

# Water Research Laboratory

## Port & Wetland Restoration and Management in Australia

Never Stand Still

Faculty of Engineering

School of Civil and Environmental Engineering

**Presentation Dr Ron Cox** [r.cox@unsw.edu.au](mailto:r.cox@unsw.edu.au)

WRL UNSW, PIANC Australia, PIANC PTGCC, PIANC CoCom

**Acknowledgement Dr William Glamore**

WRL UNSW, Chair of PIANC Australia, recent CoChair PIANC YP

# Water Research Laboratory (UNSW)



- UNSW remote Campus since 1959.
- 60+ Engineers & Scientists
- World Leading Research
  - Physical & Numerical Models
  - Field Work



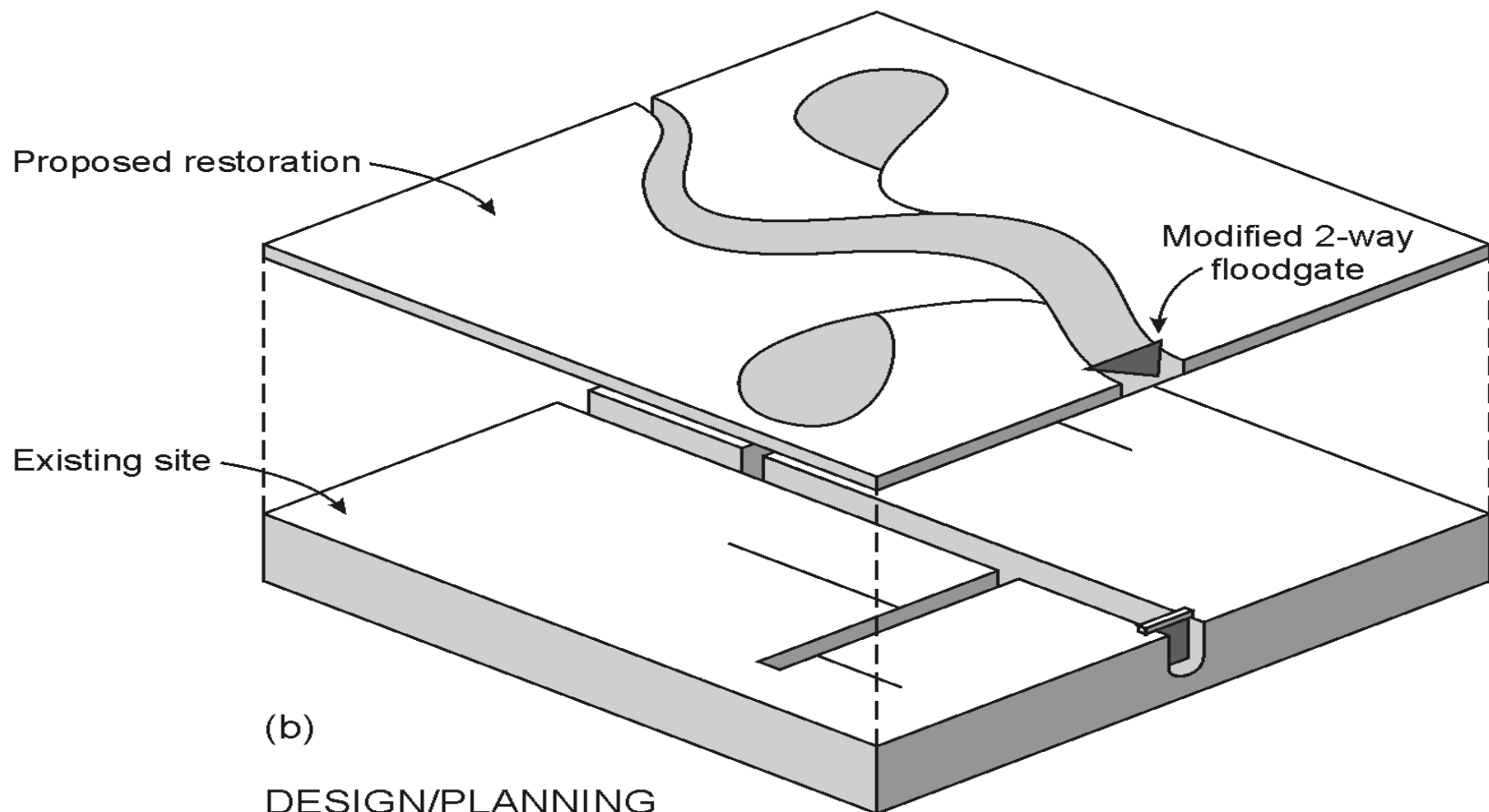
# Port Development & Environmental Restoration

- Major Port Development on East and West Coasts.
  - Breakwater design
  - Port Circulation
  - Dredging
  - Hydrodynamics
  - Sediment transport
  - Contaminant dynamics
  - Offset and environmental restoration









(b)

#### DESIGN/PLANNING

Applying conceptual design against site limitations and project restraints  
(floodgate design criteria)

# Tomago Wetlands (500 ha)

2017 – Restored?

2007 - Existing

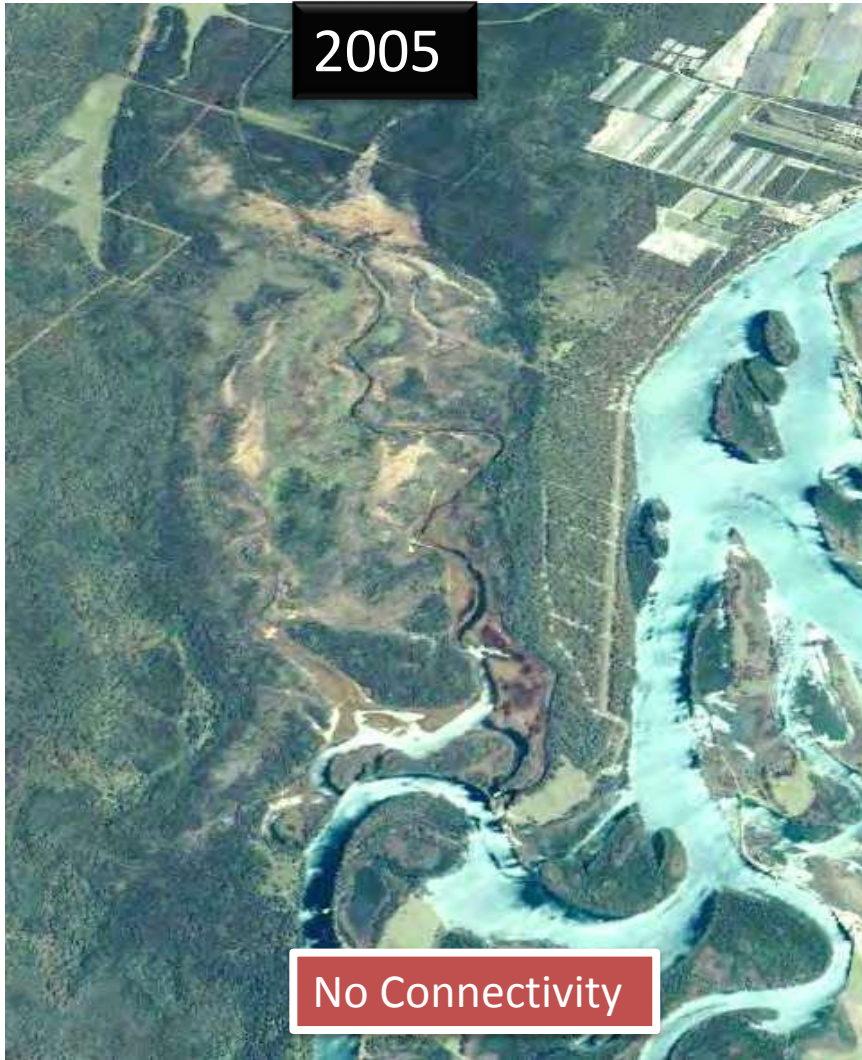






# Yarrahapinni Wetlands

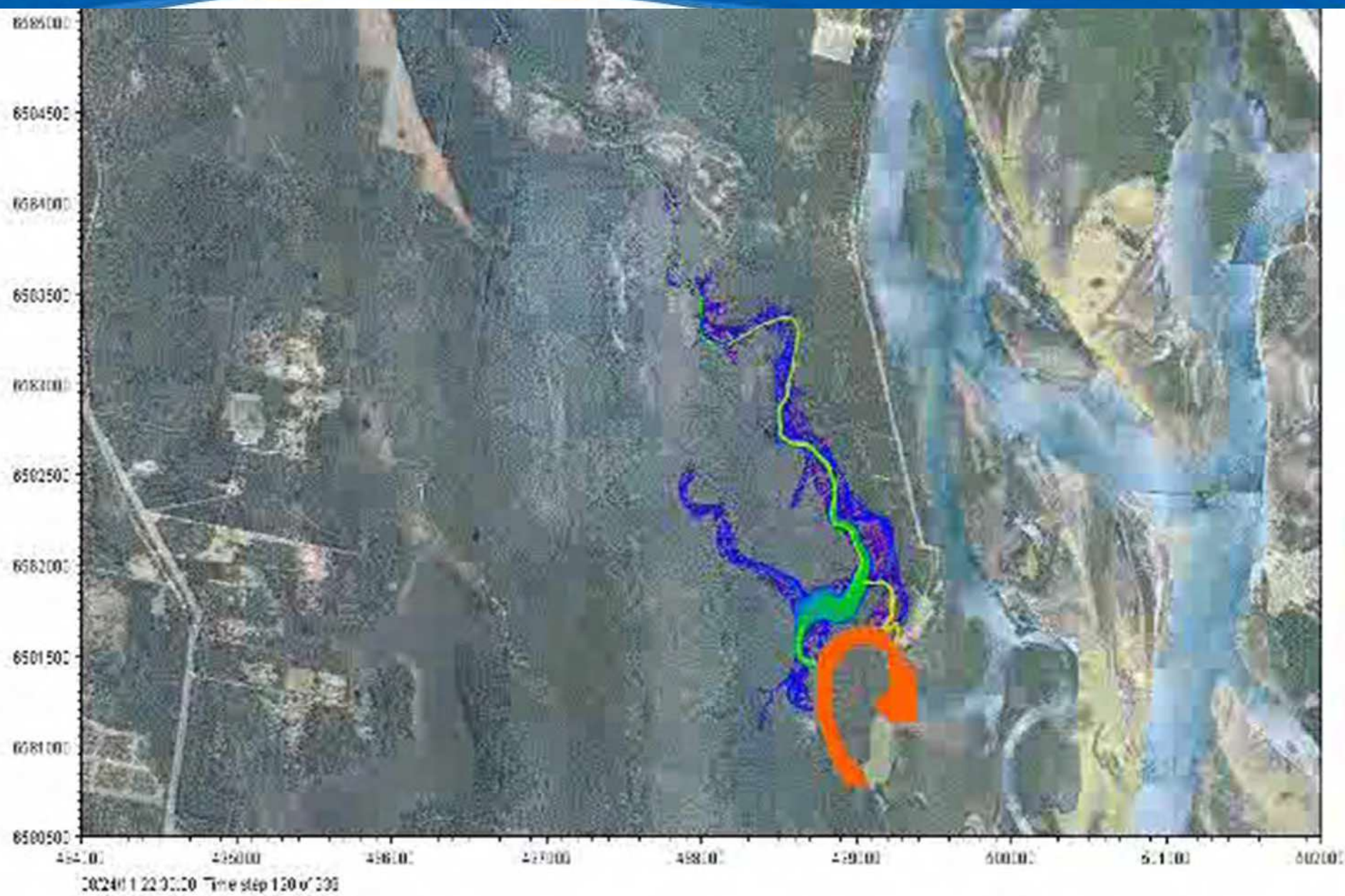
2005



2015











Kooragang  
Island



Water Rese





# Big Swamp, Manning River BEFORE



# Big Swamp, Manning River AFTER





 Pre-existing state



Pre-opening after construction



Post-remediation – low tide



Post-remediation – high tide



# Everlasting Swamp (3500 ha)



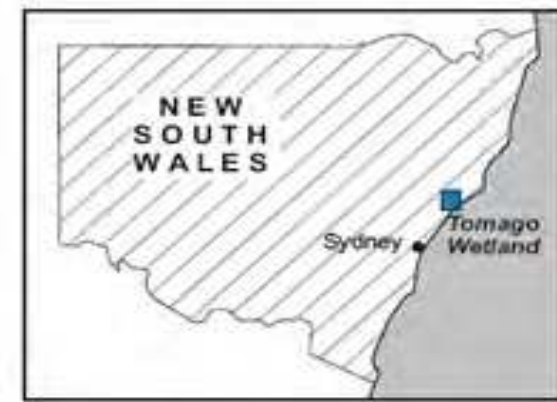


# Everlasting Swamp





# Case Study: Newcastle Port



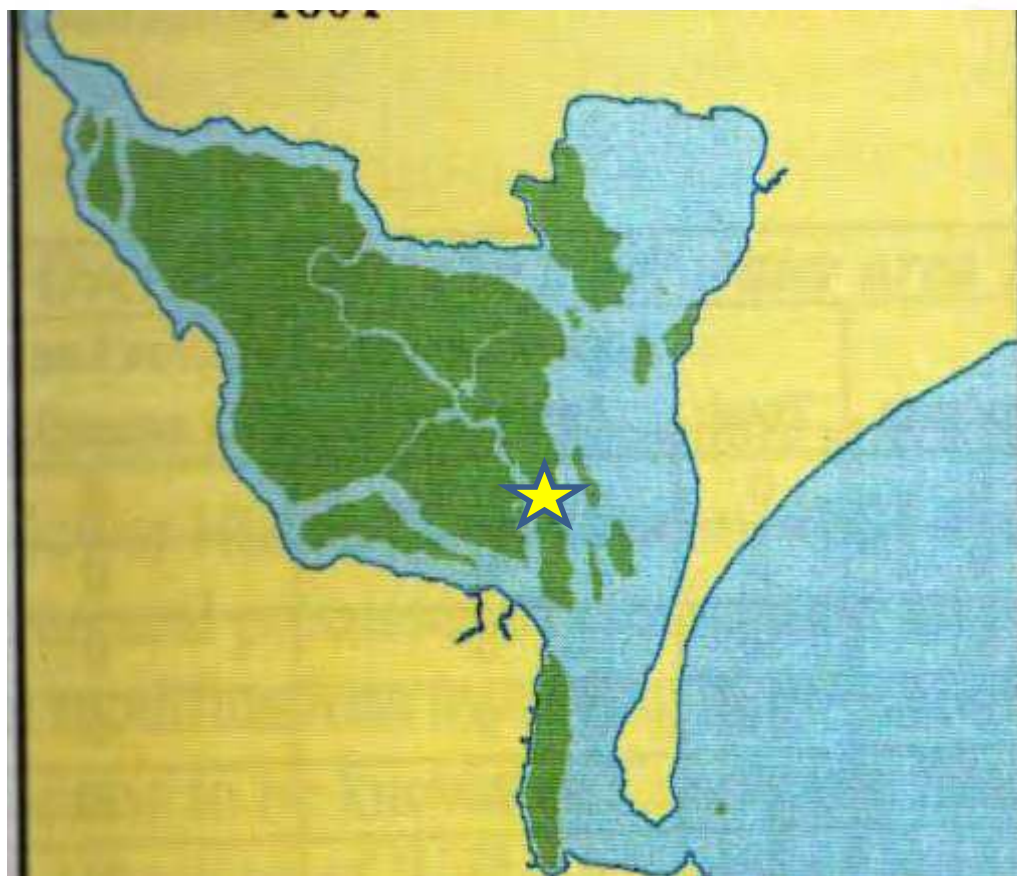
Restoration of large coastal wetland as port expansion offset.

Includes:

- Eco-Engineering Design
- Staged Planning
- On-ground works
- Monitoring







Newcastle 1801



Newcastle 2015

# Eco-engineering Design

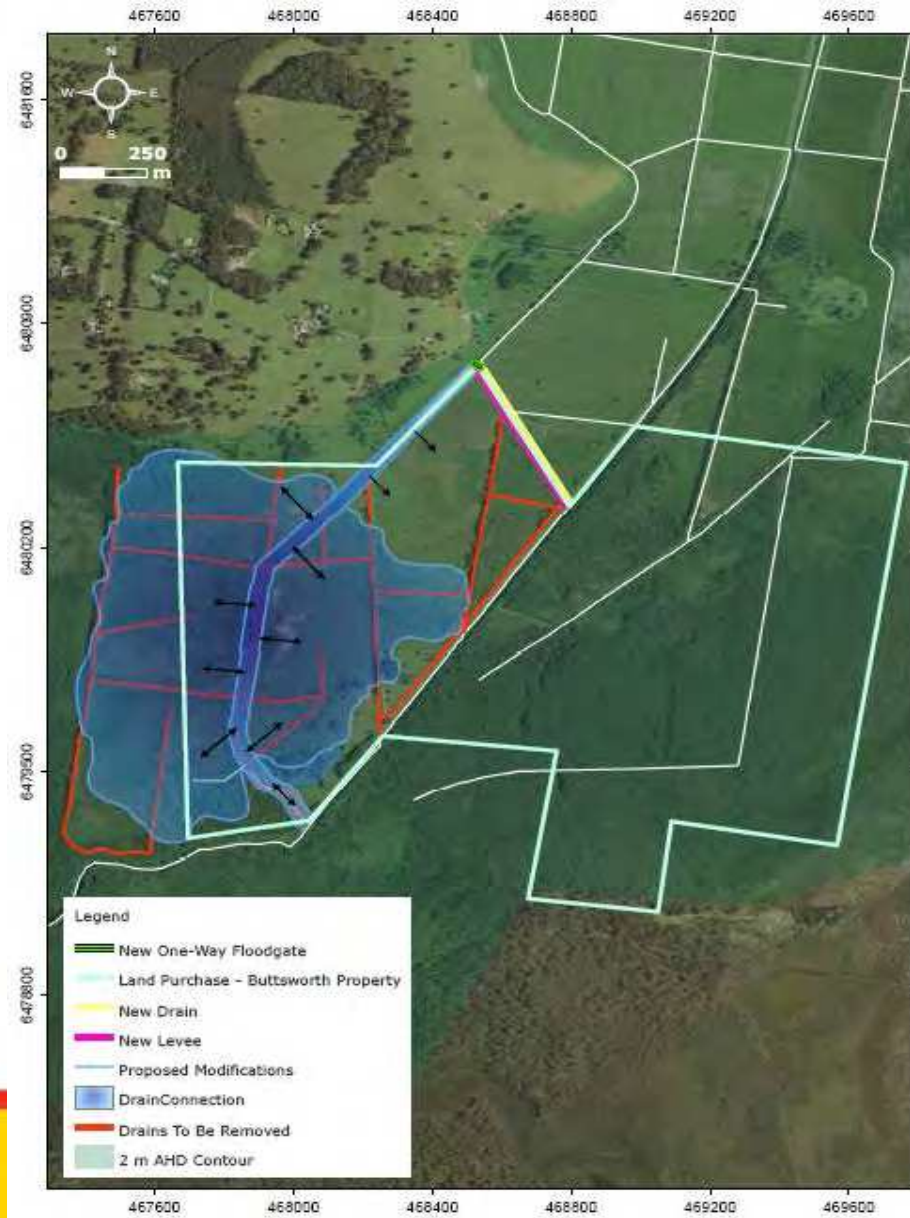
Eco-hydraulic models are developed to asses:

- Ecologic response to rewetting
- Risk
- Engineering Design

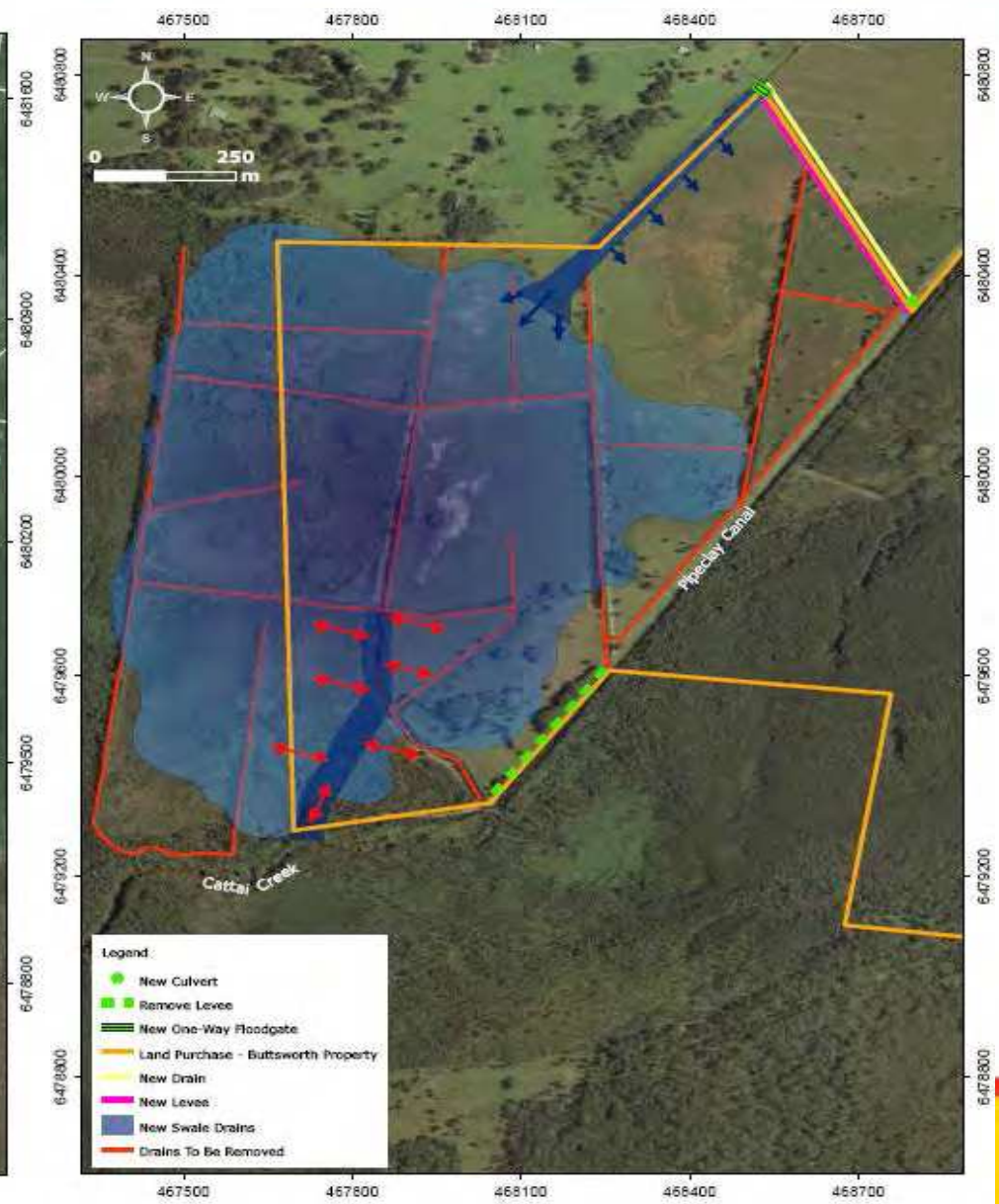




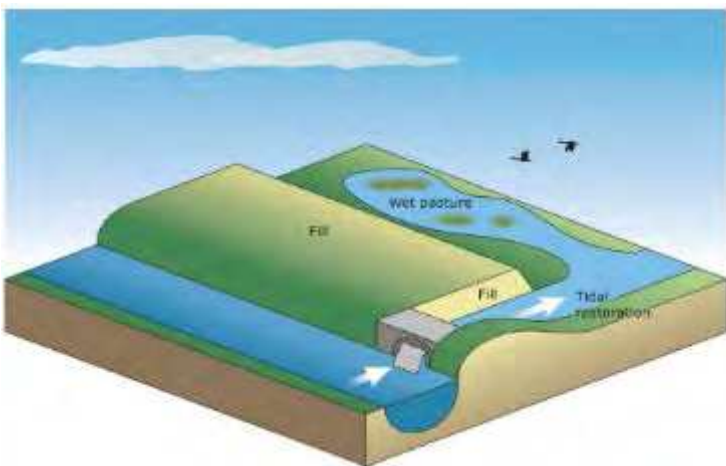
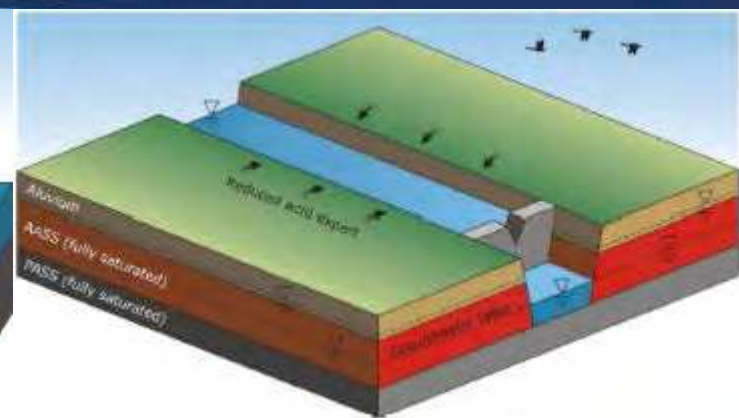
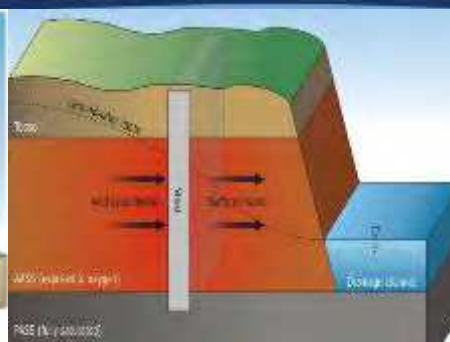
# Restoration Options: Wetland Creation



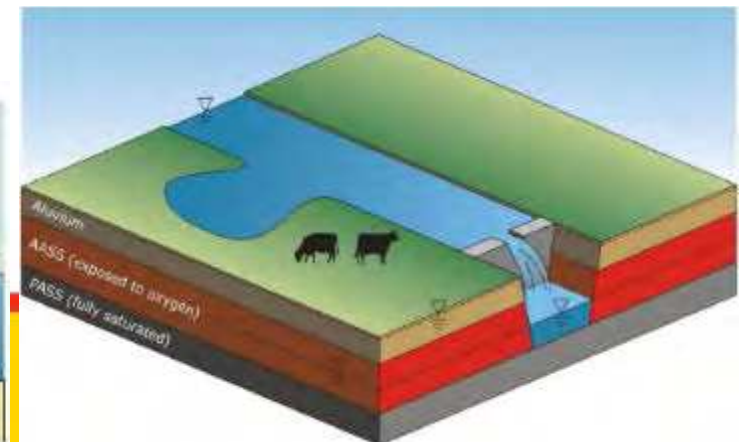
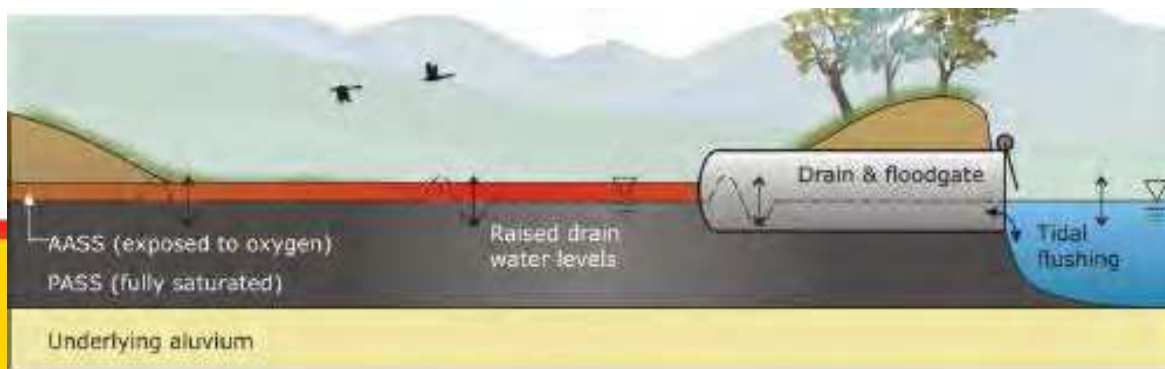
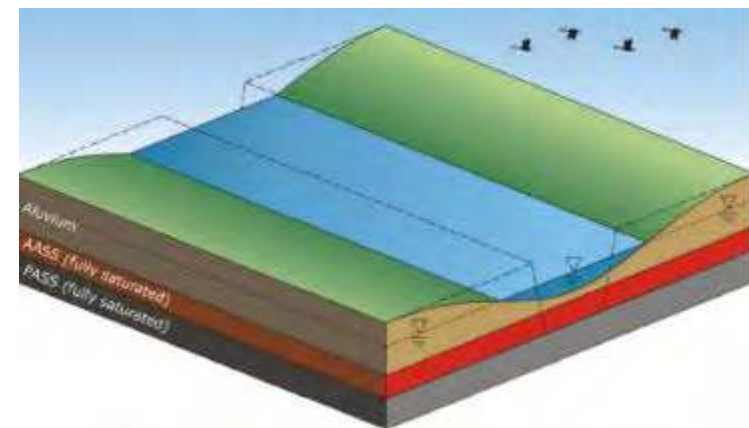
Conceptual Restoration Option 1 - South-West Property



Conceptual Restoration Option 2 - South-West Property



## Restoration Options











# On-ground Controls







# Tomago Wetland Restoration Project



SmartGates



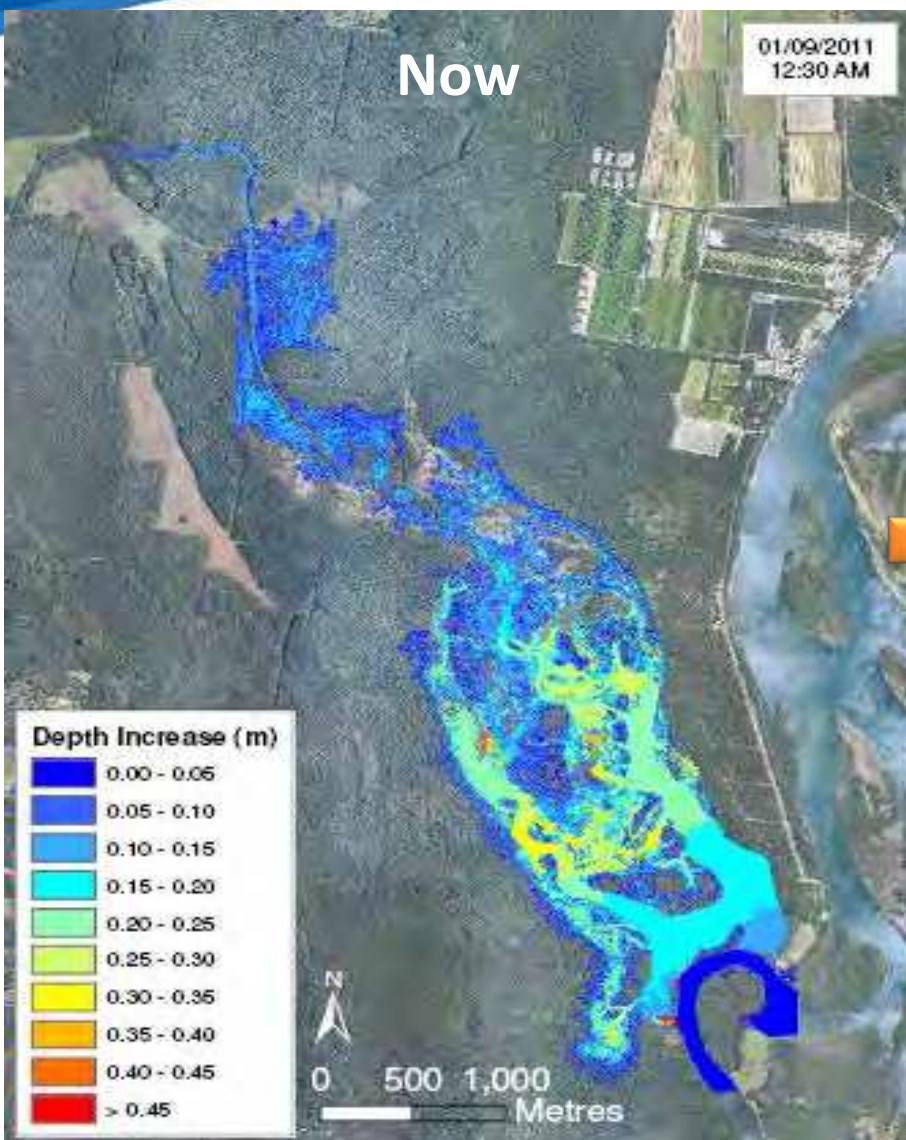
SwingGates





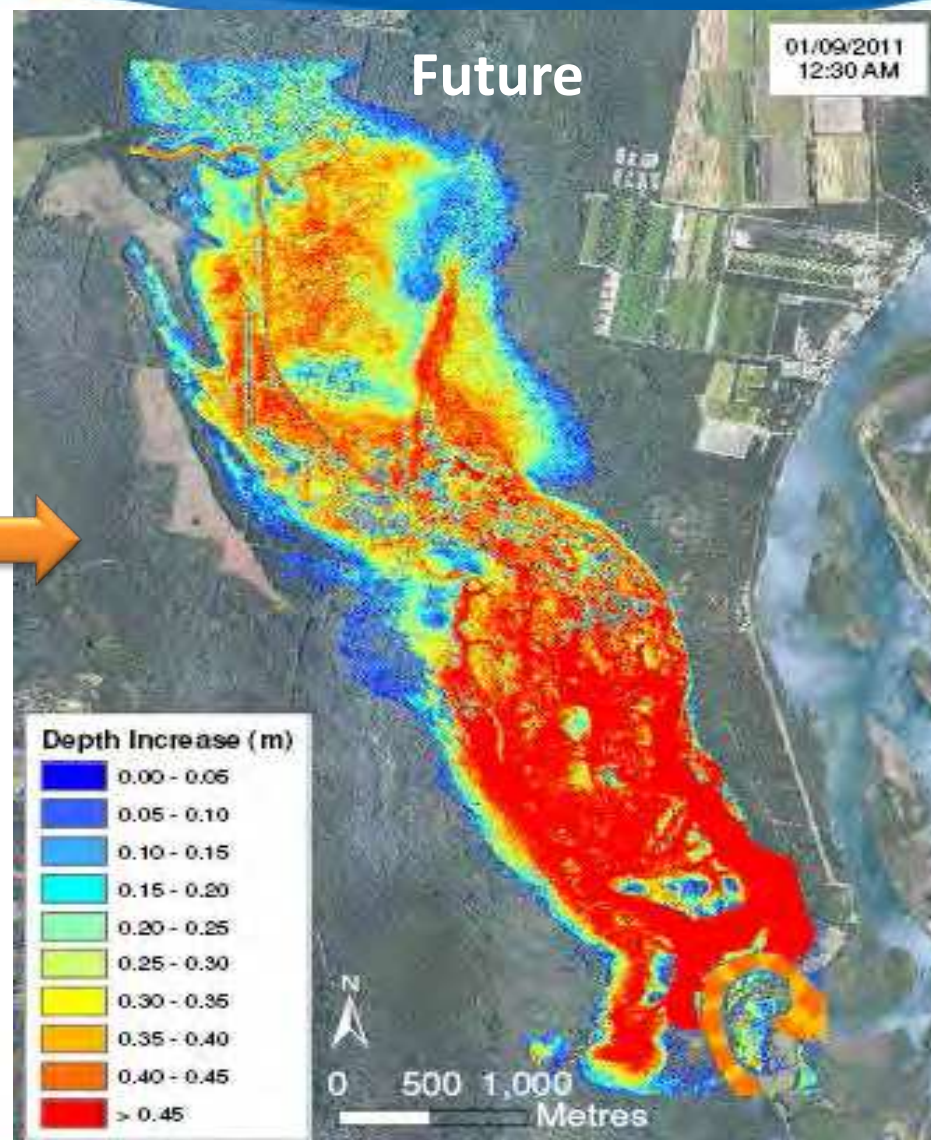
Now

01/09/2011  
12:30 AM



Future

01/09/2011  
12:30 AM







# NEWCASTLE – WORLD'S LARGEST COAL PORT

2016 – Restored



2007 - Existing



# On-going Innovation

Significant recent advances in:

- UAV usage in tidal environments
- Linking eco-hydro-geo regimes within numerical models
- Climate change predictions downscaled to local sites

