



Terrigal Water Quality Audit

A collaboration between NSW Government and Central Coast Council

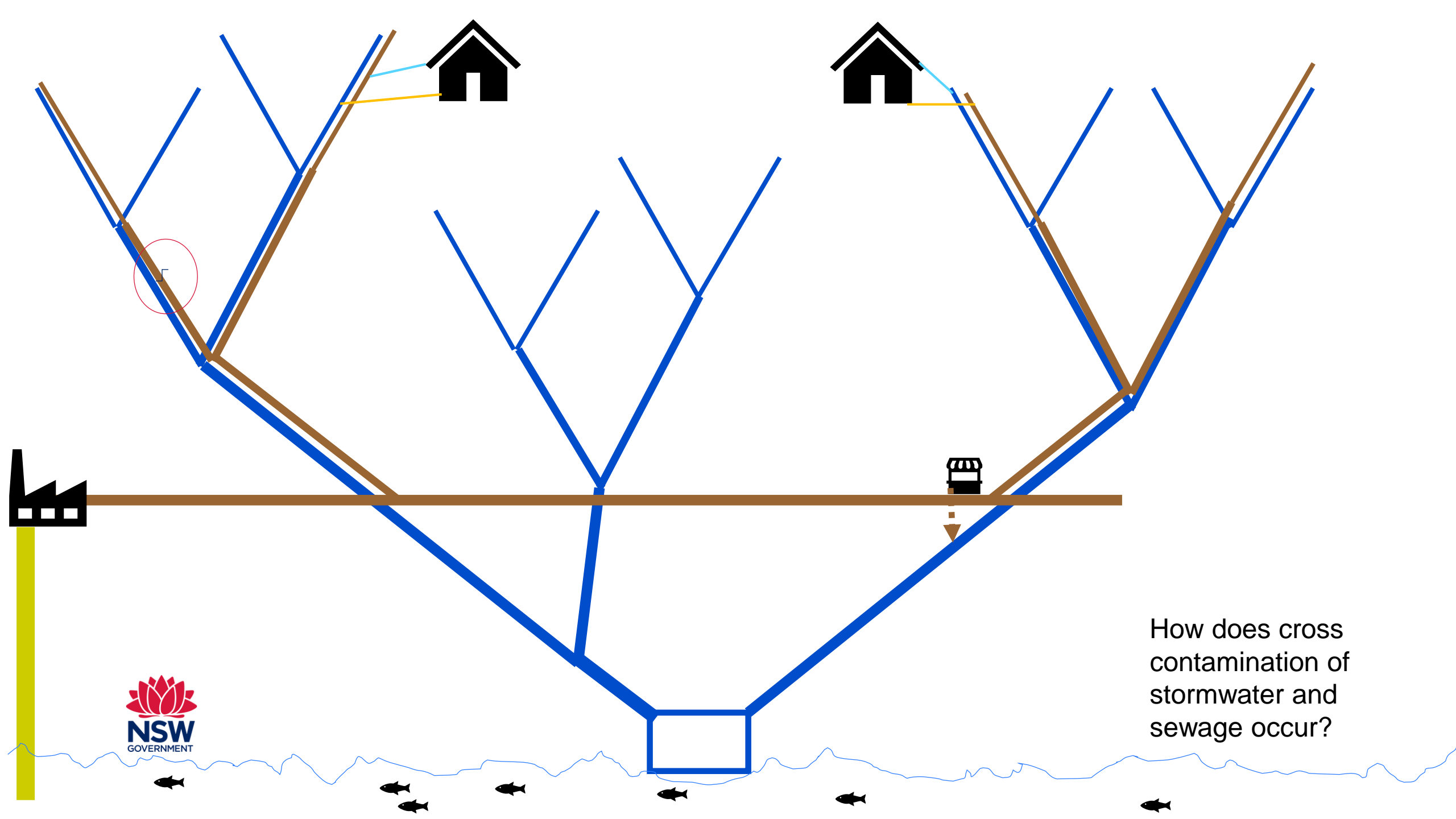
Peter Scanes, Jaimie Potts, Colin Johnson, Shivanesh Rao

Vanessa McCann, Melanie James

12,13 Aug 2019

Objective: To identify sources of pollution to Terrigal Bay and prioritise for remediation





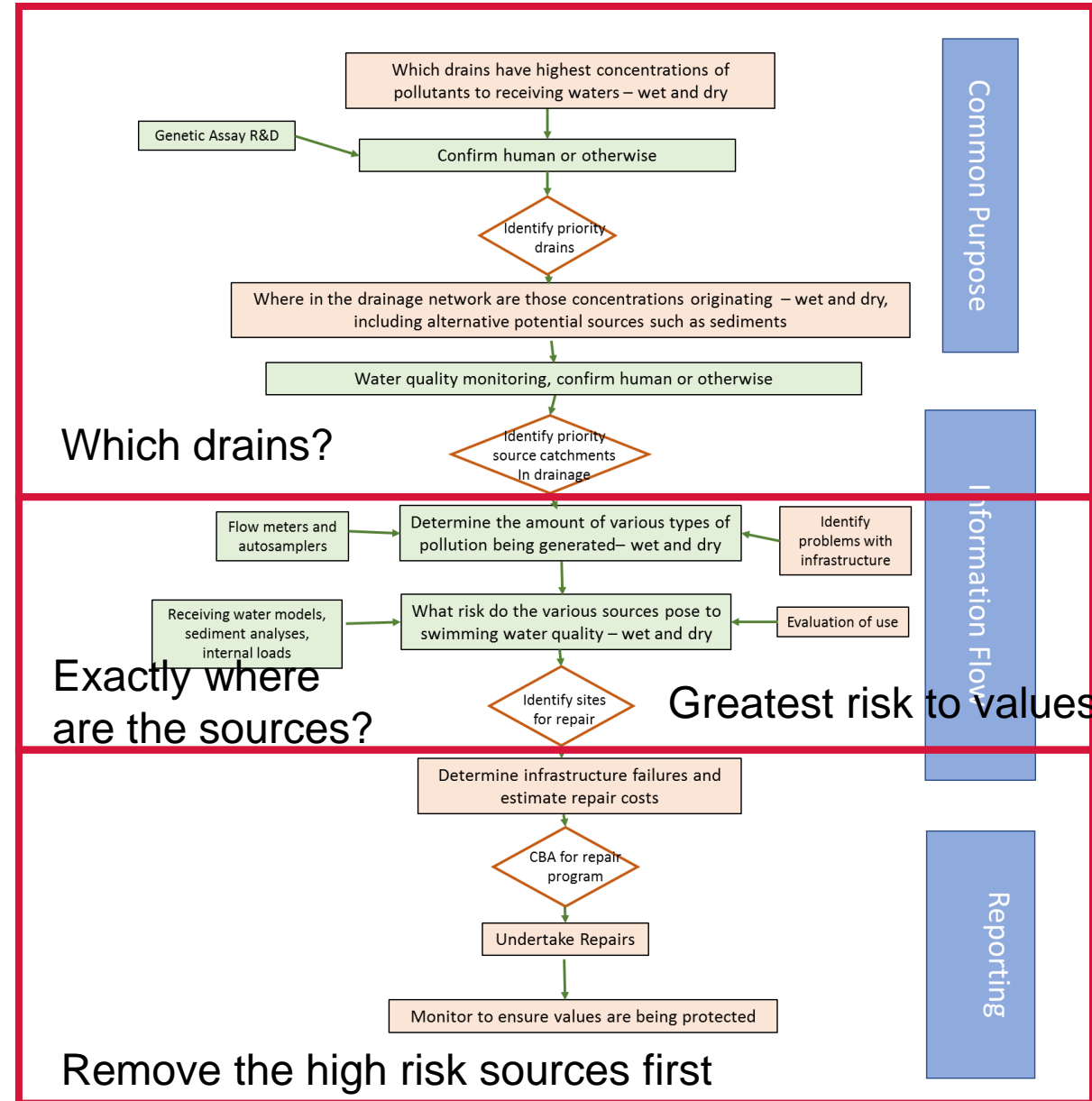
How does cross contamination of stormwater and sewage occur?



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AUDIT STRUCTURE



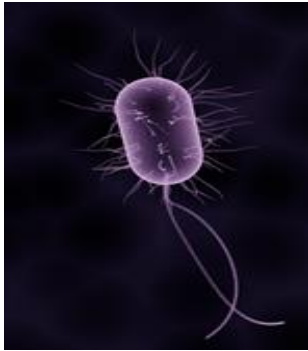
CCC primary responsibility

DPIE-ES primary responsibility

Joint responsibility

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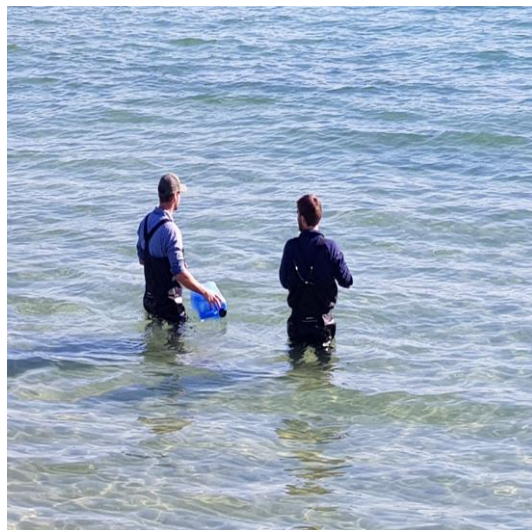
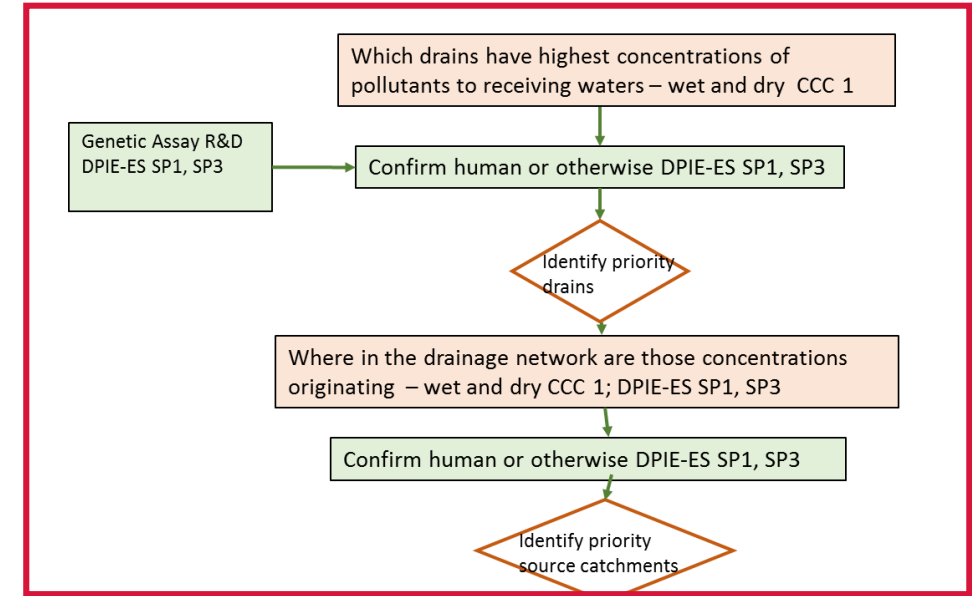
Part 1 – Which drains are contributing the most contamination, are microbes of human origin?



Mel will talk about Council's work using enterococci to identify drains of concern

DNA report not yet available, Minister will decide on release in the near future

AUDIT STRUCTURE with Sub Plans Swimming Water Quality



- Over five weeks samples were taken weekly from Rosebay and Terrigal.
- Nutrient, Enterococci and DNA samples were taken.



- Extracted DNA (UTS)
- Enterococci counts (Terrigal council, Beachwatch, Hornsby Council).
- Nutrients (OEH).



- qPCR.
- 16S sequencing.
- Statistical analysis.



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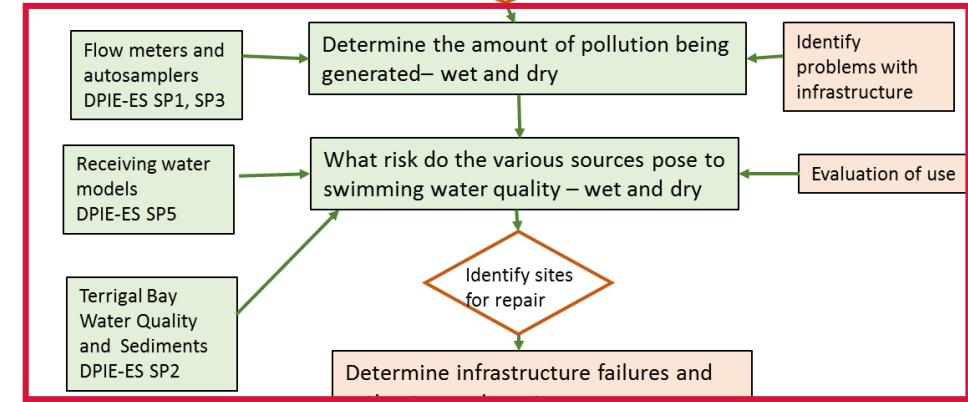
Part 2 – Risk to values

RISK: is about the **AMOUNT** of the pollutants (microbes or chemicals) and the **MIXING** at site of discharge (will it stay around or get swept away).

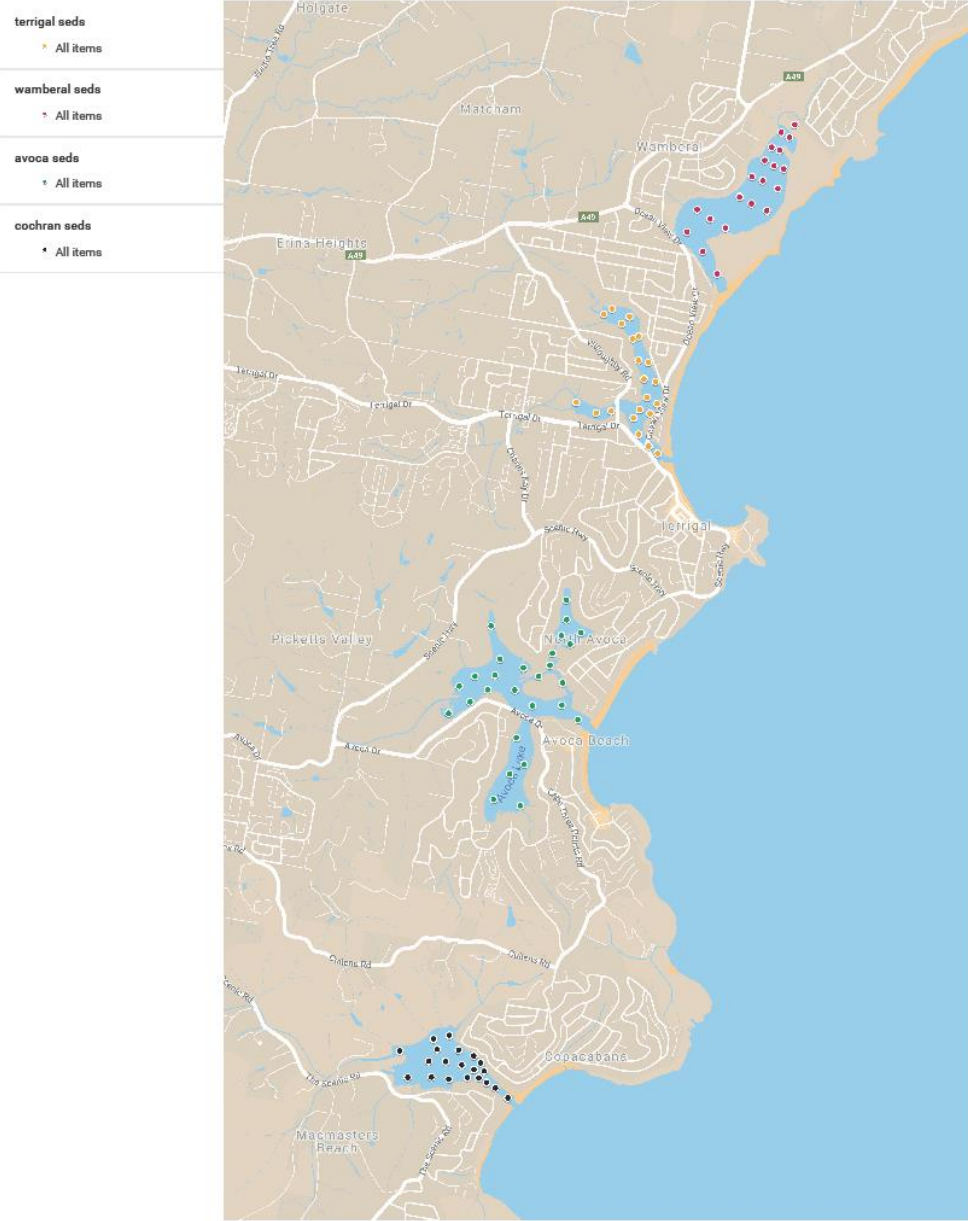
The **AMOUNT** is combination of

- the concentrations of the pollutant in water
- volume of water

WATER VOLUME



PRELIMINARY SEDIMENT SAMPLING



Sediment grain size and organic carbon

ESTUARY HEALTH

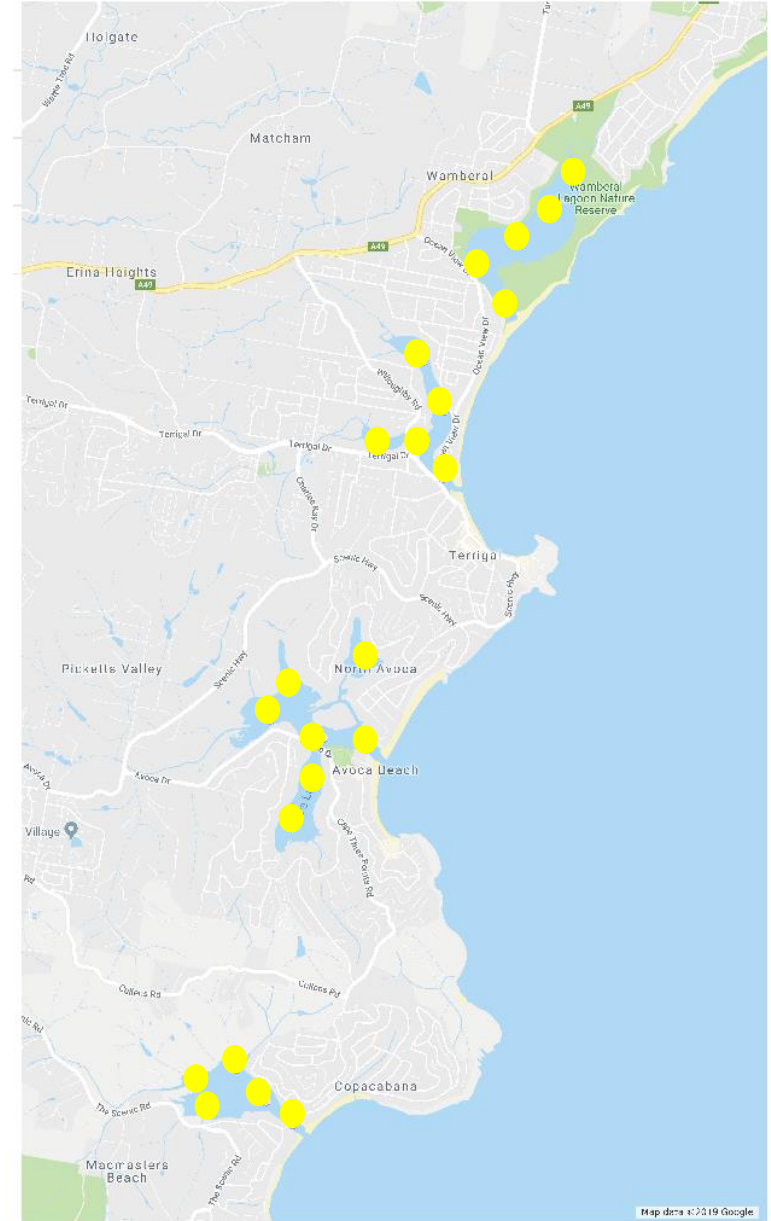
There is an existing estuary health program in the Central Coast estuaries fund by CCC

DPIE – Science Division does the sampling associated with that program

The program has been expanded to provide more information on threats to recreational water quality in lagoons; and more detailed information on status and threats to lagoon estuary health

Salinity, temperature, turbidity, pH, chlorophyll a, nutrients, bird presence/absence, seagrass and macroalgae fringing vegetation visual assessment.
Enterococci sample, DNA genomic sample, coliscan E. coli sample

WATER QUALITY SAMPLING



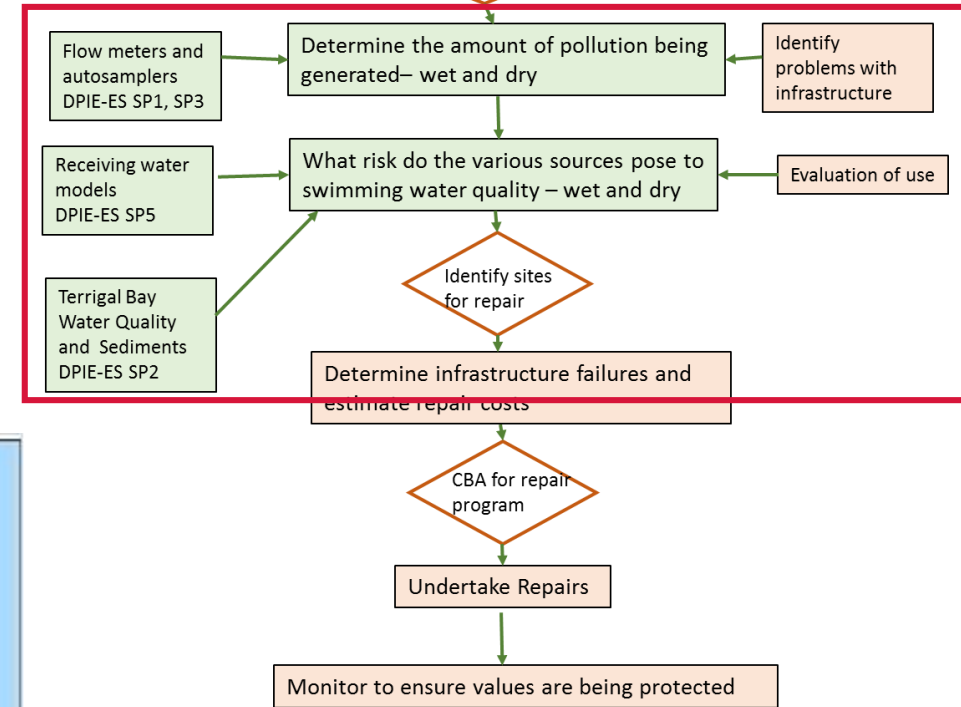
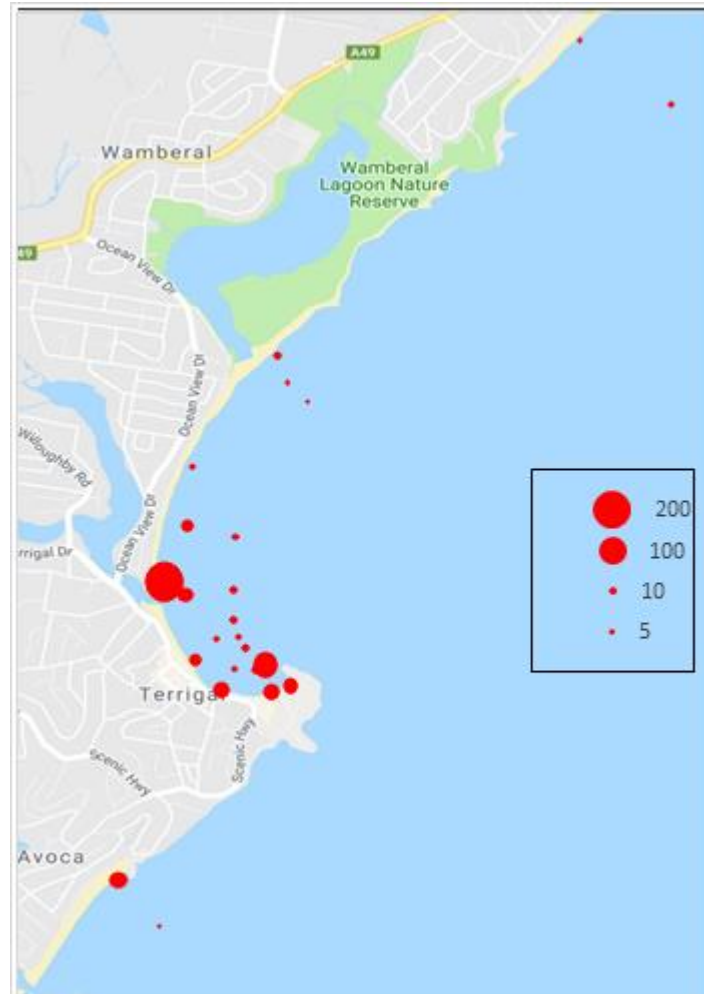
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HOW FAR DOES THE POLLUTION GO?

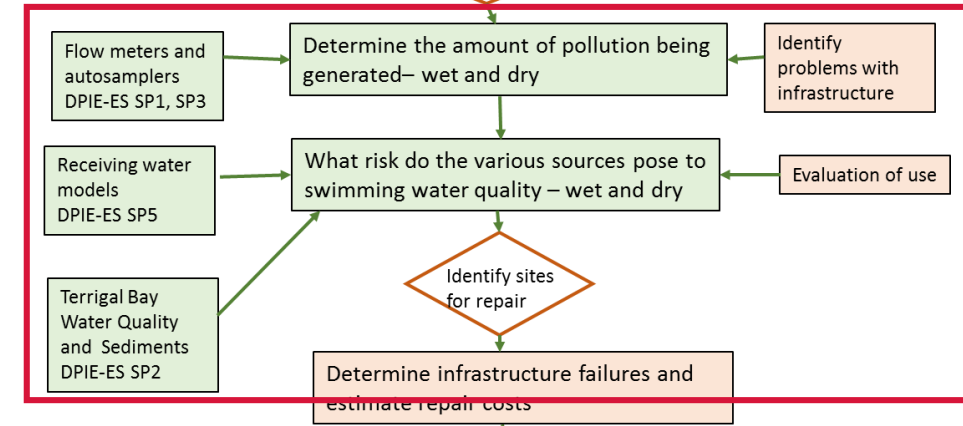
These data immediately after a 40mm rainfall event.



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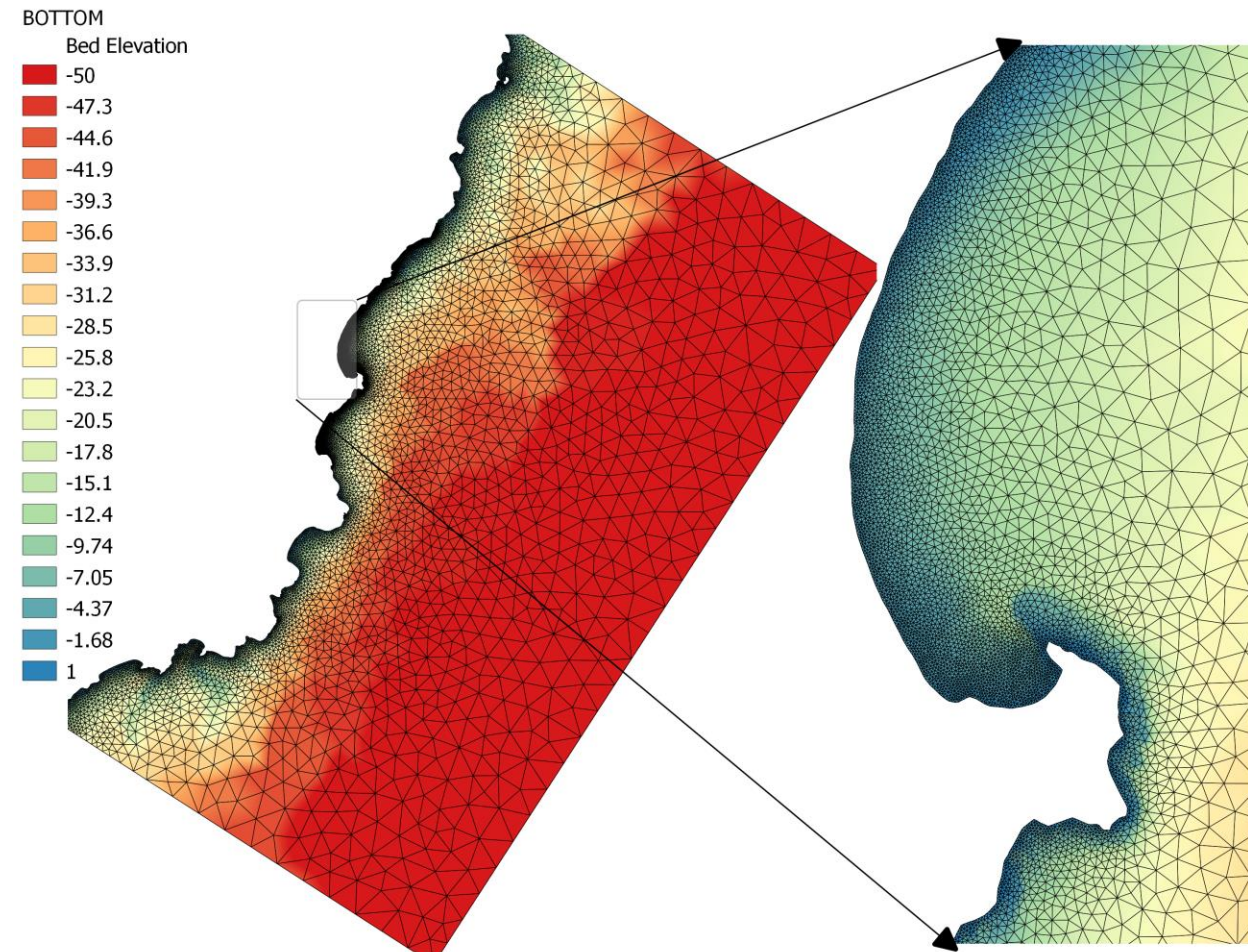
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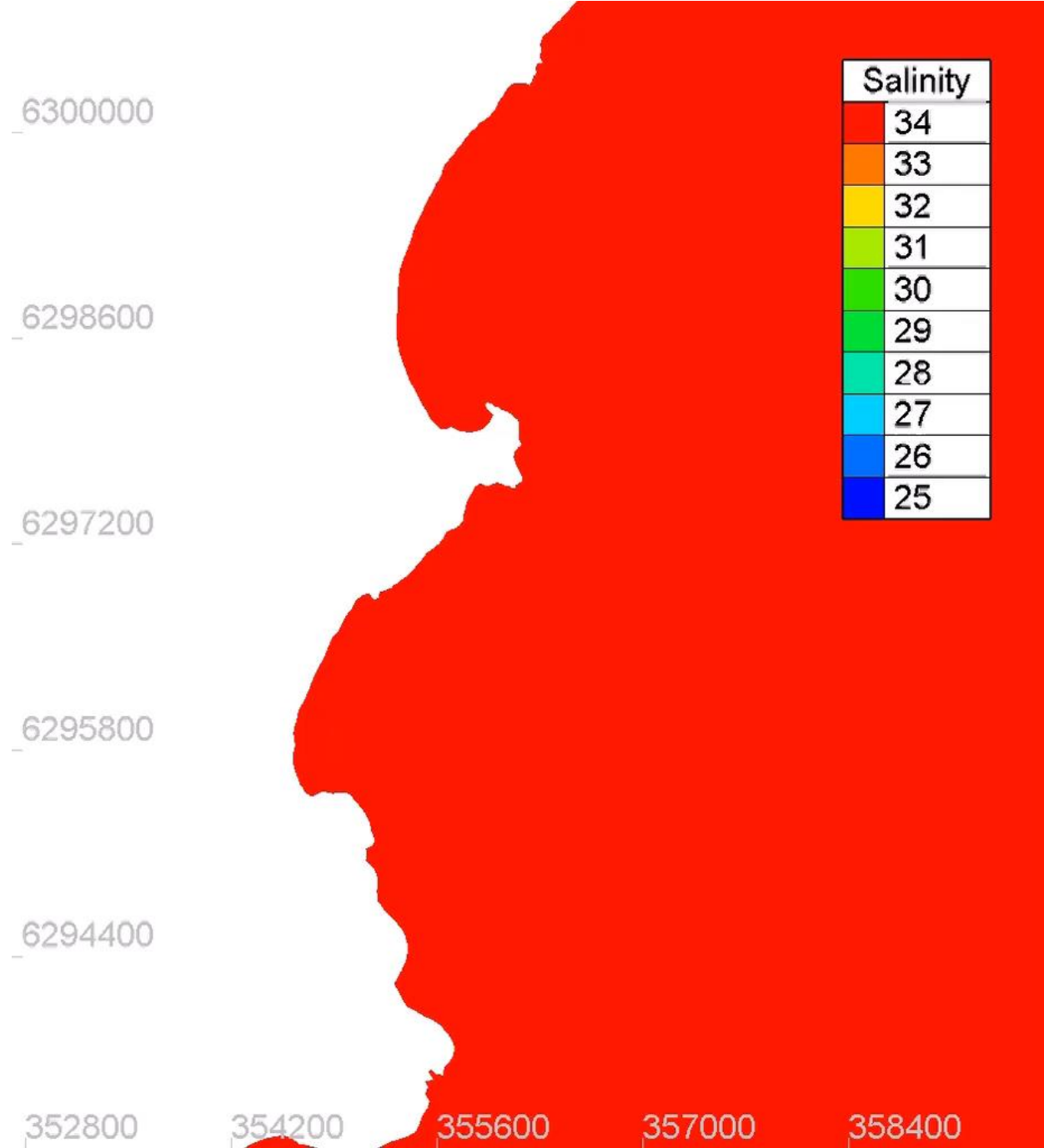
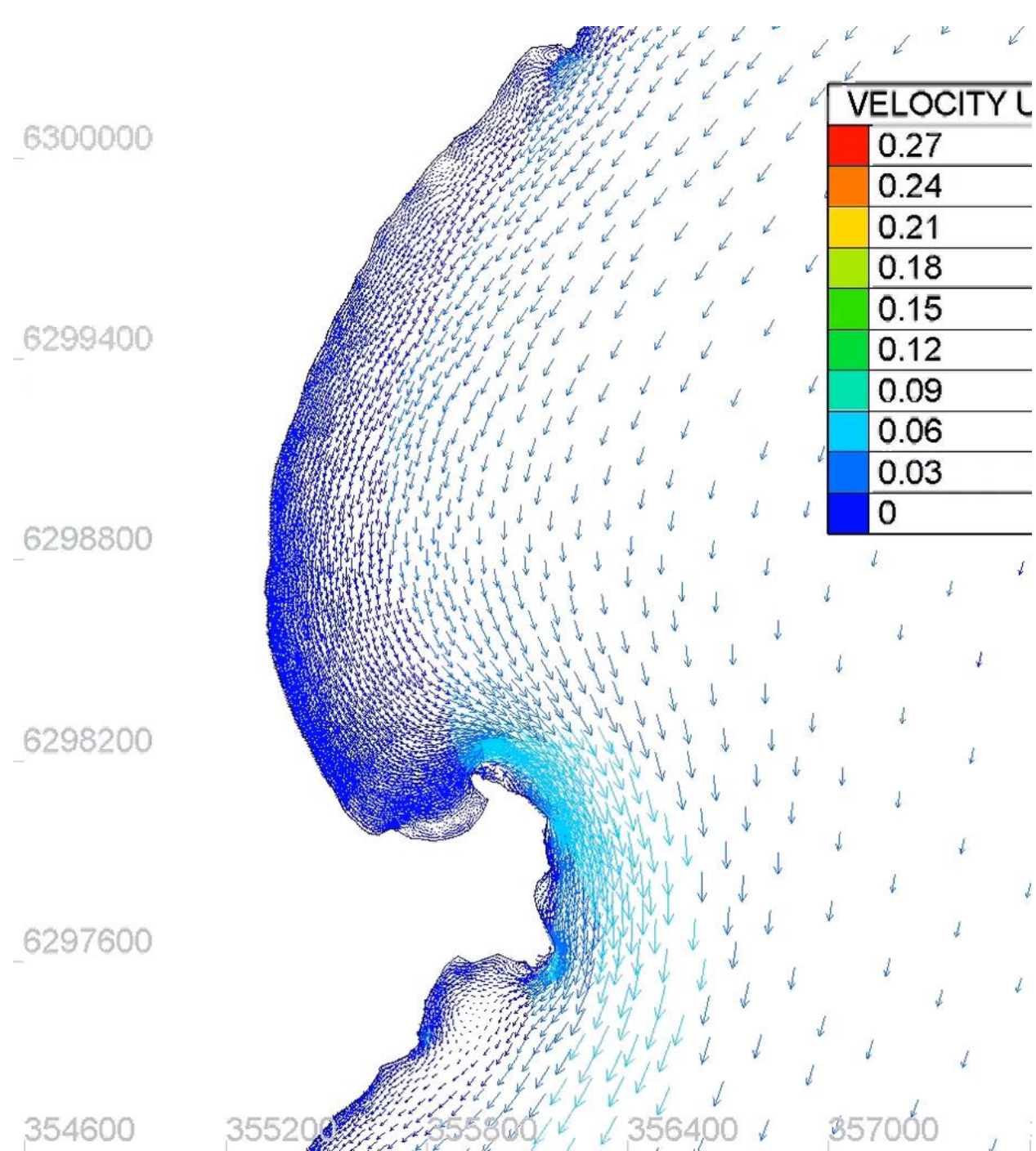


WATER MOVEMENT AND MIXING MODEL

This is the area that the model operates over – Box Head to just south of The Entrance and 15 km to sea.

This version shows typical influence of tides, winds using data from Nov 2012 and lagoon opening from 2019

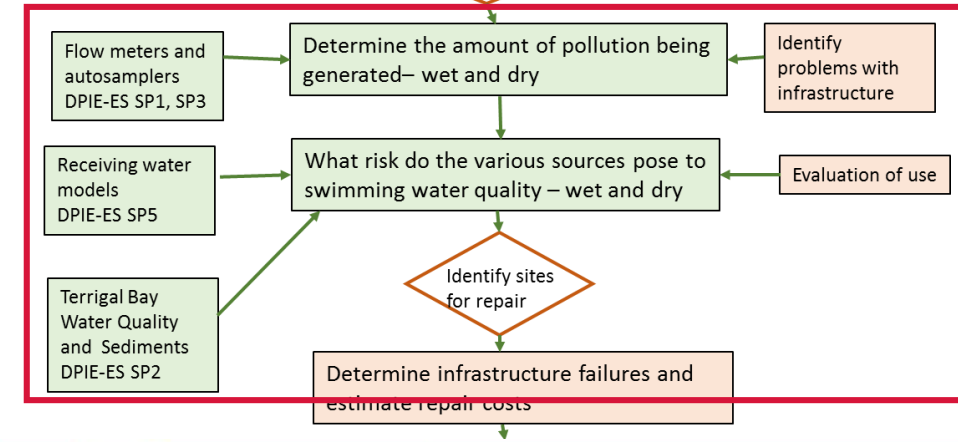




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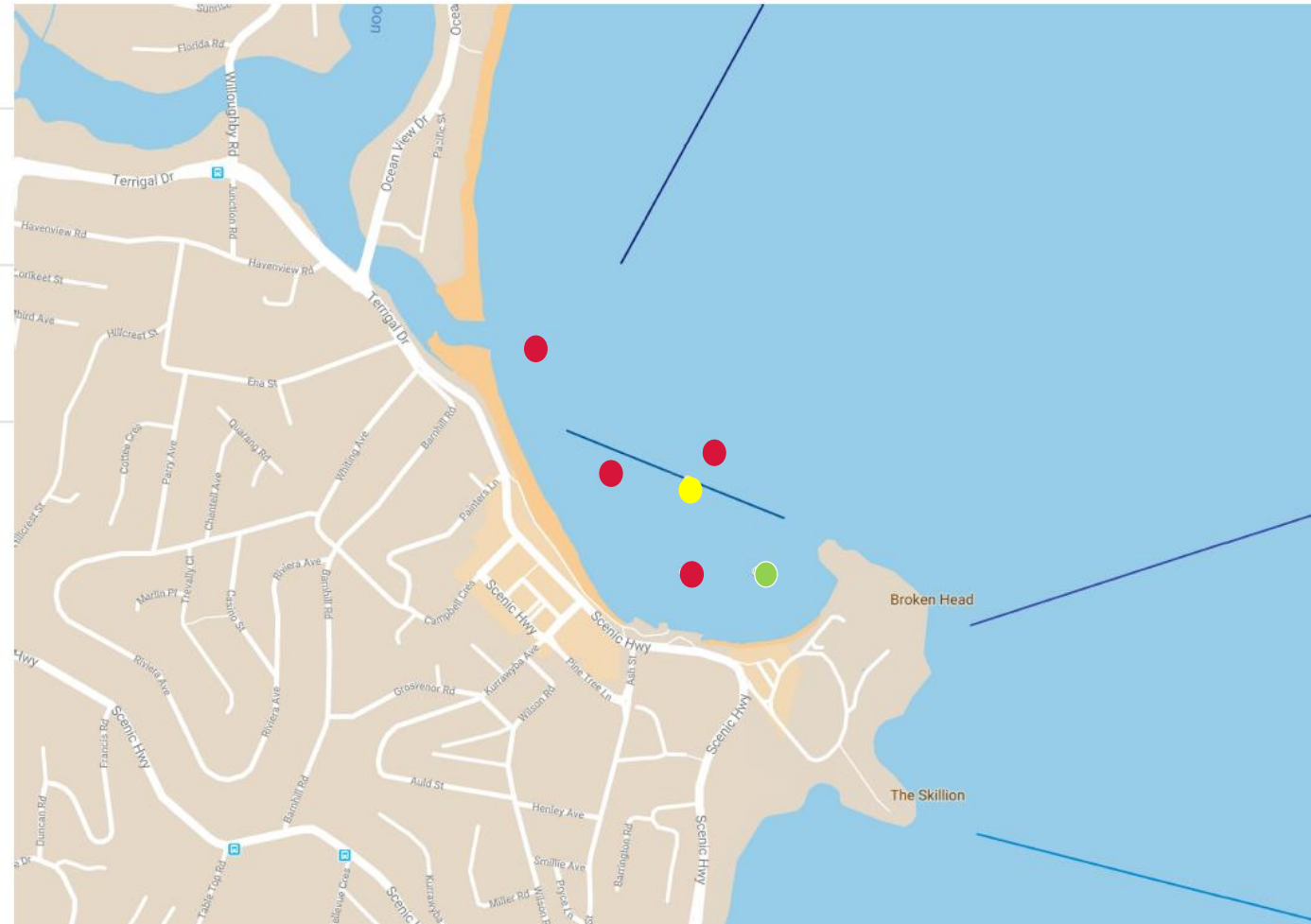
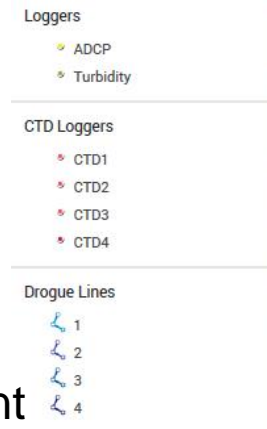
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WATER MOVEMENT AND MIXING MODEL

Next steps will be to bring in:

- Waves
- Local scale mixing (from our instrument data)
- Vertical mixing (helps understand resuspension processes)



- Conductivity and temperature
- Current strength and direction
- Turbidity

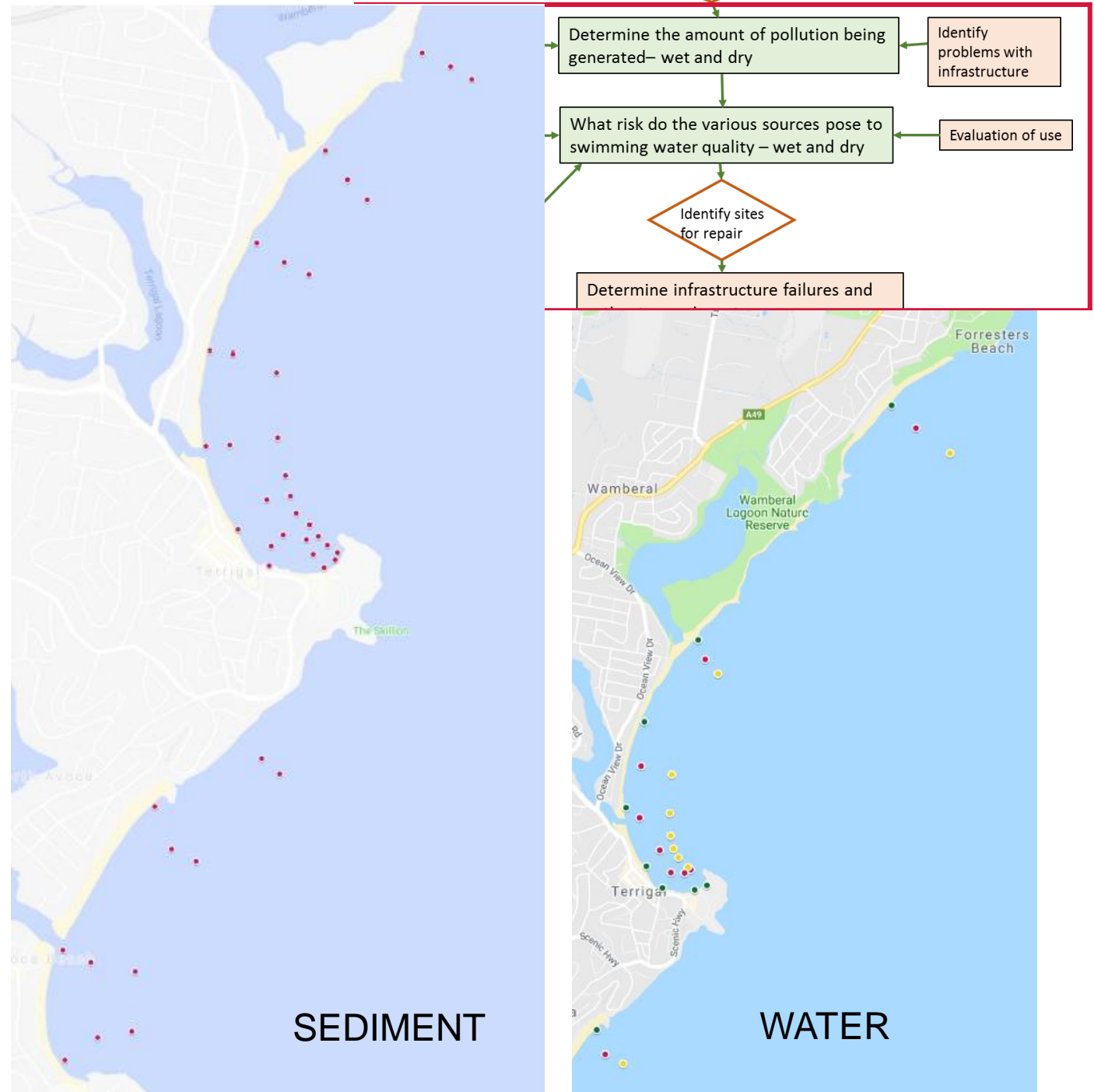
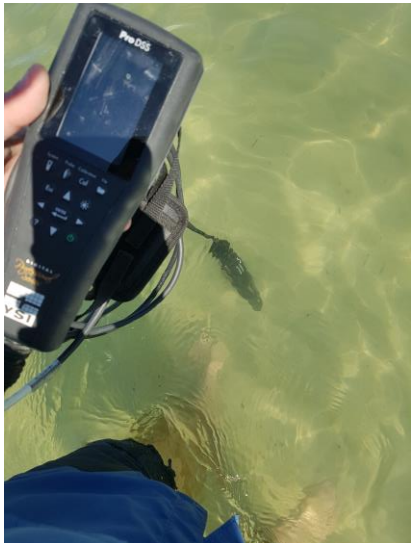
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Part 2 – Other pollutants

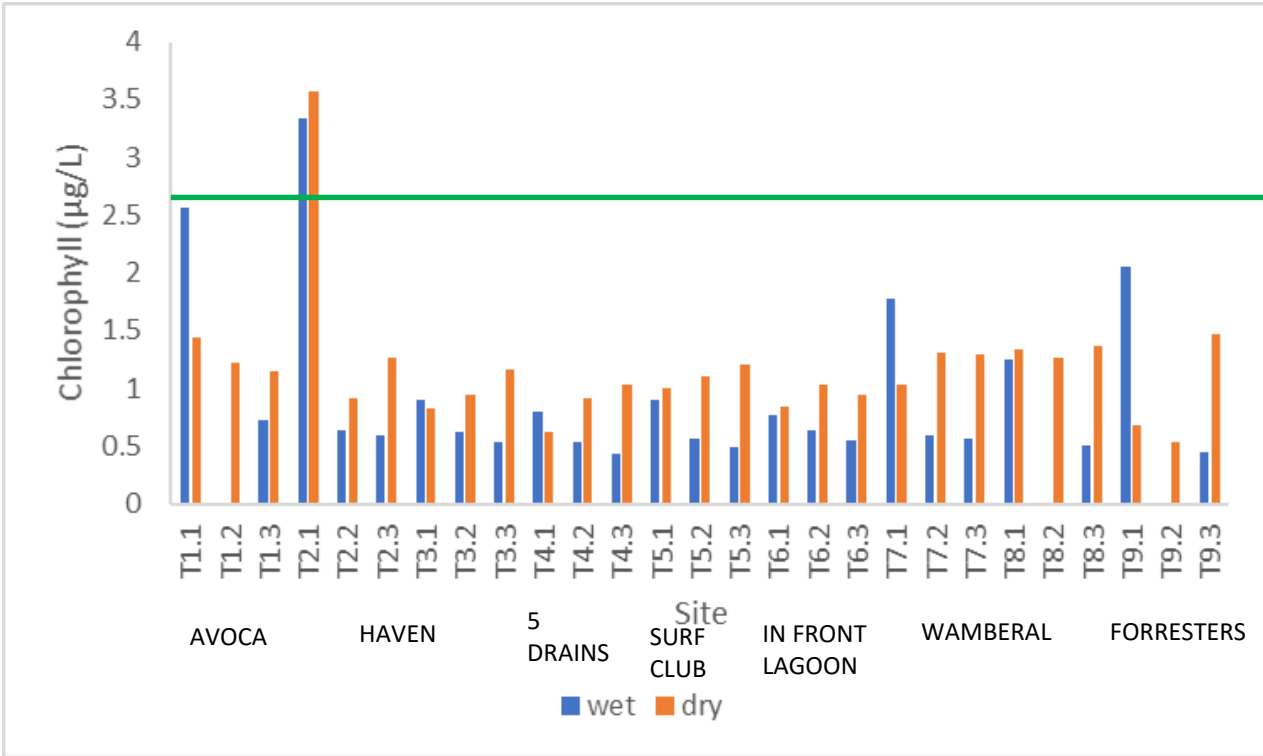
Sediment and Water Sampling

Bay sediments: samples for enterococci, DNA, sediment size, organic carbon, metals, pesticides, hydrocarbons, micro plastics.

Bay water quality: Chlorophyll a sample, nutrient samples, enterococci sample, DNA sample, salinity, temperature, oxygen, pH, . Samples as above also taken from any flowing drains in Haven and near rockpool



Algae



Conclusions

- DPIE and CCC collaborating well
- CCC has lead on measuring enterococci
- Confirmation of source using DNA is still pending
- Work to measure loads/volumes is about to commence
- Existing lagoon estuary health sampling has been expanded as part of this project
- Terrigal risk assessment model development has started
- Sampling of sediments and water for other pollutants has commenced
- Commencing working with CCC to locate wet weather sources in drainage catchments of Terrigal Bay and lagoons

