NSW GOVERNMENT | Office of Environment & Heritage

Building resilience in public infrastructure through collaborative adaptation: XDI Sydney project

IPWEA Sustainability in Public Works Conference 15 May 2018

The total economic cost of natural disasters in New South Wales over the past decade averaged $3.2 billion per year

Storms accounted for 49% and 23% due to flood events.

This cost is expected to rise to $10.6 billion a year by 2050 if we do not improve the resilience of our existing and planned assets

Building Resilience to Natural Disasters in our States and Territories, Deloitte Access Economics (Nov 2017)

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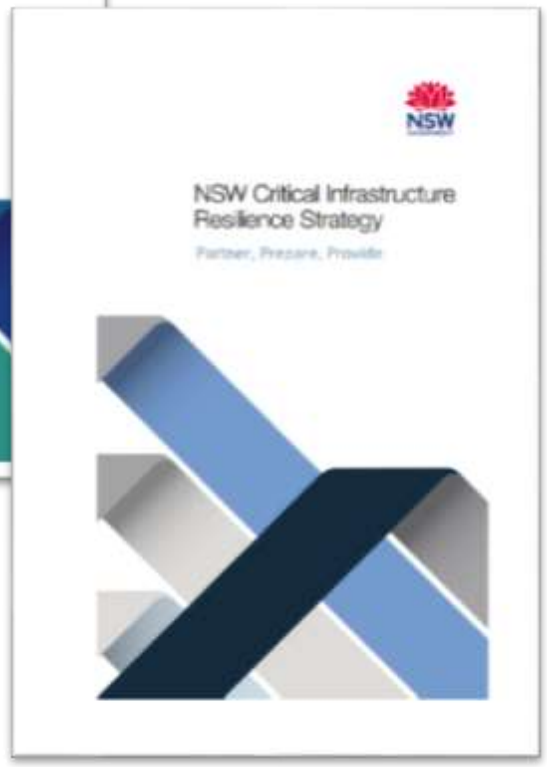
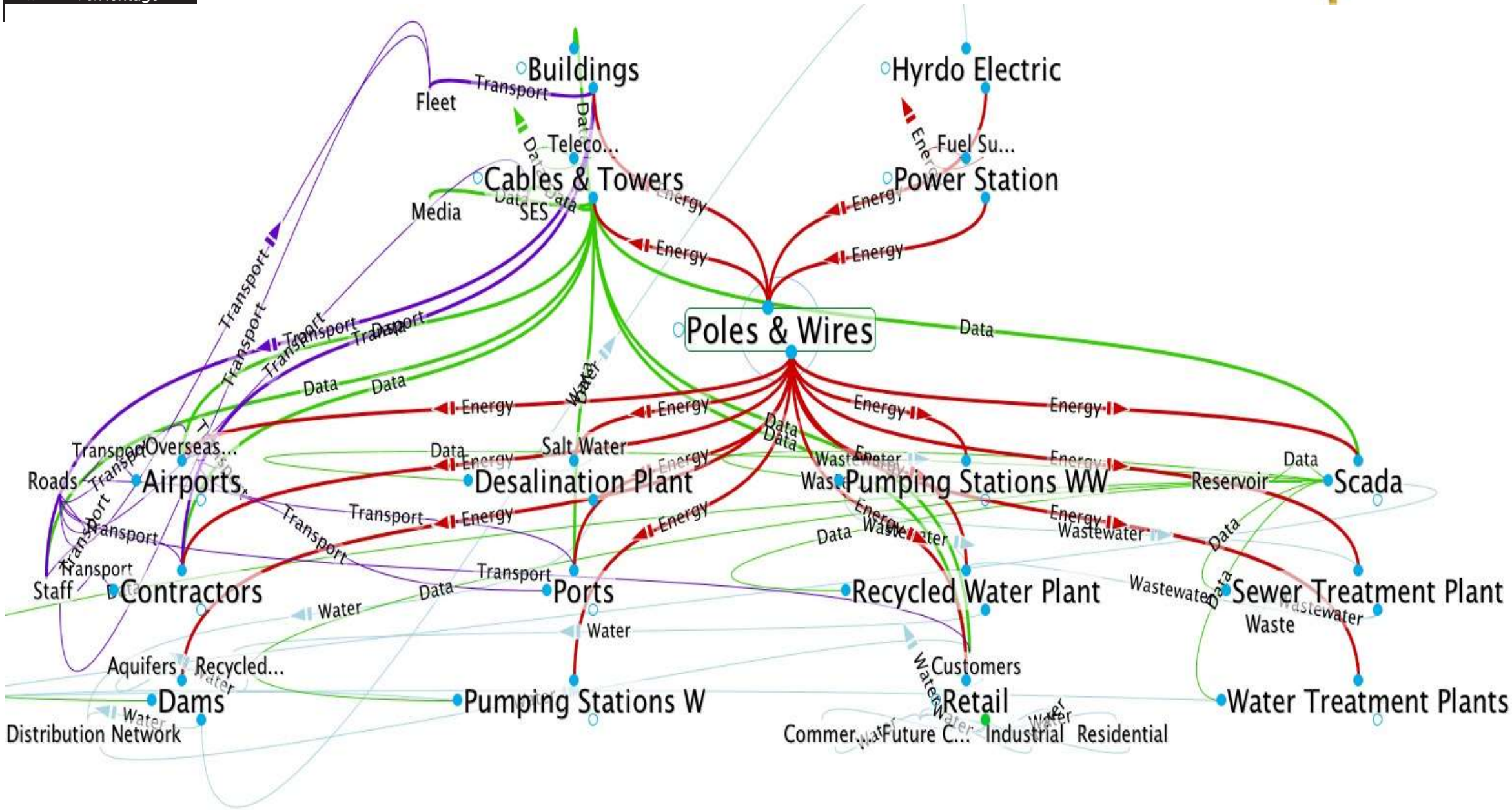


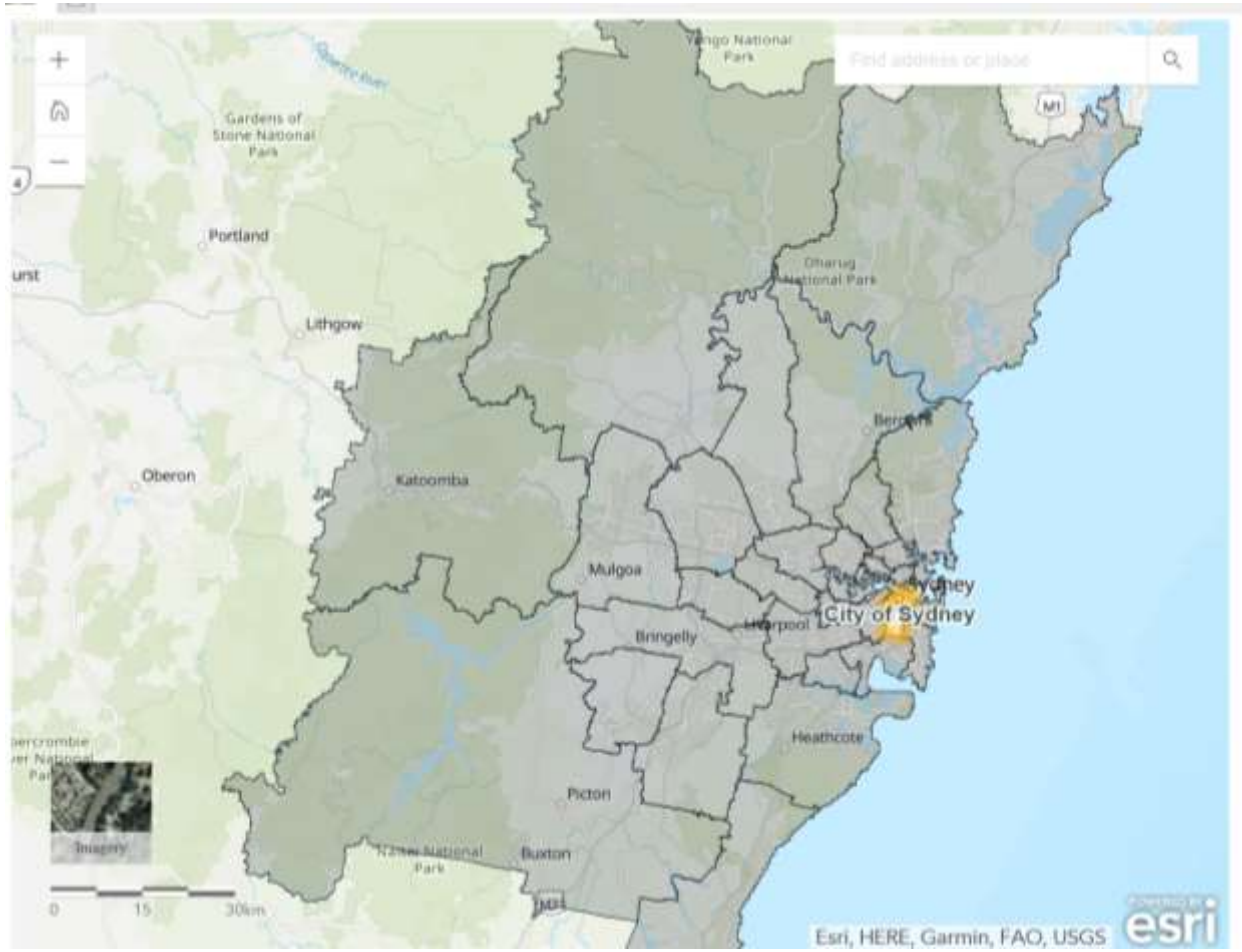

Buildings
Hyrdo Electric
Fleet
Transport
Teleco...
Fuel Su...
Cables & Towers
Power Station
Media
SES
Energy
Poles & Wires
Data
Water
Overseas...
Salt Water
Roads
Airports
Desalination Plant
Pumping Stations WW
Reservoir
Scada
Staff
Contractors
Ports
Recycled Water Plant
Wastewater
Sewer Treatment Plant
Waste
Aquifers
Recycled...
Customers
Dams
Pumping Stations W
Retail
Water Treatment Plants
Distribution Network
Commer...
Future C...
Industrial
Residential

Cross Dependency Initiative – XDI Sydney

Identifies extreme weather and climate change risks to assets, and importantly the dependencies between different types of infrastructure

3 year pilot in Metro Sydney from March 2017– March 2020

Readily expandable to NSW and nationally



Foundation Partners

Observers and Technical Advisory Group

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AdaptNSW

AdaptWater™

Sydney WATER

AdaptWater™

A climate change adaptation tool for the urban water industry

AdaptWater™ will allow Sydney Water to assess and quantify the impact of climate change and extreme events on its water supply and sewerage assets, and compare adaptation responses.

Overview of project

AdaptWater™ is an online climate change adaptation and asset-planning tool. It is designed to quantify the risk associated with climate change and extreme events and perform cost-benefit analyses of proposed adaptation options in order to inform planning and investment decisions.

A range of scenarios can be run against a utility's assets (existing or planned) to assess the impact of various climate change hazards on an individual asset or set of assets. The user can explore the impact of hazards such as sea level rise; precipitation; rises in temperature; and extreme wind. The tool is backed up by a robust set of data to give decision-makers the necessary information to determine the most cost effective solutions. AdaptWater™ allows the user to:

- measure the impact of climate change hazard/s on thousands of water supply and sewerage assets
- predict the probability of asset damage and failure from existing hazards and those made worse by climate change
- calculate the risk to the utility in both financial and non-financial terms
- compare adaptation measures to establish the costs and benefits of multiple adaptation options and allow prioritisation
- present outputs in a visual way to provide a compelling case to a range of stakeholders including managers, financial controllers, economic regulators and environmental authorities.

LOCAL GOVERNMENT NSW

Office of Environment & Heritage

Adapting roads to climate change

COUNCIL NAME
Manly Council

WEB ADDRESS
manly.nsw.gov.au

SIZE
14.4 square kilometres

POPULATION
44,232

Overview

The AdaptRoads pilot project builds resilience to road infrastructure by developing a business case for adaptation. The tool uses road asset data and hazard geospatial data both from Manl Council and national and international climate change sources to analyse current and future risks associated with different climate change scenarios. This analysis shows that extreme weather events such as bushfire, riverine flooding and coastal inundation are likely to increase in severity and frequency, which will result in greater risks to road assets. Adaptation pathways were developed and analysed to plan cost-effective adaption options.

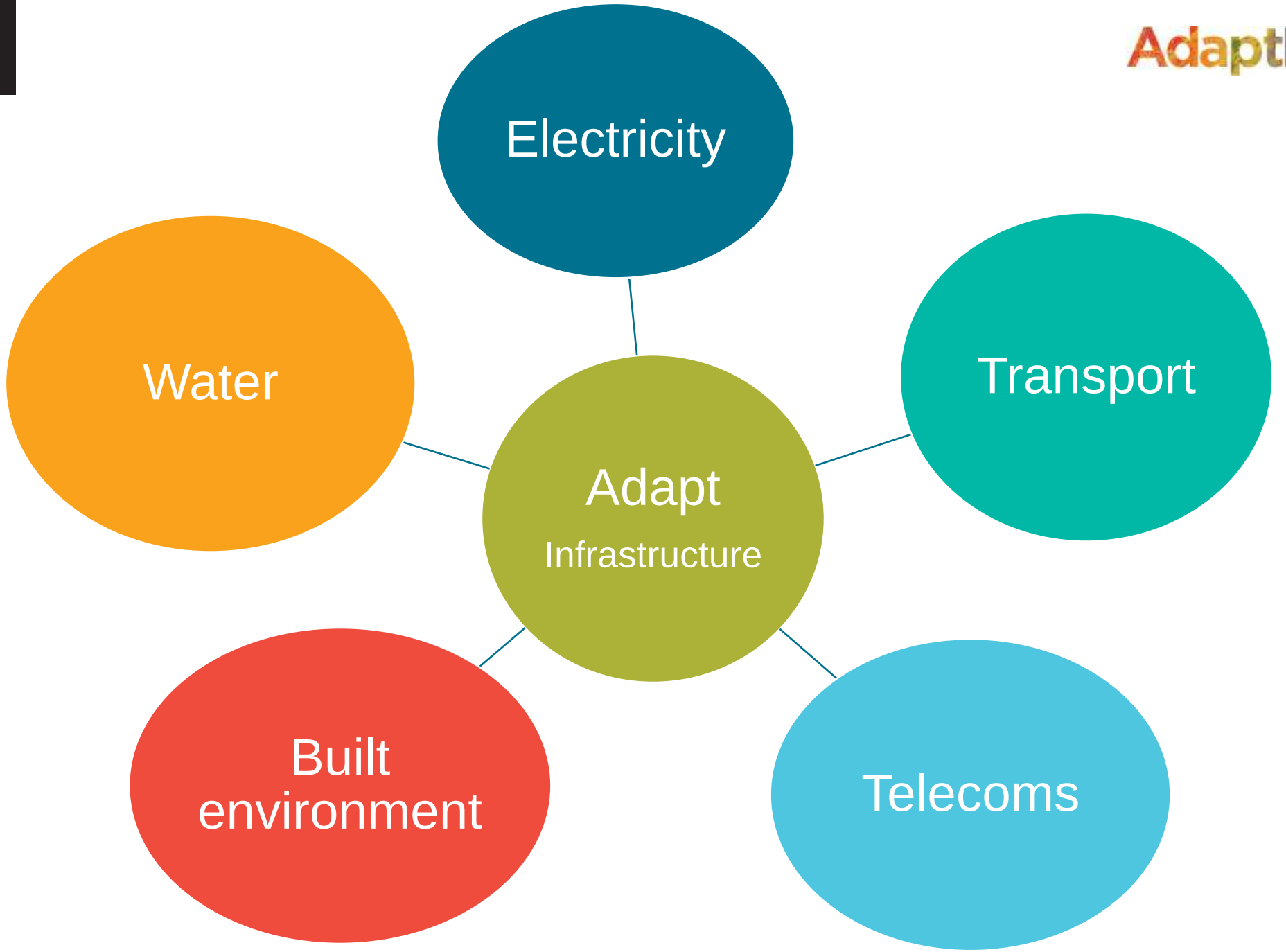
Background

NSW local governments manage 90% of the state's road network. Council road assets are valued at over $65.7 billion and cost approximately $1.1 billion per year to maintain. Flooding events, coastal inundation, bushfire and extreme windstorms can disrupt use, damage and sharply reduce their usable life.

Road infrastructure will be more vulnerable through increased intensity and frequency of climate and weather hazards. The Metropolitan Sydney Region is expected to experience more hot days (>35°C) with an additional 4 hot days in the near future and 11 days more hot days in the far future. The region is also expected to experience an increase in average and severe fire weather in the near future and the far future (OEH, 2014).

Bushfire burning in the Blue Mountain Local Government Area (photo: BMCC)

Rows of trees down in Newcastle after storm (photo: Sydney Morning Herald)


Electricity
Water
Transport
Adapt
Infrastructure
Built environment
Telecoms

Asset archetypes

Waste water – treatment plants, pumping stations, pipes, chemical dosing units, odour control units

Water supply – treatment plants, reservoirs, pumping stations, pipes, chemical dosing units, weirs, dams

Storm water - pipes, drainage

Roads – traffic signalling systems, sealed flexible pavement, rigid pavement, bridges, tunnels, culverts, slopes, safety barriers, kerbs and gutters

Rail – tracks, signalling systems, bridges, platforms, stations, catch point, HV assets

Electricity – transformers, substation

Telecommunications – towers, exchange, nodes

Council-owned public buildings - library, community centre, depot, council buildings

Recreation facilities - aquatic centre, parks and playgrounds

Streets - footpaths, street furniture, poles and street lights, street trees

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ADAPT NSW HOME | ABOUT CLIMATE CHANGE IN NSW | CLIMATE PROJECTIONS FOR NSW | IMPACTS OF CLIMATE CHANGE | ADAPTING TO CLIMATE CHANGE | EDUCATION RESOURCES | BACK TO OEH HOME

Understanding and adapting to climate change impacts in New South Wales

Discover everything you need to know about climate change in NSW.

Discover how. Explore where. Learn to adapt.

Need some help on where to start?

About climate change

What can we expect NSW Climate projections

Show me changes in temperature

in region | my local area | state view

2020-39 | 2060-79

See interactive climate change map

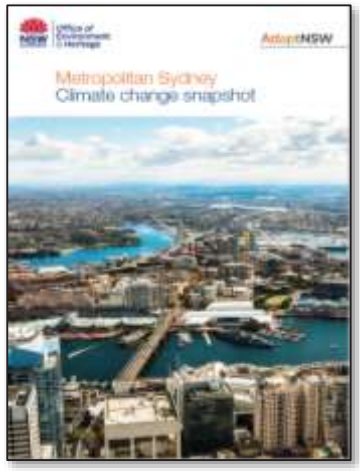
Access the raw data

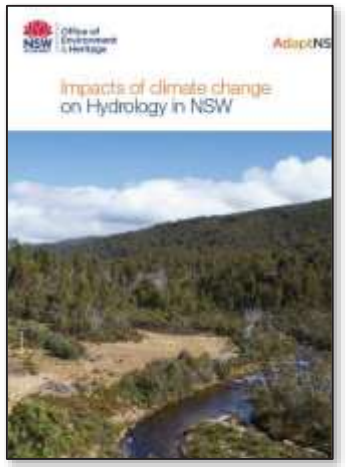
About climate change
Learn more about climate change in NSW page

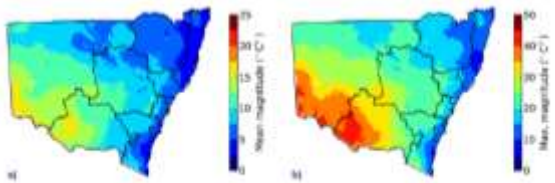
Impacts of climate change
Find out about the impact of climate change

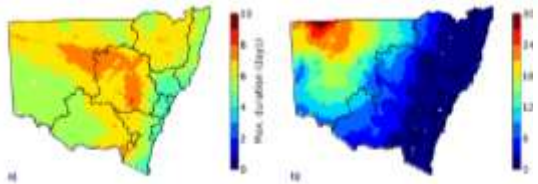
Adapt to climate change
Learn about how you can adapt to climate change

Educational resources
Information & resources on climate change









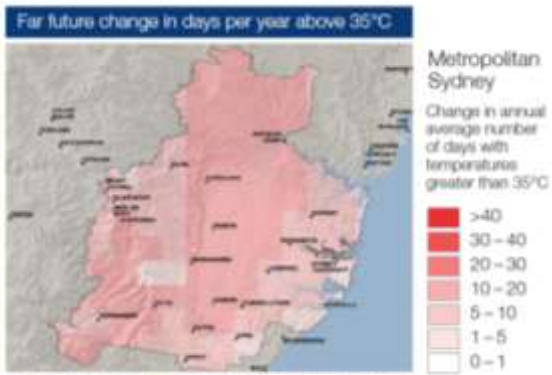


Figure 9: Far future (2060–2079) projected changes in the number of days per year with maximum temperatures above 35°C.

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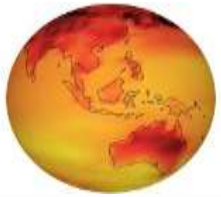
Assets

+

Hazard Maps

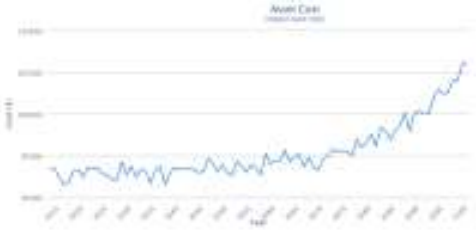
+

Climate Science



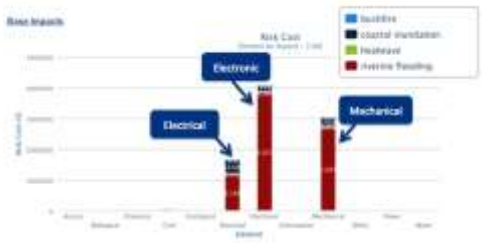
Resilience Engines

Risk Cost and Asset Failure Projections



Heat Mapping of Risk of portfolios

Vulnerability Diagnostics



Adaptation Planning, Cost Benefit Analysis

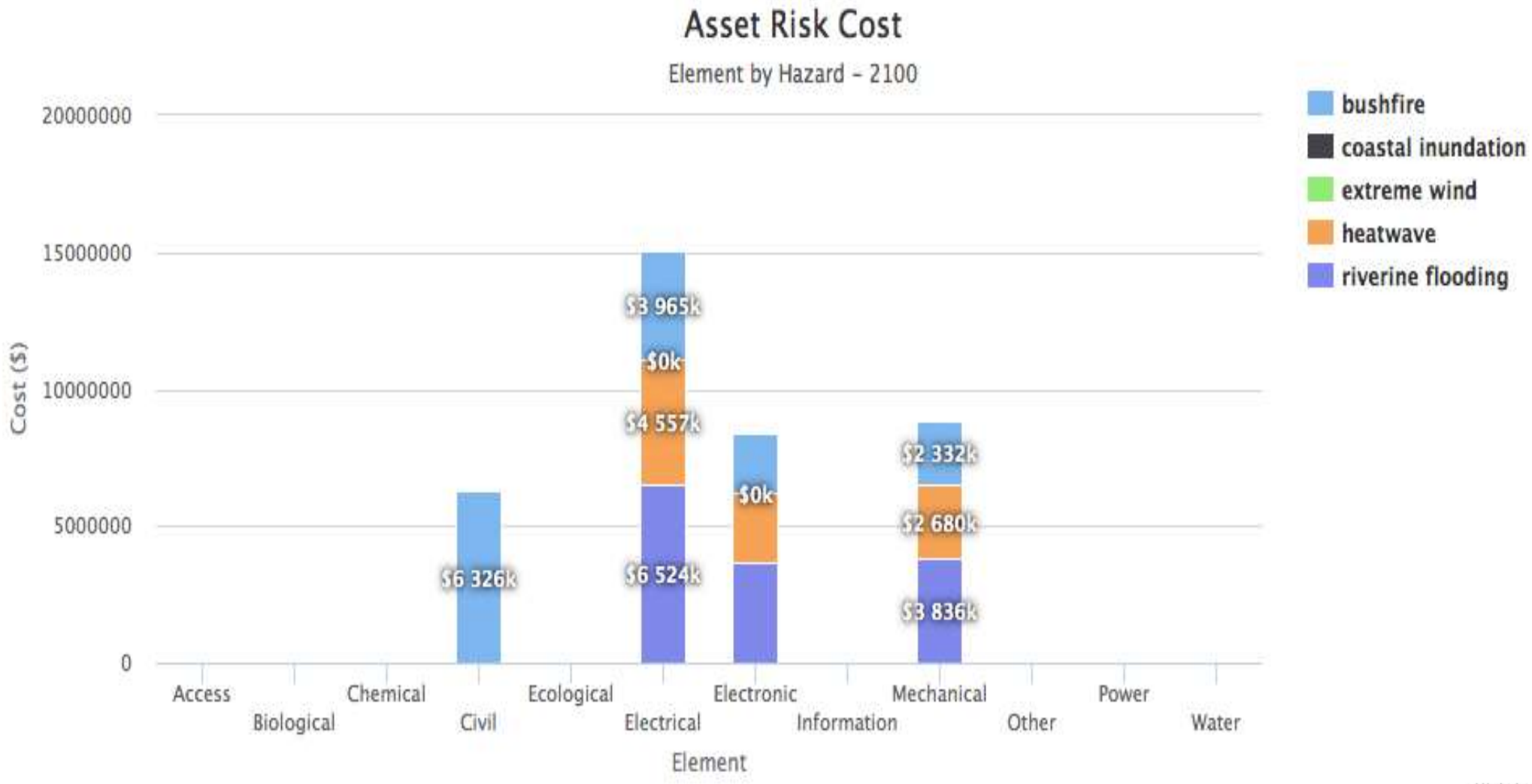
Exposure → Vulnerability → Risk Calculation → Adaptation options

Asset risk cost

Base Impacts

Asset risk cost

Base Impacts



Adaptation Options

Compare results of adaptation option assessment and select a preferred option.

Refresh

Chart years

2016 — 2100

Summary year for accumulated impacts

2100

2020 — 2100

Adaptation option name	Select preferred	NPV all costs	PV Asset risk cost	# Failure Events	Health Impacts	Customer disruptions	Edit
base_unadapted		$10,141,337	$9,678,032	394	0	0	
Adaptation Option		$9,233,436	$8,753,583	212	0	0	
Adaptation Option 2		$10,012,483	$9,412,489	269	0	0	
Adaptation Option 3		$9,976,393	$9,268,592	380	0	0	

Visualisation | Add new option

XDI RiskAssurance

John Smith

MAIN NAVIGATION

- Outlook
- Governance
- Strategy
- Scenarios
- Business KPI's
- Financials
- Diagnostics
- Stress Tests
- Portfolio

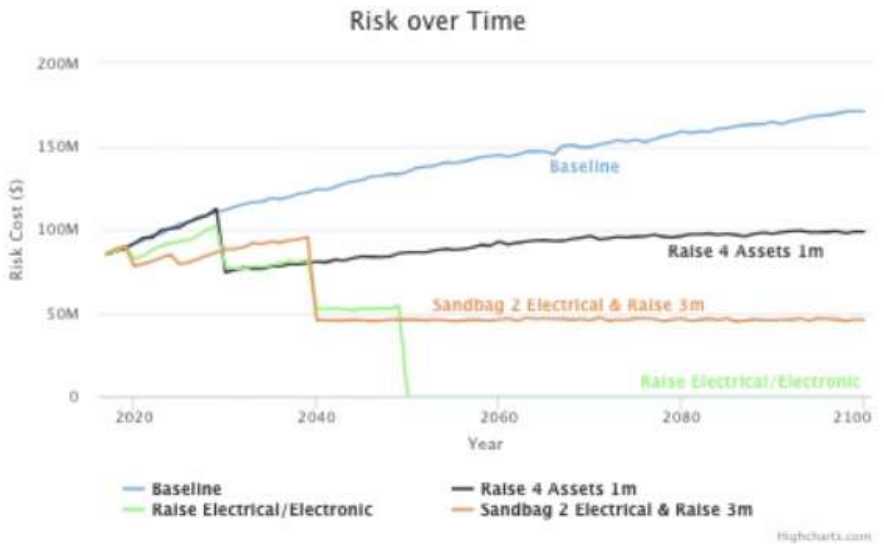
MORE

- Tracking
- Risk Assurance Statement
- Report

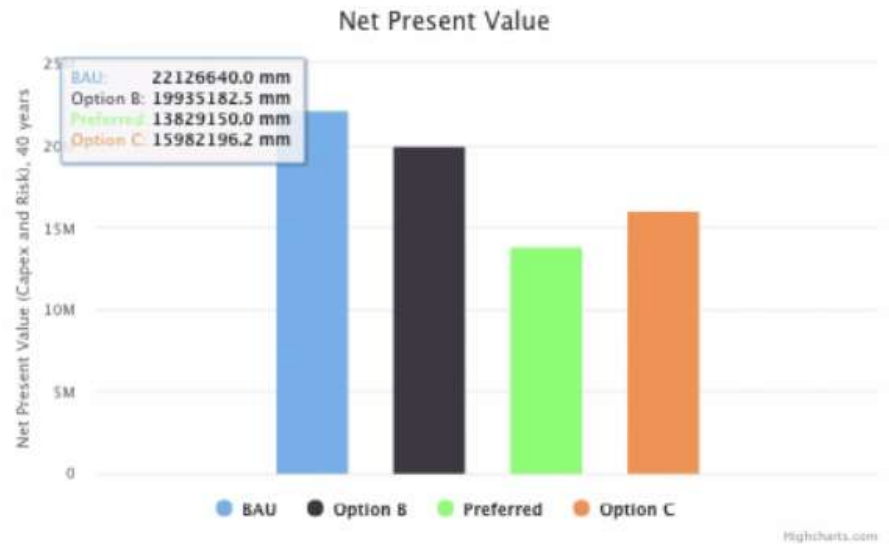
Financials

Home > Finance

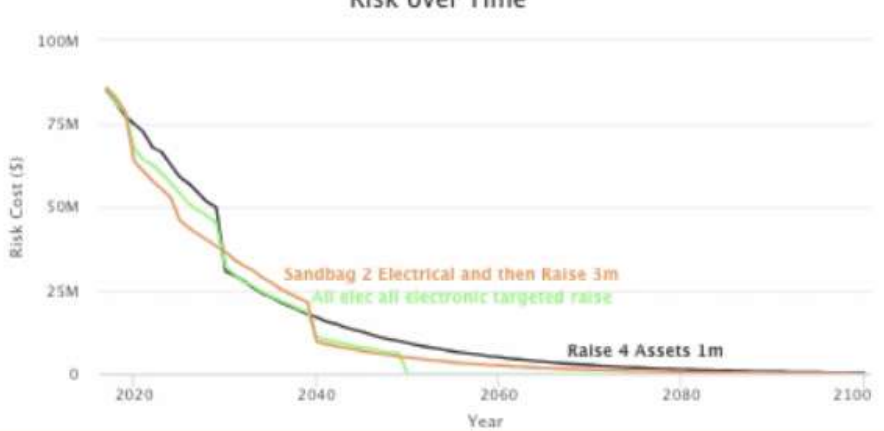
Risk Overview



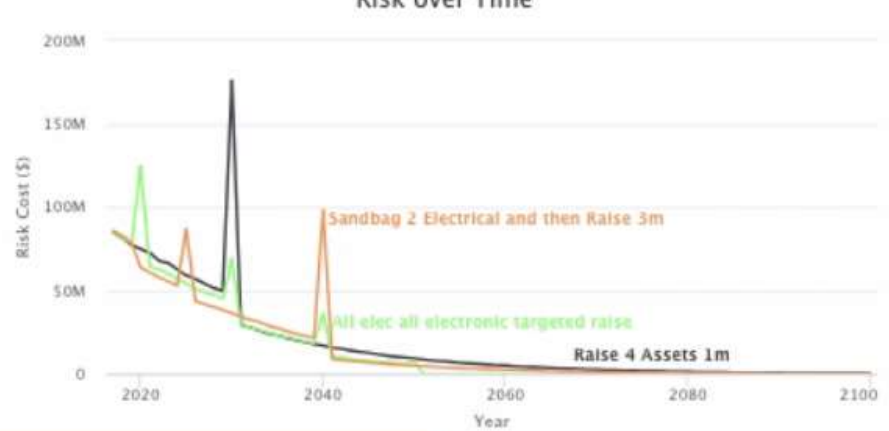
Net Present Value

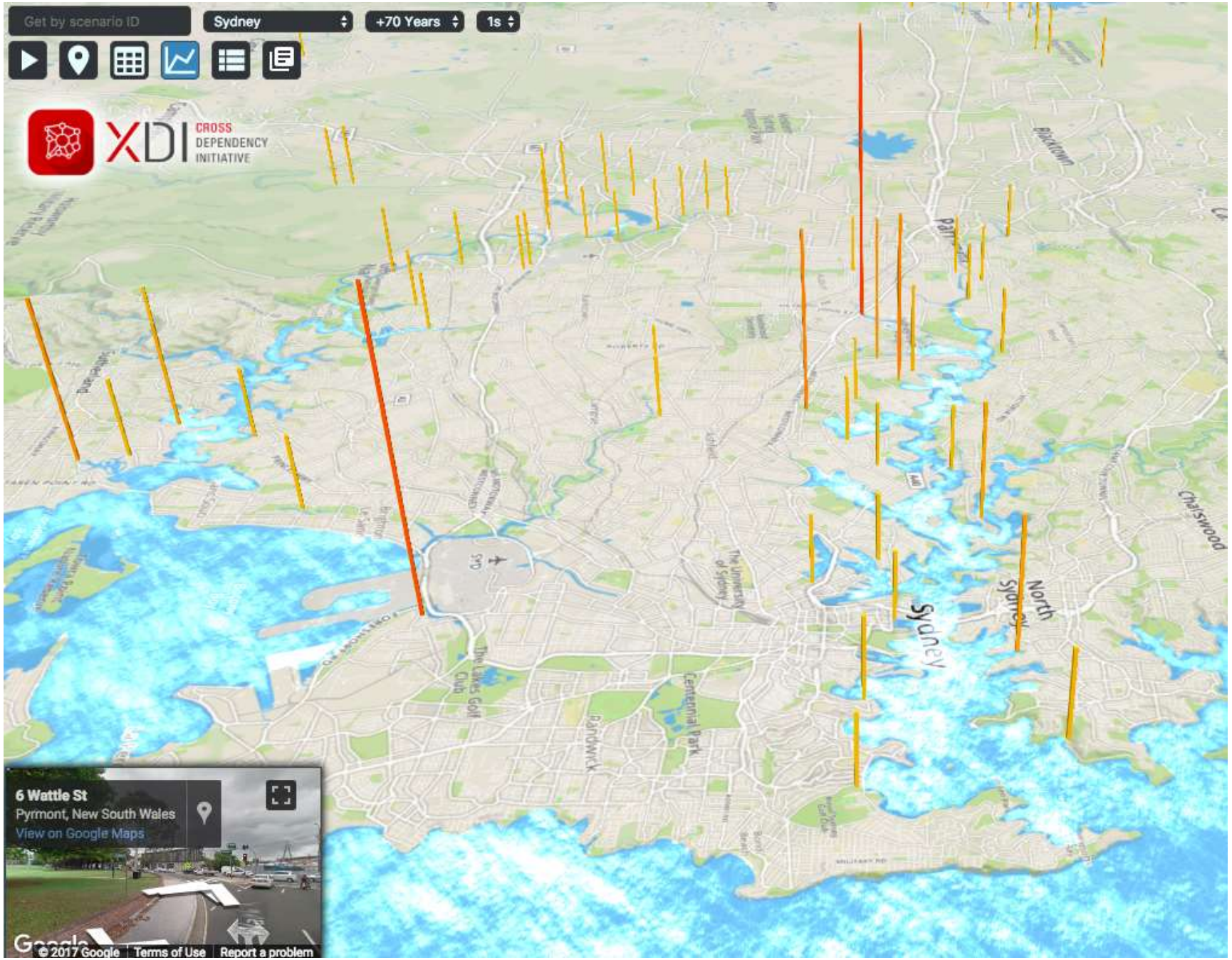


Present Value of Risk Cost



Present Value All Costs




Get by scenario ID
Sydney
+70 Years
1s
XDI
CROSS
DEPENDENCY
INITIATIVE
6 Wattle St
Pyrmont, New South Wales
View on Google Maps
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Report a problem
Sydney
North Sydney
Centennial Park
Randwick
Chatswood

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Application of AdaptInfrastructure

Asset management – inform business cases, prioritise funding for upgrade and/or replacement

Risk management - inform risk framework/register

Strategic development – inform site selection, technical designs and specifications, procurement and planning consent conditions

Emergency management – inform emergency planning and risk assessments, including managing events and large public gatherings

Come join us…

- Infrastructure owners and operators, private and public, state and local – operating within the pilot footprint are invited to join XDI Sydney
- Once the pilot phase is complete we will look to expand the tool across NSW

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Questions?

For more information, please email:
adapt.NSW@environment.nsw.gov.au