Coastal dunes provide the first line of defence from sea level rise and storm surge

Green infrastructure, climate change and asset management collaboration.

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## Introduction

- Why asset management matters
- Climate change impacts on coastal assets
- Disaster Resilience Fund Climate Resilient Infrastructure Assets
- Green Infrastructure services for the coast
- LGA SA Research and Development Fund Asset Management for Green Infrastructure
- Getting involved



### Asset management matters!

Infrastructure now accounts for approximately 70% of global greenhouse gas emissions and half of all resources used and waste created globally.

And 60%-70% of the 2050 infrastructure is not yet built.

We have a huge responsibility to:

- 1. Reduce impacts on natural assets reusable, recyclable assets.
- 2. Reduce impacts on the climate carbon neutral and climate resilient assets.
- 3. Prioritise green infrastructure solutions.



### Global temperatures – observed 2023



### Greenland ice melt – observed 2023



### Global SLR rate - observed





Cazenave and Moreira (2022), NASA (20023)

# Future projections (AR6)

- Current SSP3-7.0 approx. 3 –
  4.5°C by 2100 and 7.5°C by 2300
- Global warming projected to be 1.5°C before 2030 and 2°C by 2050.
- To keep below 2°C, emissions must fall to about 45% of 2010 levels by 2030 and net zero by 2050 plus interventions
- Greenhouse gas emissions continue to rise.... And natural land sinks are now beginning to fail.



**IPCC AR6 2021** 



## The low likelihood, high impact scenario

- "Global mean sea level rise above the *likely* range approaching 2 m by 2100 and 5 m by 2150 under a very high GHG emissions scenario (SSP5-8.5) cannot be ruled out due to deep uncertainty in ice-sheet processes" <sup>1</sup>
- "Global mean sea level might rise as high as 2.3 m in 2100 - based on structured expert judgement "<sup>2</sup>
- The higher resolution CMIP 6 models and recent observations indicating that ice sheet sensitivity to warming is greater than previously modelled.
- The Antarctic Thwaites Glacier and ice sheet alone have the capacity to raise global sea levels by up to 3 m



## Risks and impacts to coastal councils

Infrastructure assets have a useful life of up to 150 years and urban footprints remain in place longer

All coastal assets less than 2-3 m above current 1:100 AEP - and those further from the coast that are subject to saline groundwater intrusion are at risk within planning timeframes. Impacts include:

- Physical and chemical wear / damage to exposed assets and reduction in useful life
- Interruptions to service
- Climate stress on green infrastructure (vegetation, trees, living shorelines)
- Management impacts (planning, adaptation)



Several beachfront homes at Wamberal (NSW) are in danger of collapsing (NT news 2020).



## Coastal adaptation strategies

- Adaptation actions include: Avoid; Accommodate; Protect / Defend; or Retreat
- No regrets, Low-regrets, Win-win and flexible measures are all required
- Preference green infrastructure (living shorelines, vegetated dunes, mangroves, artificial reefs)
- Limit hard grey infrastructure (sea walls, groins, training walls) – high cost and embodied CO<sub>2</sub>, don't provide space for ecosystems to migrate landward
- Remember sea walls don't keep the sea out! It comes up in the water table / needs constant pumping out





Rehabilitated coastal dunes – Holdfast Bay (Living Shorelines Australia (2023).

## Practice Note 14

#### **Practice Note 14: Climate resilient infrastructure assets**

- Update and build on Practice Notes 12.1: Impacts of climate change on infrastructure assets and Practice Note 12.2: Climate resilient materials for infrastructure assets (New PN14)
- Include the coastal zone and assets for the first time
- Examine climate change impacts and adaptation (SLR)
- Extended and updated supporting tools and resources
- Stand alone online training module with industry recognised micro-credential
- Integrate content across all IPWEA's resources, tools and templates

Supported by Disaster Resilience Funding and project partners (SACCA, DEW, DIT, Councils). Completion December 2025.



# PN 14 - Supporting Resources

- Climate change maps
- Decision tree worksheet
- Detailed worked examples
- Case studies
- Summary tables of climate impacts to asset materials
- Traffic light tables of asset risk and vulnerability
- Extensive tables of climate change adaptation options

ASSET MANAGEMENT AND

Practice Note 12.2: Climate Resilient Materials For Infrastructure Assets

FINANCIAL MANAGEMENT GUIDELINES

**IPWEA** 

- Appendices and active links to further information
- Additional on-line resources
- Videos
- Interviews
- ... and more.

PN 14 FREE FOR SA COUNCILS AND PROJECT STAKEHOLDERS



## Project funding and milestones

**Cash contributions:** IPWEA = \$5,000.00 **In-kind contributions:** IPWEA = \$110,000.

#### DRF Cash = \$130,000 TOTAL BUDGET = \$274,344

Project partners = \$8,000 Project partners = \$21,344Climate Resilient Infrastructure - Best Practice Guidelines, Trainina and Tools **Delivery Timeframe** Total Budget Milestone Title Description Anticipated Anticipated (Comm. + end date start date partners) 1 Project setup, stakeholder The initial project administration requirements will be put in place, contracts signed, key Q4 2024 O4 2024 \$24,500 stakeholders identified and an initial project launch / scoping workshop run, regular engagement, scoping workshop, ongoing administration meetings set up, marketing plan developed. Includes all ongoing project management costs. Development of draft Practice Project partners in collaboration with SA stakeholders (asset managers, engineers, council 2 Q1 2025 Q2 2025 \$53,750 Note 14: Climate resilient representatives) will develop a draft best practice quideline "Practice Note 14 - Climate resilient infrastructure assets" for the planning, aquisition and management of climate infrastructure assets reslient infrastructure assets. Practice Note 14 will be build on Practice Note 12.1 and 12.2 funded by NSW government and LGNSW and will include coastal assets and climate change dimensions. Review and testing of Practice The draft Practice Note will be reviewed by project partners and stakeholders as well as 3 Q2 2025 Q3 2025 \$27,750 identified experts in climate impacts and adaptation, asset materials, asset management, Note 14 engineering and construction. 4 Publication of Practice Note 14 Practice Note 14 will be formatted and published on the IPWEA Bookshop website as an e-Q3 2025 Q4 2026 \$100,250 and integration of outputs to book and provided free of charge to all South Australian Councils and participating other quidelines, tools and stakeholders for two years. Content from the Practice Note will be added to other existing templates IPWEA guidelines, tools and templates including the IIMM, IIFMM and NAMS Plus. Development of a supporting 5 Content from Practice Note 14 will be used to develop an online education / training course 03 2025 04 2026 \$56,000 that provides an industry recognised micro-credential as a digital badge for all completing online trainina course participants. Launch of the project deliverables, 6 The Practice Note and online education course will be launched in Adelaide and online, KPIs 04 2025 04 2025 \$12,094 finalisation of project reporting will be assessed and final reporting completed. and KPIs

### Green Infrastructure

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Green Infrastructure can be defined as a *"managed and interconnected nature-based network for the provision of services"*.

And "including green infrastructure as part of an overall asset management strategy, can save capital and operating costs and reduce risk when compared to engineered alternatives".

**MNIA**, 2023

### Green Infrastructure Services



Urban forest, Singapore (Source: Ecobusiness).



Streetscape rain garden Adelaide





The Hondsbossche Dunes, the Netherlands.

Land services



Coastal services



### Green Infrastructure Assets

There has been a lot of research undertaken on:

- Benefits / Values
- Planning / Design
- Construction / Costs

But, very little on asset management:

- Asset management plans
- Financial management plans



## Practice Note 15

#### Practice Note 15: Asset management for green infrastructure

- Build on work already underway within IPWEA including the Asset Management for Green Infrastructure Seminar
- Will include the fundamentals of asset management for green infrastructure for assets on the coast, land and water
- Will follow the principals of the International Infrastructure management manual and updated ISO 55000:2024
- Develop Practice Note 15 Asset management for green infrastructure
- Range of supporting tools and resources

Supported by LGA SA Research and Development Scheme Funds and project partners (SACCA, WSSA, Green Adelaide, LSA, LFA, Councils). Completion December 2026.



## PN 15 - Content

- Identify green infrastructure options for land, water, coasts
- Communicate and quantify GI services, values and benefits
- Understand costs, limitations and threats
- Determine the Levels of Service for GI assets
- Use an asset life cycle approach including planning, acquisition, operation, monitoring, maintenance, repair, renewal, disposal
- Assess risks and opportunities including climate change
- Integrate into strategic plans, Asset Management Plans and Financial Management Plans.
- Published as a best practice e-book: Practice Note 15



Salt mash restoration project on Galveston Island, Texas



A coastal mangrove forest

# PN15 - Supporting Resources

- Decision tools to identify and select the service required and location specific GI options
- Detailed worked examples including cost benefit analysis of GI options
- Template for building a business case to prioritise GI
- Numerous images and case studies from around the world
- Extensive summary table of GI options
- Traffic light table of asset climate vulnerability.
- Appendices and active links to further information
- Stand alone online training module with industry recognised micro-credential





## Project funding and milestones

**Cash contributions:** IPWEA = \$40,000.00 LGA SA = \$95,000.00 In-kind contributions: IPWEA = \$30,000. Project partners = \$82,586.00 TOTAL BUDGET = \$247,586

Milestone	Task	Year	Budget
1	Project setup and scoping workshop	2024 - 2025	\$10,000
2	Literature review	2024 – 2025	\$30,000
3	Draft Practice Note 15	2024 – 2025	\$20,000
4	Review of Draft	2024 – 2025	\$10,000
5	Publication of Practice Note 15	2024 – 2025	\$10,000
6	Development of online learning program (optional)	2025 - 2025	\$30,000
7	Launch of the project deliverables and marketing	2025 – 2025	\$5,000
8	Monthly meetings, partner collaboration, scoping workshop and pre- and post-project survey, evaluation	2024 - 2025	\$10,000
9	Administration and project evaluation	2024-2025	\$10,000

### We need to act now – here is how

#### **Embrace the circular economy (Practice Note 13):**

• Implement the circular economy steps for your assets and infrastructure.

#### Plan and adapt to climate change (Practice 14):

- Identify climate impacts and risk
- Invest in climate resilient infrastructure assets.

#### **Prioritise green infrastructure (Practice Note 15):**

 Identify and include green infrastructure assets to provide climate smart, resilient services and solutions.



# Please join us in the next ste sustainability

# THANK YOU

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