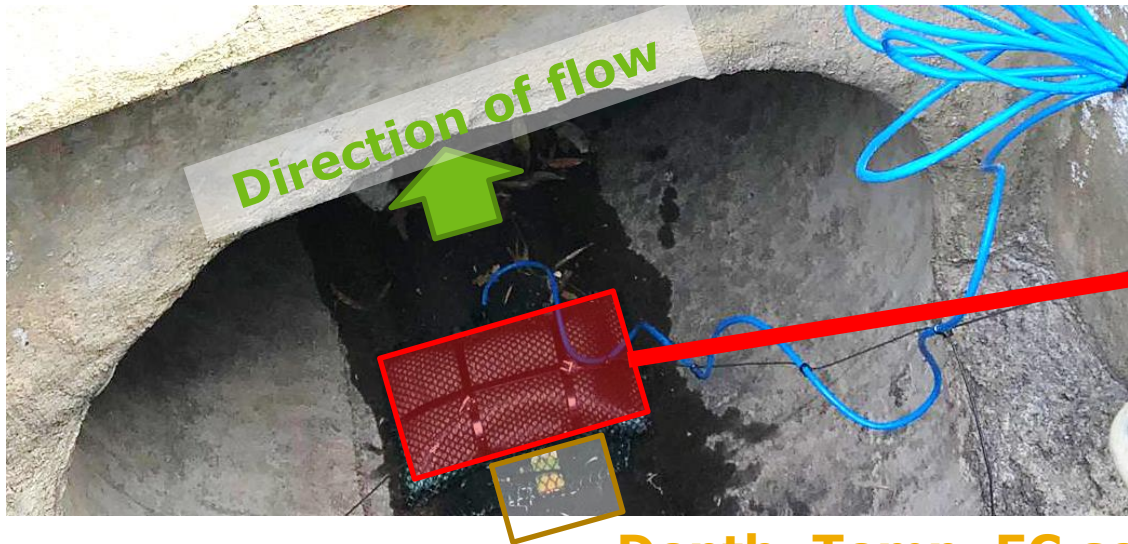
Website designed and operational

- Automatically corrects air pressure changes using air sensors around Melbourne
- Alarms - SMS or emailing if depth, EC or temperature goes above setpoint
- Backed-up twice daily
- Flexible



Underground Arduinos

- **Deployment**
 - 20 sensors have been deployed in this project



Depth, Temp, EC sensor



Wire cables and sand-bag

Comparison of monitoring techniques

	Field (Research/Blitz)	Ultrasonic (BlokAid)	Low Cost Hi Res (Arduino)
Water Quality	Y (detailed)	N	Y
Alarm Trending	N	Y	Maybe
Detailed analysis (quality)	Y	N	Y
Gas detection	N	Y	Maybe
Flow trend analysis	N	Y	Y

Where to next?

- 12 months (End April 2020) – complete trial in OJC
- Review data, trends, device issues
- Relocate, create new focus areas
- Seek new areas – council asset focus, whole community benefit
- Automatic alert system (EPA/MW/DELWP?) –
- Response protocols

Thank you

Acknowledgements:

- Sarah Watkins (MW)
- Caroline Carvalho (KCC)
- Giuliano Marcon (KCC)
- Matthew Teston (SEW)
- Dale Irwin (EPA)
- Jason Morris (Iota)
- David McCarthy (Monash Uni)
- Biaoqian (Luke) Shi (Monash Uni)