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Port Adelaide Enfield

Climate change – coastal inundation and adaptation in Port Adelaide

Presenter
Maggie Hine,
Team Leader Strategic Planning and Environment

Strategic assets

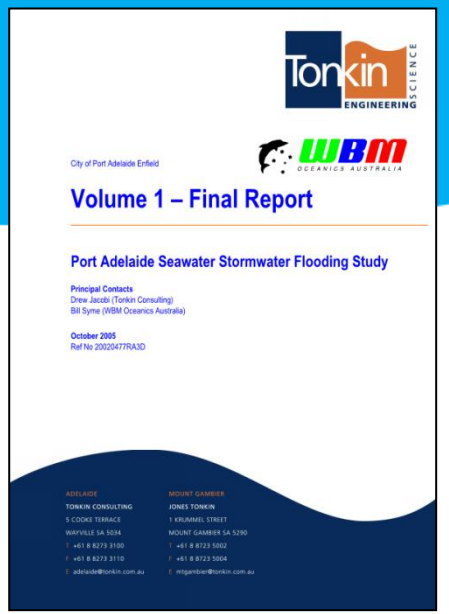
3 power stations supplying SA electricity
Key nationally linked natural gas pipeline
Osborne defence facility (submarine and frigate)
Birkenhead – fuel depots, Adelaide Brighton Cement
Outer Harbor – international sea freight terminal
Major commercial freight rail and road infrastructure
Port Centre - Renewal of commercial and residential land

Existing studies

Phase 1 Port Adelaide Seawater and Stormwater Flooding Study (2005)

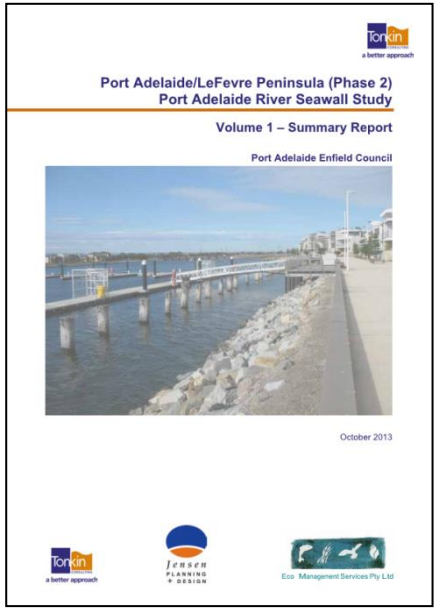
Aim : - Determine the impact of sea level rise and land subsidence
- undertake modelling and mapping

Output : - Need planning controls – eg. Finished floor level, surface level, type of development
- Physical mitigation options - Seawall



Phase 2 - Port Adelaide River Seawall Study (2013)

- Options for seawall construction
- Highlighted that Council does not own any of the foreshore/promenade area



Existing studies

Phase 3: Gillman Study (part of Western Region Coastal and Inundation Modelling)

Build on work done under the Port Seawater Stormwater project to determine the potential effects on the western region

Extrapolate the effects of sea level rise modelled in the Port Seawater Stormwater Study to determine the impact on the Western Adelaide Region

- Take account of increased rainfall intensity since the 2005 study
- Model the impact of vulnerable stormwater networks

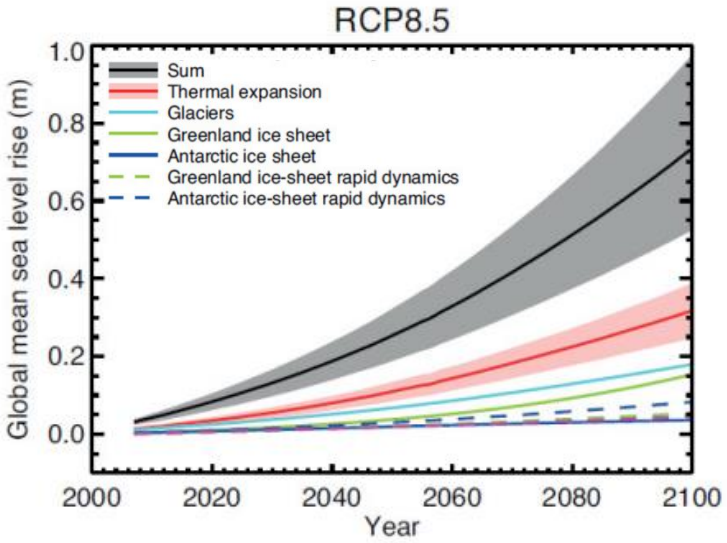
Sea Level Rise Scenario

Predicted Sea Level Rise to 2100 and Land Subsidence

Sea level rise predictions (IPCC – 3rd Assessment Rpt)

- 300mm to 2050
- 500mm to 2070
- 1000mm to 2100

Predicted land subsidence 2.1mm/yr



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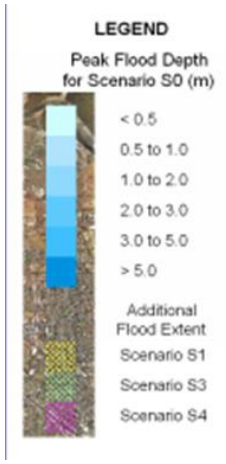
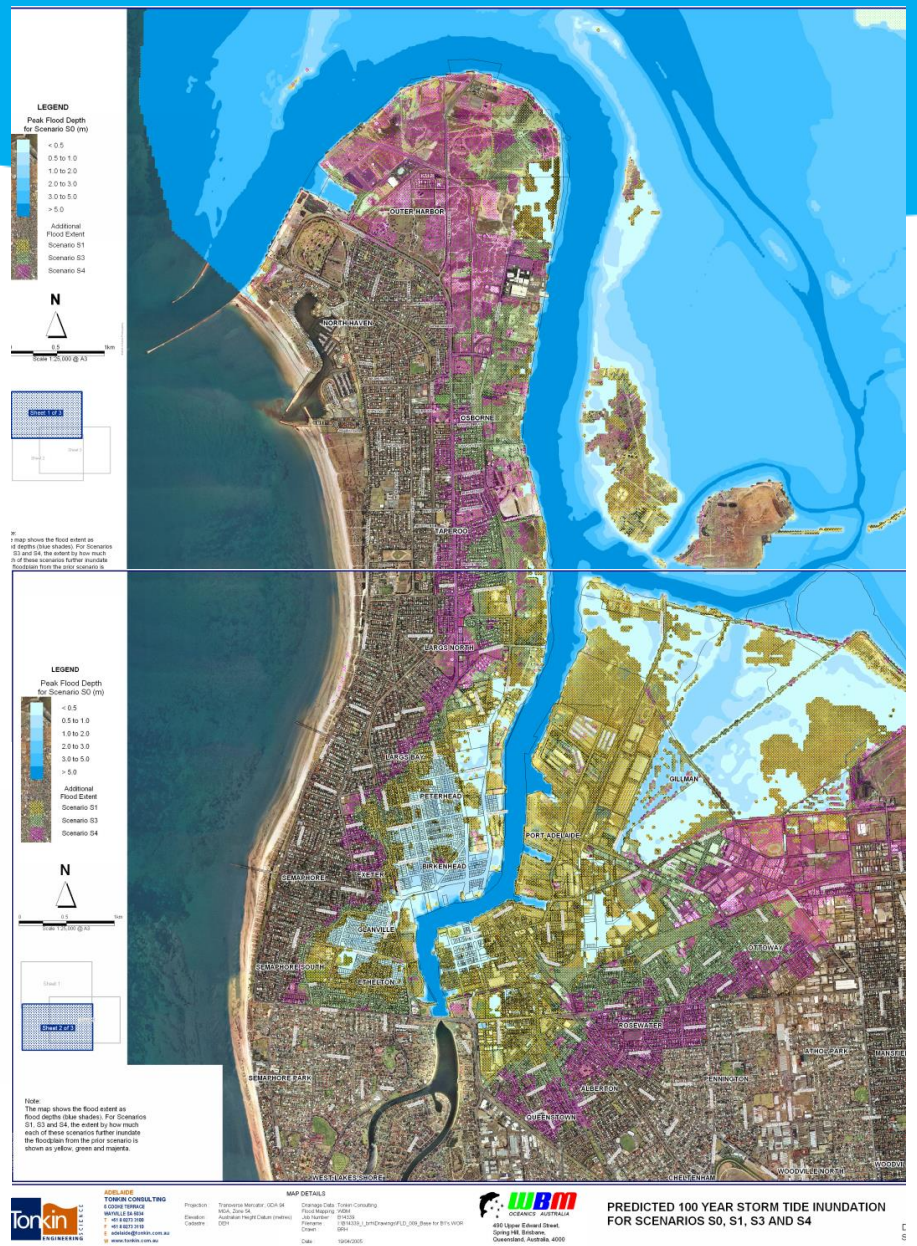
Phase 1 Study

Flooding due to Sea Level Rise

- The PAE study assessed the risks associated with sea level rises of 0.10m, 0.30m, 0.50m and 0.88m.
- Scenario 1 is 2050 predictions – 300mm sea level rise and 50 years of land subsidence
- Scenario 4 is 2100 predictions – 880mm sea level rise and 100 years of land subsidence





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Note:
The map shows the flood extent as flood depths (blue shades). For Scenarios S1, S3 and S4, the extent by how much each of these scenarios further inundate the floodplain from the prior scenario is shown as yellow, green and majenta.

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W: www.tonkin.com.au

MAP DETAILS

Projection : Transverse Mercator, GDA 94 MGA, Zone 54,
Elevation : Australian Height Datum (metres)
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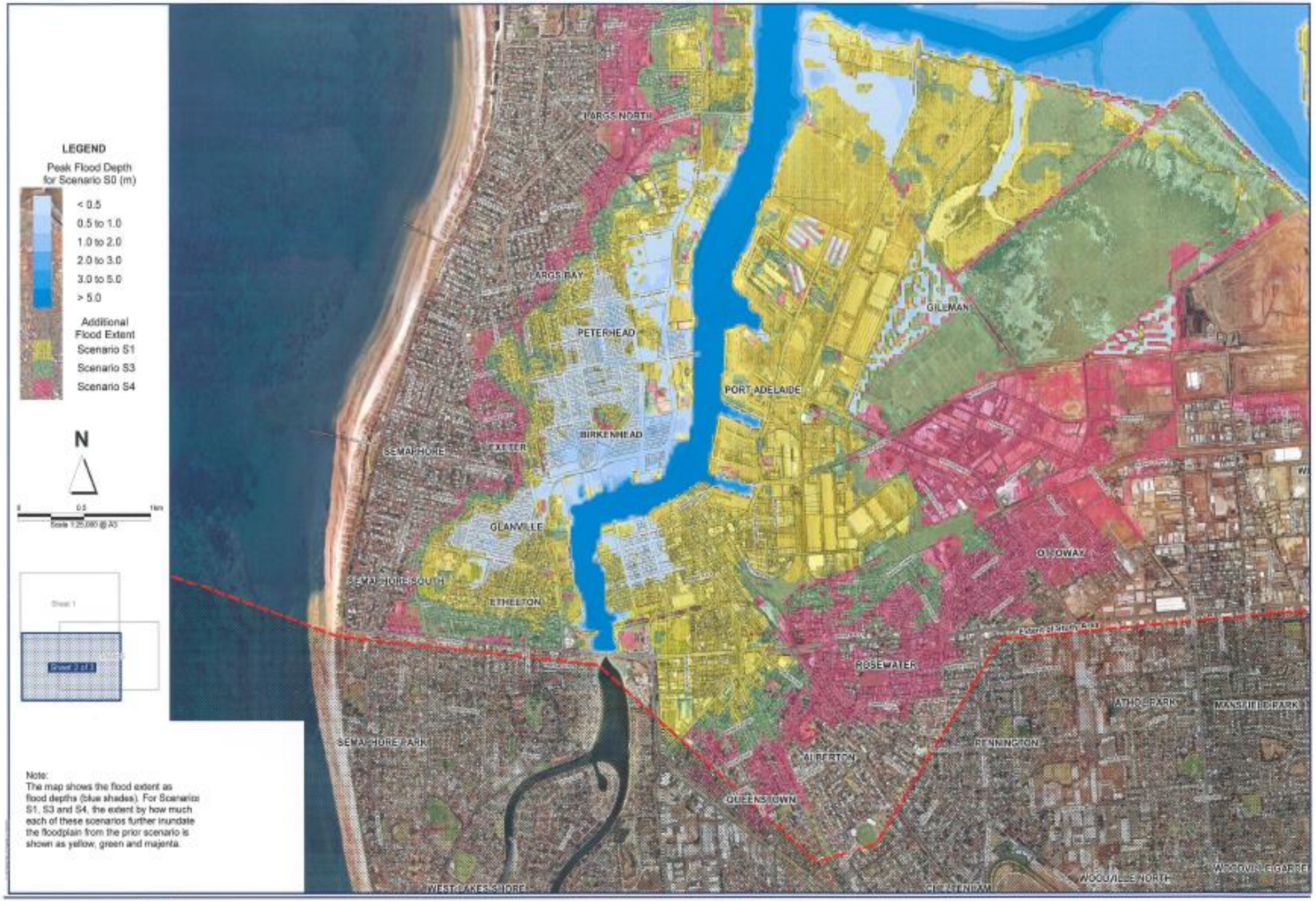
Drawn : BRH
Date : 16/04/2009

WBM OCEANICS AUSTRALIA
490 Upper Edward Street,
Spring Hill, Brisbane,
Queensland, Australia, 4000

LOWER CASE
PREDICTED 100 YEAR STORM TIDE INUNDATION FOR SCENARIOS S0, S1, S3 AND S4

Drawing 4-4
Sheet 1 of 3



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MAP DETAILS

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Elevation : Australian Height Datum (metres)

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Drawn : BRH
Date : 19/04/2005

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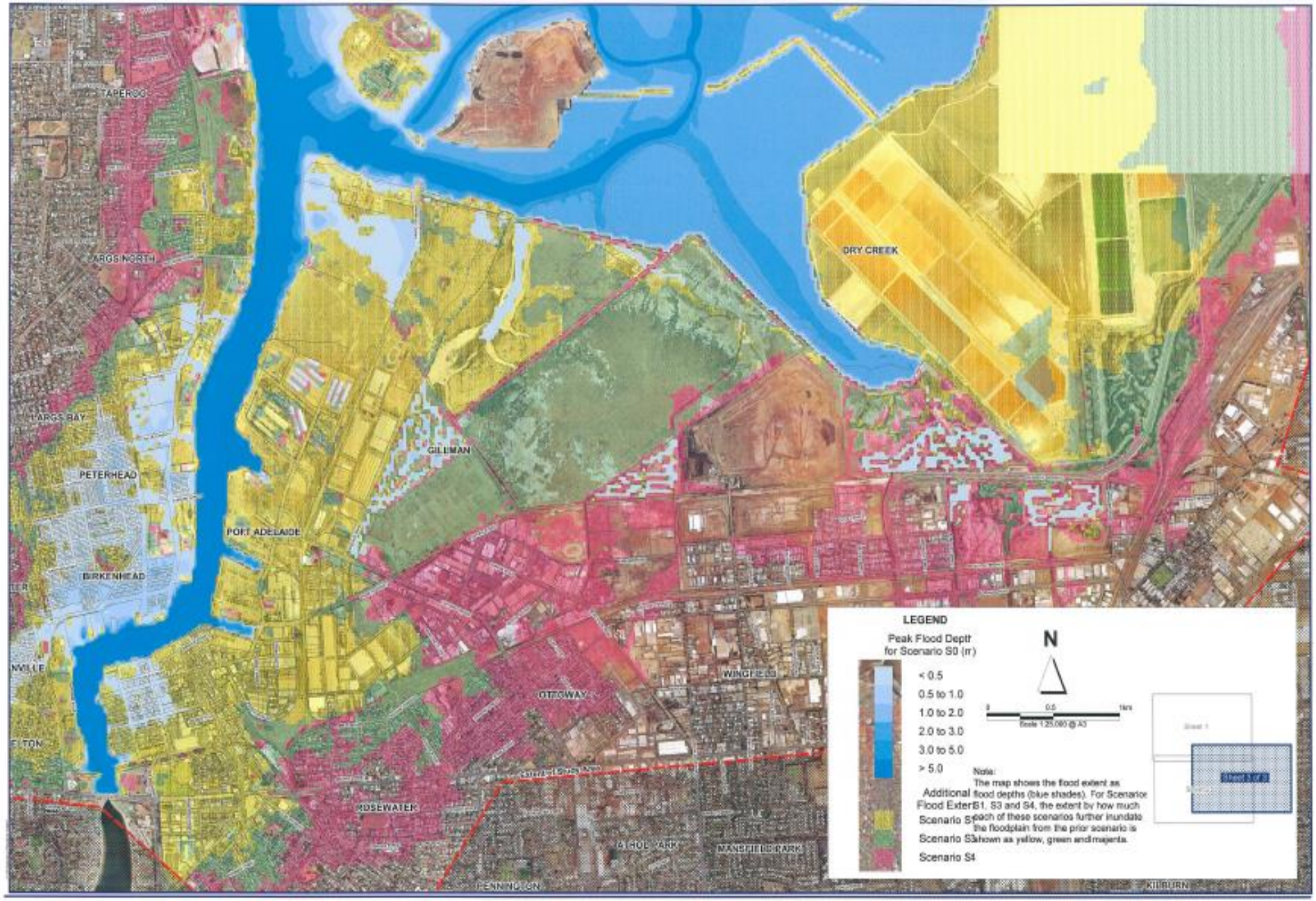
Queensland, Australia, 4000

LOWER CASE PREDICTED 100 YEAR STORM TIDE INUNDATION FOR SCENARIOS S0, S1, S3 AND S4

Drawing 4-4
Sheet 2 of 3



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MAP DETAILS

Projection : Transverse Mercator; GDA 94; MGA, Zone 54;
Elevation : Australian Height Datum (metres)

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Drawn : BRH
Date : 19/04/2005

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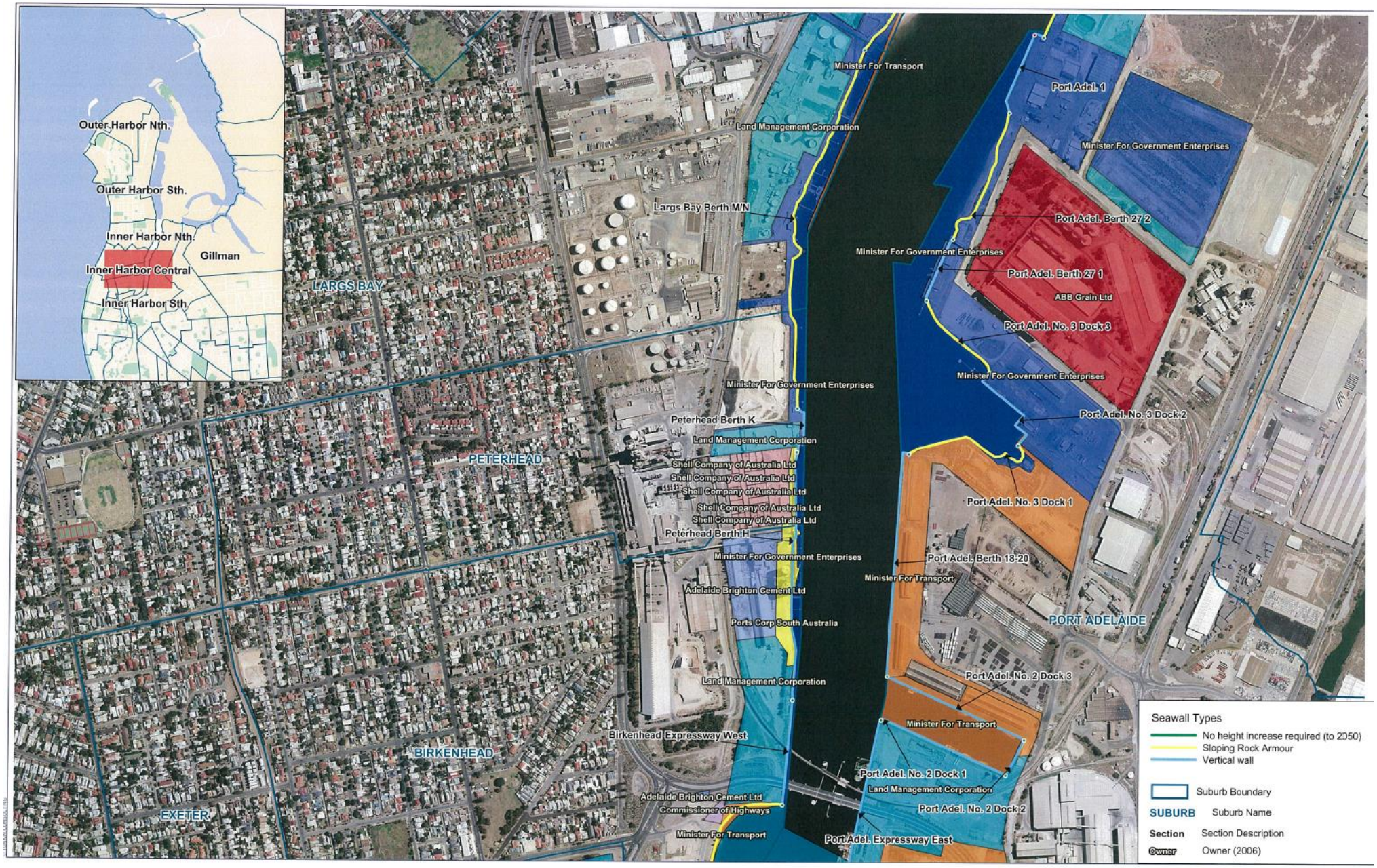
LOWER CASE PREDICTED 100 YEAR STORM TIDE INUNDATION FOR SCENARIOS S0, S1, S3 AND S4

Drawing 4-4
Sheet 3 of 3

Phase 2 - Seawall Study

- Mitigation strategies developed as part of Stage 2, in particular seawalls, living shorelines, levee banks, considered constraints including -
  - the need for access for port related activities
  - highly sensitive environmental regions such as mangrove areas
  - constraints within heritage areas

Section Descriptor	Existing Infrastructure	Condition	Approximate Existing Wall Height (m AHD)	Constraints/Issues	Recommended Upgrade	Priority Number
				undeveloped land used as informal car parking. Part of proposed Newport Quays Development		
Newport Naval Yard	Vertical sheet pile/slip facilities	Good	1.7	Some corrosion visible. Large buildings located in close proximity to the top of wall. Part of proposed Newport Quays Development	Vertical wall to 3.4 m AHD	2
Newport Fletcher Dock	Vertical sheet pile/sloping rock armour/slip facility	Serviceable	2.0	Some corrosion visible. A large building is located in close proximity to the top of wall. Part of proposed Newport Quays Development	Vertical wall to 3.4 m AHD	1
Newport 1	Vertical timber wallings	Poor	2.4	Some holes through timber. Part of proposed Newport Quays Development	Vertical wall/Rock armour	1
Newport 2	Sloping rock armour	Good	2.3	Some minor slip. Part of existing Marina Cove section of Newport Quays Development	Vertical wall to 3.4 m AHD	1
Port Adelaide Harbourside Quay	Sloping rock armour	Excellent	2.0	Shared path directly behind seawall. Residential area very close to seawall	Vertical wall to 3.4 m AHD	1 (due to close proximity of residential area)
Port Adelaide North Parade Wharf	Vertical sheet pile	Good	2.5	Spalling of concrete along top of sheet pile wall. Area behind wall used for car parking and pedestrian access. A section of this area is proposed to form part of the proposed Newport Quays Development	Vertical wall to 3.4 m AHD. Consider raising pavement as part of Newport Quays development.	2
Port Adelaide Queens Wharf	Vertical concrete wall	Good	2.6	Spalling observed on previously repaired area. Area behind wall used for pedestrian access. Access to the Dolphin Explorer from this area, may require localised raised pavement behind wall	Vertical wall to 3.4 m AHD	2
Port Adelaide No. 1 Dock 1	Vertical concrete wall	Good	2.5	Spalling observed on previously repaired area. Area behind wall used for pedestrian access. This area forms part of the proposed Newport Quays Development	Vertical wall to 3.4 m AHD. Consider raising pavement as part of Newport Quays development.	2
Port Adelaide No. 1 Dock 2	Vertical sheet pile	Good	2.5	Some corrosion visible. Pedestrian access to a pontoon from this area. Part of proposed Newport Quays Development	Vertical wall to 3.4 m AHD. Consider raising pavement as part of Newport Quays development.	2
Port Adelaide No. 1 Dock 3	Vertical concrete wall	Good	2.6	Isolated spalling, exposed reinforcement in areas. Vessels accessed from existing platform. Pavement may need to be raised to continue operations. Part of the proposed Newport Quays development	Vertical wall to 3.4 m AHD. Consider raising pavement as part of Newport Quays development.	2
Port Adelaide Expressway East	Vertical concrete wall	Serviceable	2.6	Isolated spalling, exposed reinforcement in areas. Vessels accessed from existing platform. Pavement may need to be raised to continue	Vertical wall to 3.4 m AHD. Consider raising pavement as part of Newport Quays development. Existing seawall may require repairs	1



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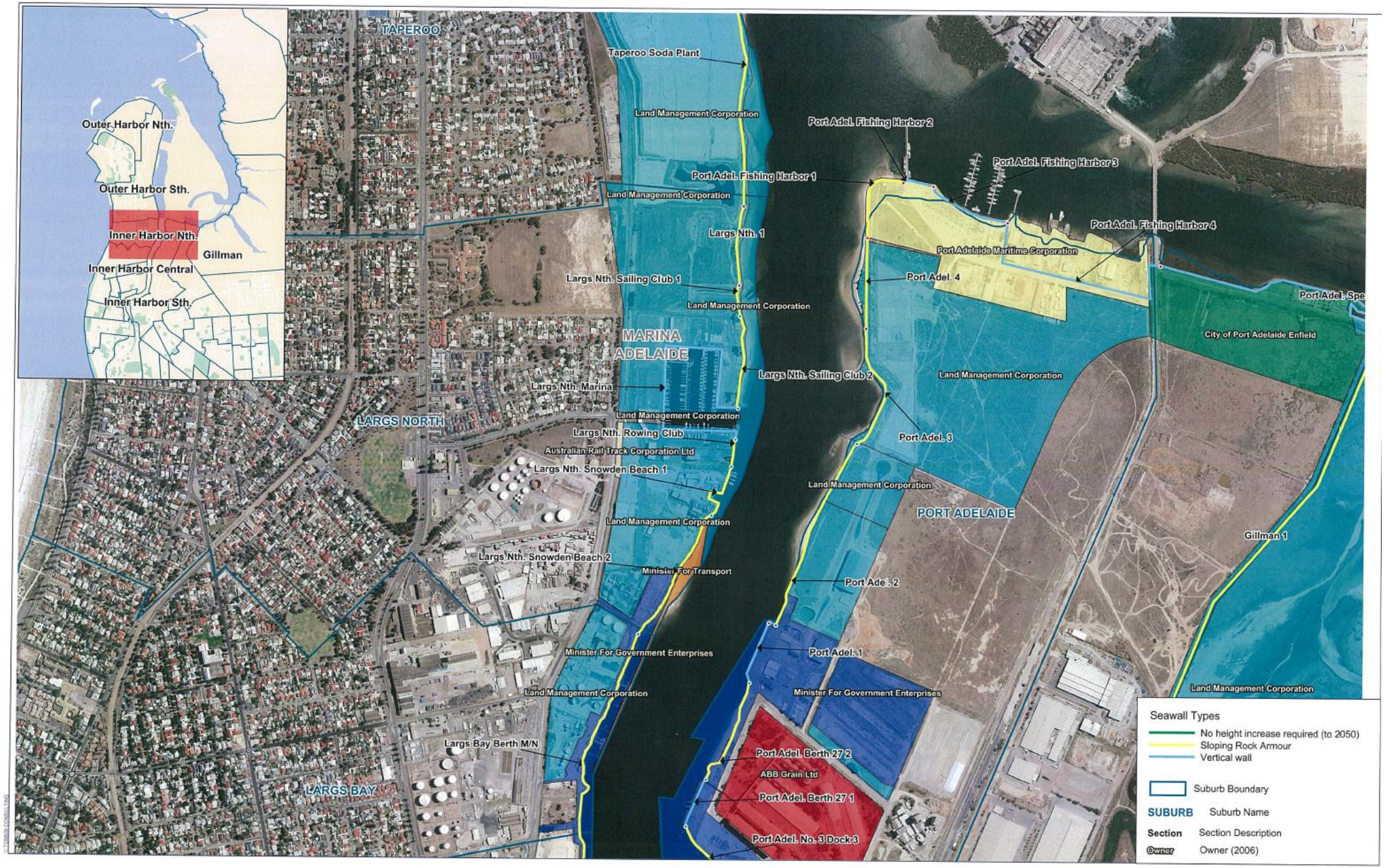
a better approach

INNER HARBOR CENTRAL

Job Number:	2006.0417
Filename:	SeaWall_Alignments_owners.WOR
Revision:	B
Date:	20/12/2012
Drawn:	MRE
Spatial Approval:	Not Approved
Technical Approval:	Not Approved

Port Adelaide Seawall Study

SEAWALL ALIGNMENTS AND TYPES PROPERTY OWNERSHIP (2006)



Port Adelaide Seawall Study

Phase 3 - Western Region Coastal & Inundation Modelling

Vulnerable stormwater networks :

- Gillman (City of PAE)
- West Lakes (City of Charles Sturt)
- Patawalonga (City of West Torrens)

Magazine Creek/Range/Gillman System:

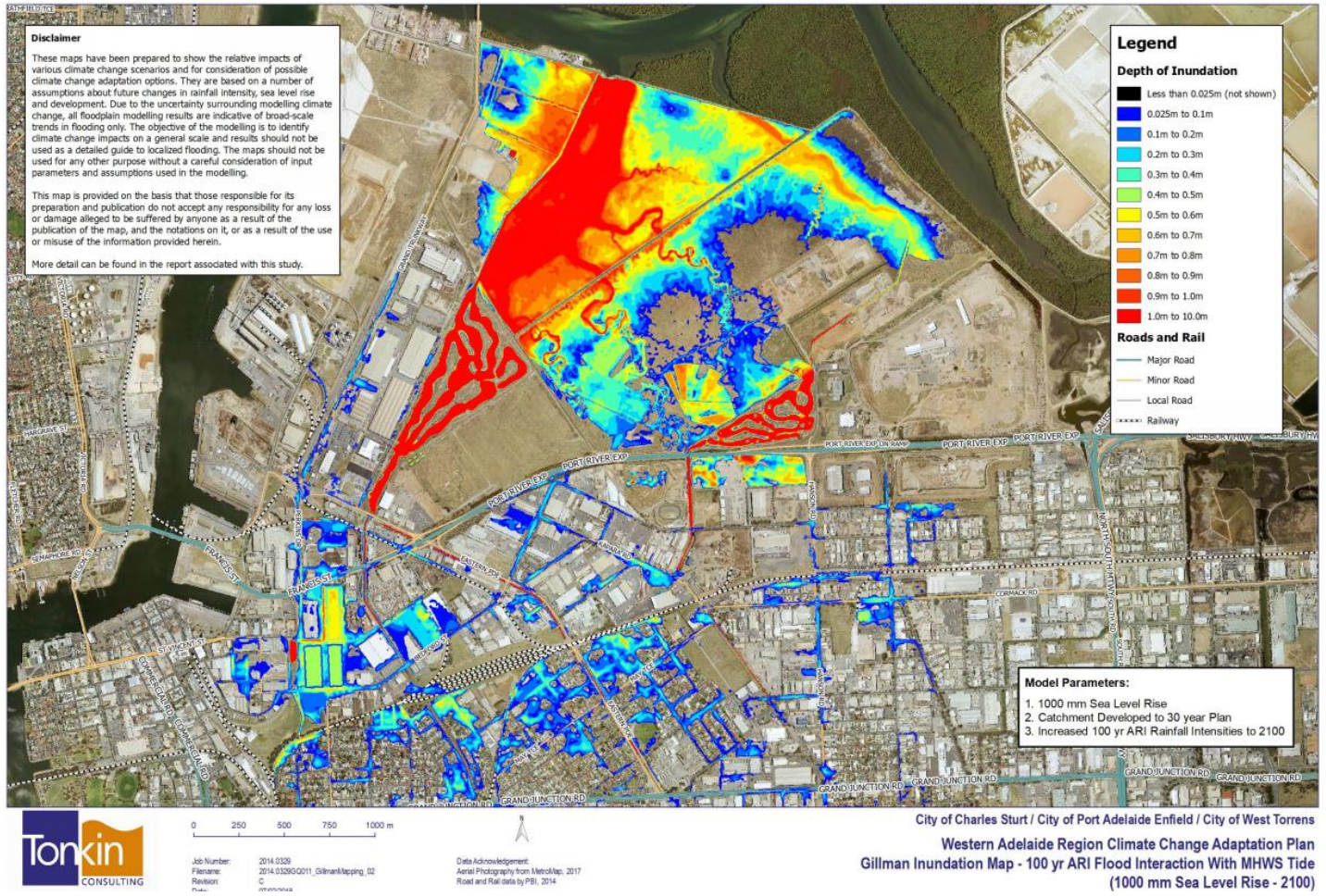
Targeted this area for the following reasons:

- Low lying land (subject to inundation)
- Tidal gates control the outflow of stormwater and inflow of seawater
- Outlet for major stormwater catchment (TRDA)
- SA Government Development

Western Region Coastal & Inundation Modelling

Modelling

- Worst case for Gillman area is 100yr storm with MHWS tide plus 1metre sea level rise
- Minor increase in flooding in industrial and residential areas as the wetland is low lying and high tide currently chokes the outflow from the wetland
- Large ponding area north east of wetland provides additional storage space to minimise flooding upstream



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UNHaRMED mitigation and planning exercise 2019

- https://www.bnhcrc.com.au/hazardnotes/86

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HAZARD **NOTE**

bushfire&natural HAZARDSCRC

ISSUE 86 DECEMBER 2020
TOPICS IN THIS EDITION | EXPOSURE | FLOOD | MITIGATION

IMPROVING RISK MITIGATION THROUGH BETTER SCENARIO MODELLING: A COASTAL INUNDATION CASE STUDY

ABOUT THIS PROJECT

This research was conducted as part of the Bushfire and Natural Hazards CRC's *Improved decision support for natural hazard risk reduction* project, part of the economics and strategic decisions cluster.

AUTHORS

David Parsons, Charles Sturt University; Dr Graeme Riddell and Prof Holger Maier, University of Adelaide.
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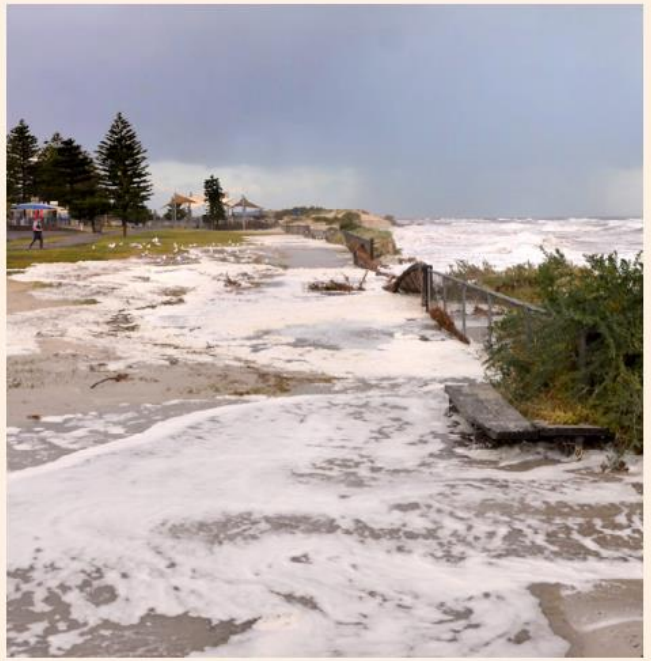
SUMMARY

This project trialled the application of decision support software developed by the research team, called UNHaRMED – Unified Natural Hazard Risk Mitigation Exploratory Decision system – in a mitigation and planning exercise. The exercise, conducted in August and September 2019, brought together a diverse multi-agency team to explore future coastal inundation risk at the City of Port Adelaide Enfield in South Australia. The trial explored the ways in which the likelihood and consequence of coastal inundation risk at the port could change in future decades. UNHaRMED was crucial in focusing attention on the key policy issues to be addressed and resolved to mitigate future risk.



▲ **Above:** THIS RESEARCH EXPLORED WAYS IN WHICH THE LIKELIHOOD AND CONSEQUENCE OF COASTAL INUNDATION RISK WILL CHANGE IN FUTURE DECADES AND WHAT CAN BE DONE TO MITIGATE THE CHANGING RISK. PHOTO: ANTHONY VIRAG, COASTAL MANAGEMENT BRANCH, SOUTH AUSTRALIAN DEPARTMENT OF ENVIRONMENT AND WATER

Developing Resilience Investment Cases

- Port Adelaide region one of two national cases studies – PAE Flood Hazard, Bega Bushfire Hazard to test methodology to develop resilience investment cases
- Outcomes to inform work of new National Recovery and Resilience Agency
- CSIRO and Value Advisory Partners led project
- PAE case study:
  - used modelling and mapping data from prior studies
  - Focused on government stakeholders
  - Focused on identify opportunities for mitigation of hazards, beneficiaries, value creation, funding mechanisms and investment pathways

Overview: Enabling Resilience Investment Framework

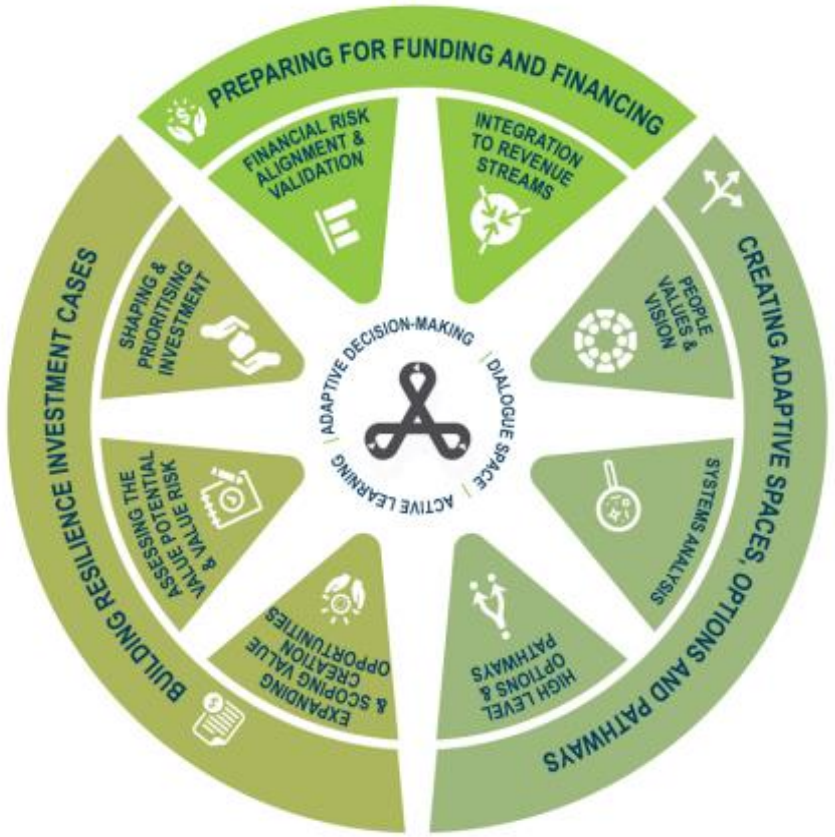
Integration to revenue streams
Alignment of policies, decisions, assurance and delivery plan & stress testing to finalise options.

Financial risk alignment and validation
Assessment of financial risk on assets and value added impacts. Identify the stakeholders risks and values that form the focus of potential investment cases.

Shaping and prioritising investment cases Assessment of resilience investment cases through the climate-hazard vulnerability scenarios and adaptation and risk reduction.

Assessing the value potential and value at risk
Assessment of value created and potentially realisable revenue that is recoverable and reliable over time

Expanding options & scoping value creation opportunities
Assessment of resilience investment cases through the climate-hazard vulnerability scenarios and adaptation and risk reduction.



Systems analysis
Integration to climate analysis, hazard assessment and decision context (V.K.R) assessment.

Identify high-level options and pathways
High-level options & pathways leading to disaster risk reduction.

People, values and visions
Stakeholder mapping and engagement. Scoping, visioning & goal setting

VALUE ADVISORY PARTNERS

CSIRO

Where we are now

Sept 2021 – State Government/PAE made submission to Infrastructure Australia to have Port Adelaide listed on national priority list for investment in coastal adaptation infrastructure:

- business case development
- integrating current and future climate change risks

Dec 21 – council report on CSIRO/VAP project outcomes

Dec 20/Jan 2022 - R&D Project (DEW funding) – Coastal Adaptation Governance Framework for Port River

Current - Exploring funding options under new National Recovery and Resilience Agency funding program with CSIRO/VAP and State Government

Current - Review of coastal hazard overlays in new Planning Design Code

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Thank you for listening

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