

Where to focus our coastal monitoring priorities in  
Victoria?

What are the projected impacts on the coast?

How will this impact upon coastal assets, both on  
and near to the coast?



Environment,  
Land, Water  
and Planning

SOUTH EAST

# Coastal erosion at Greys beach Geraldton

Posted 5 Mar 2016, 3:35pm

Greys Beach in Geraldton has been badly affected by erosion.

ABC News: Gian De Poloni



# Wind loss threatens Lord Mayor's Camp

er 16, 2017 [Stephen Taylor](#) [Latest News](#)

# The sand ripped from Portsea



Beach bummer: Windy weather and rough seas last week saw even more erosion of Portsea's once beautiful front beach. Pictures: Josh Clark/Dive Victoria

PHOTO: Erosion at Marengo beach on the Great Ocean Road has increased to one metre a year. (ABC News)

# Project Objectives

- Decision support framework
- Spatial prioritisation for coastal monitoring
- State-wide Coastal Climate Change Impact Assessment
- Approach that can be:
  - Refined and reapplied
  - Readily shared
  - Modular approach



# Approach

- Regional Scale – Sediment Compartments
- Focus at a 2<sup>nd</sup> pass risk (impact) assessment
- Based around
  - Climate futures – Sea Level Rise, Storm Surge
  - Scenarios – Time and Scale
  - Erosion and Inundation Hazards
- Focused on areas and assets impacted based on:
  - Exposure, Sensitivity and Adaptive Capacity





# Project Stages

Preliminary – approach, definitions, and datasets

**Stage 1 – Likely erosion impact ratings**

**Stage 2 – Likely inundation impact ratings**

**Stage 3 – Impact rating profile of significant assets  
and coastal planning units**

Spatial Validation of Results

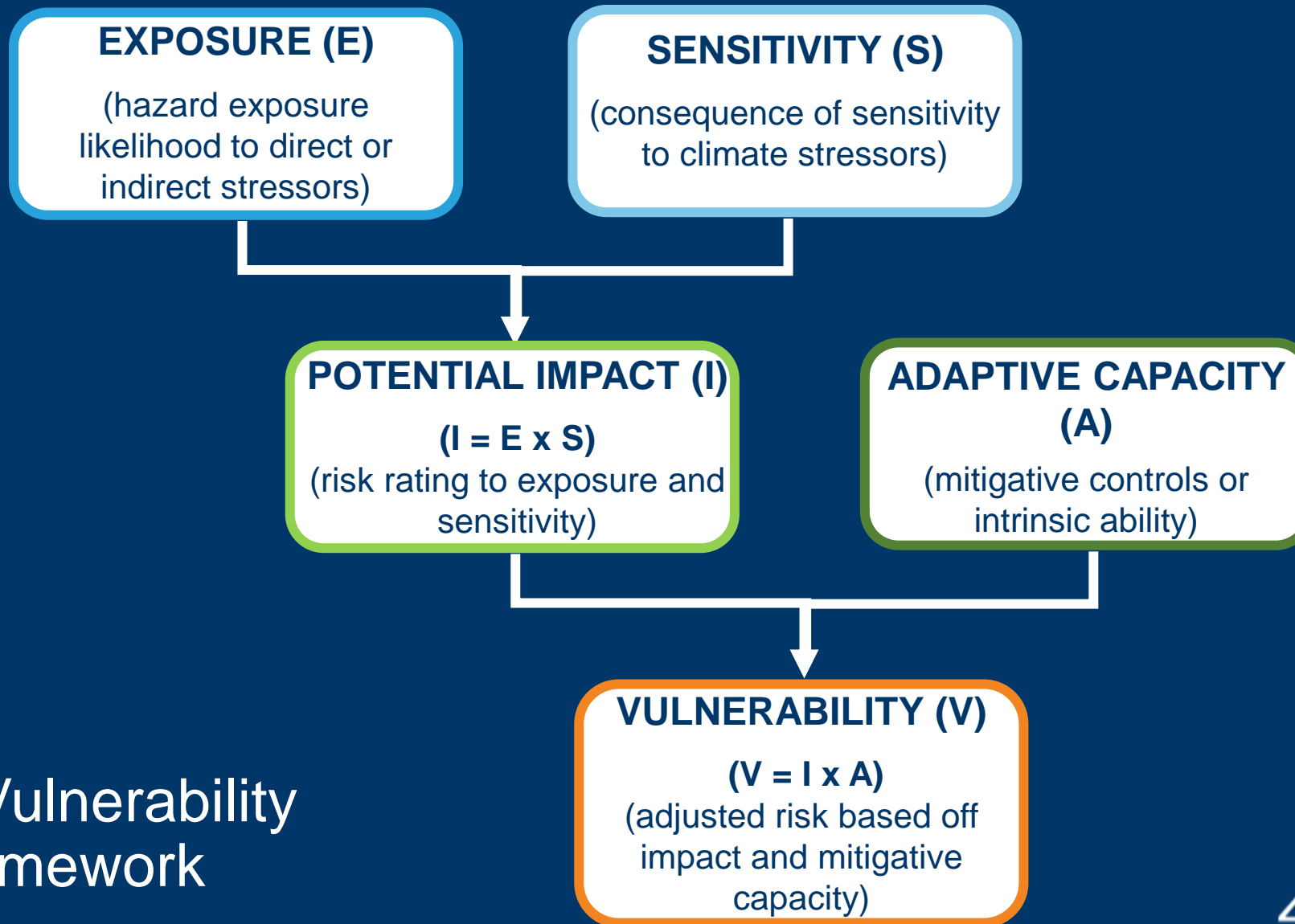


# Stage 1 – Erosion Rating

1. Identify and assign **coastal attributes** likely to influence impact of coastal erosion processes.
2. Determine a likely 'coastal erosion impact rating' to **coastal segments** (50m sections of coast).
3. Assign 'coastal erosion impact rating' to entire **study area** (50m<sup>2</sup> polygrid).



# Erosion Rating - Conceptual Framework



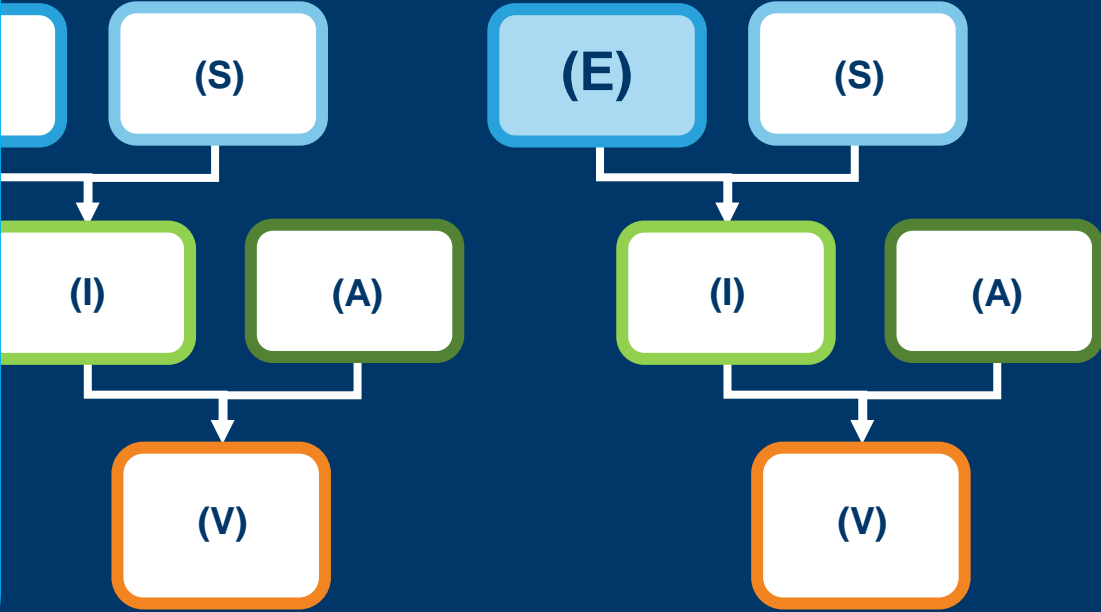
IPCC Vulnerability Framework



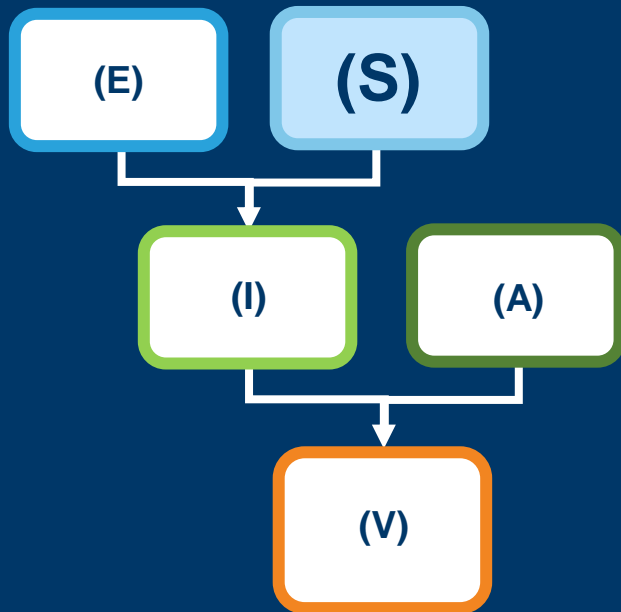


For every 50m section of coastline

**Exposure (E)**  
**Coastal Type**  
**Orientation**  
**Fetch**  
**Bathymetric profile**  
**Wave Height**  
**Wave Energy**



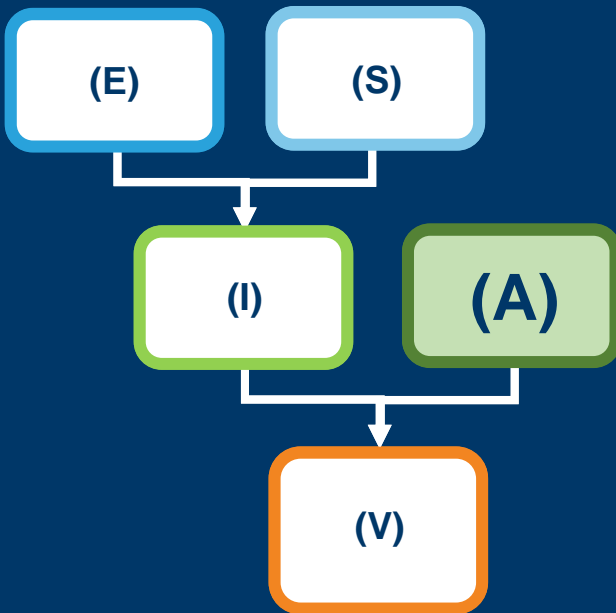
For every 50m section of coastline



**Sensitivity (S)**  
**Erodibility**  
**Compartment Sediment**  
**Sensitivity**



For every 50m section of coastline



## Adaptive Capacity

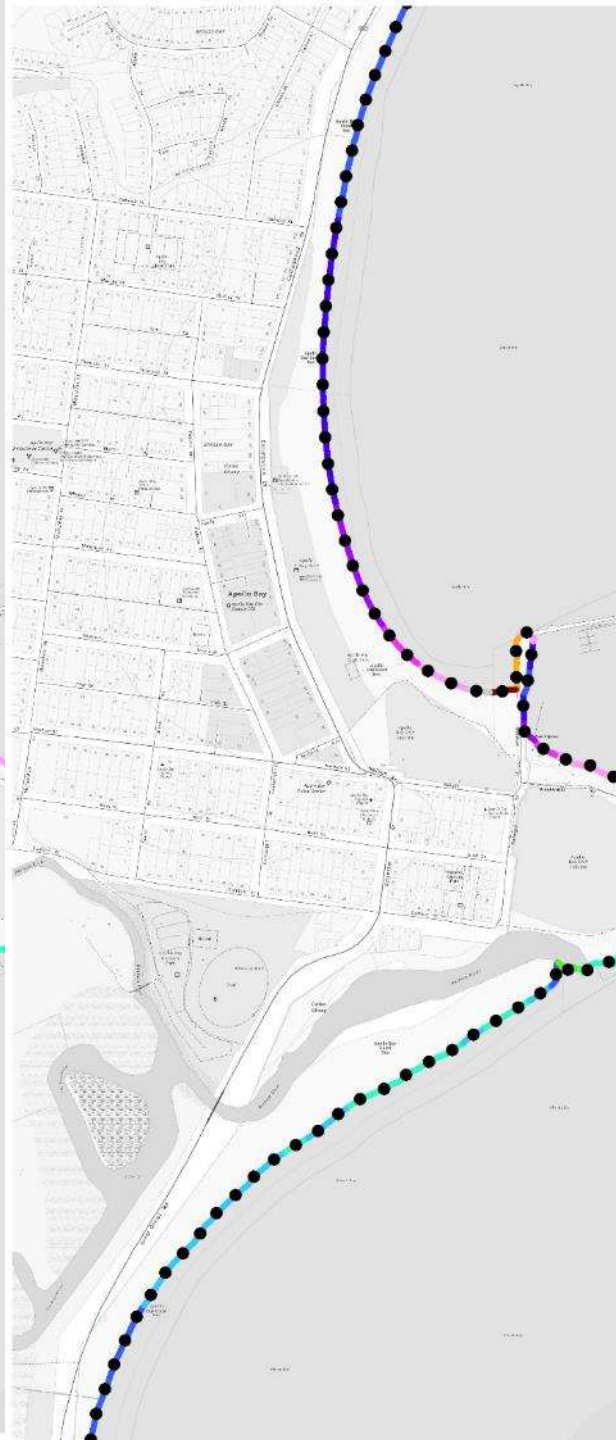
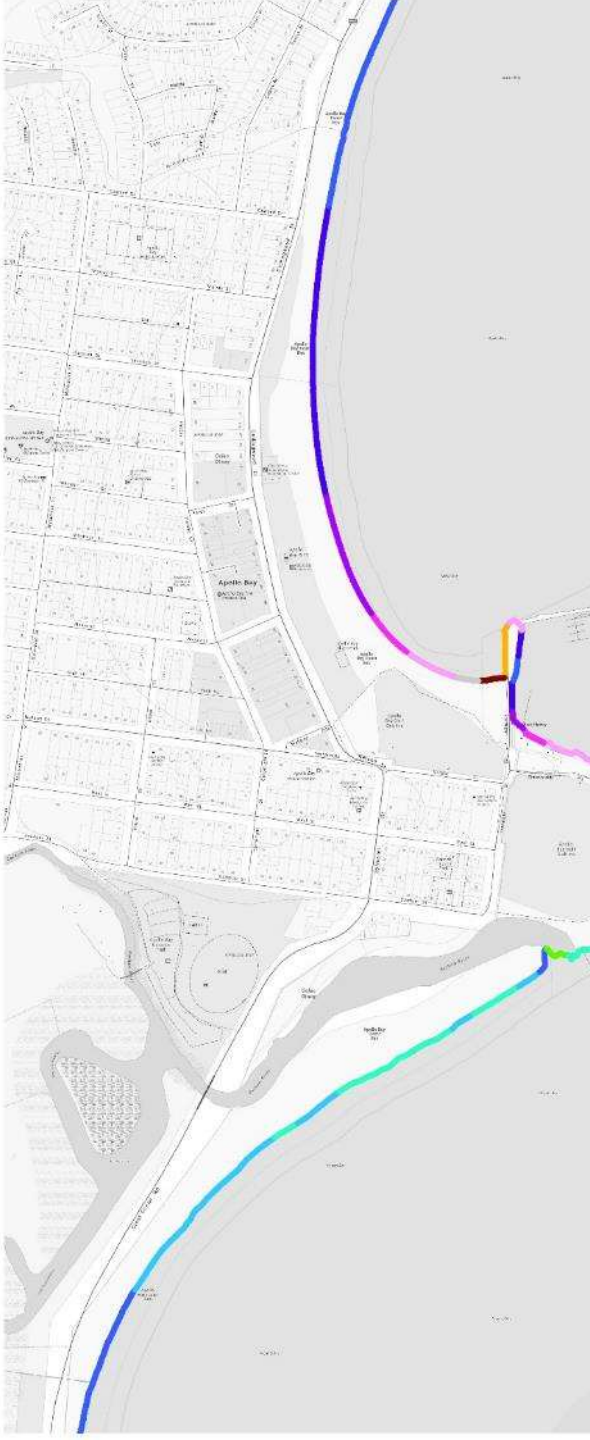
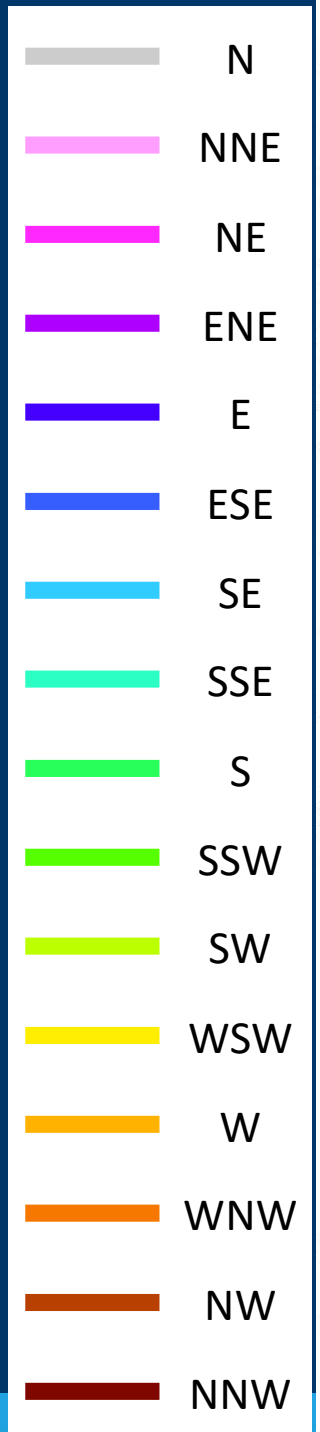
(A)

Intertidal / Coastal  
vegetation

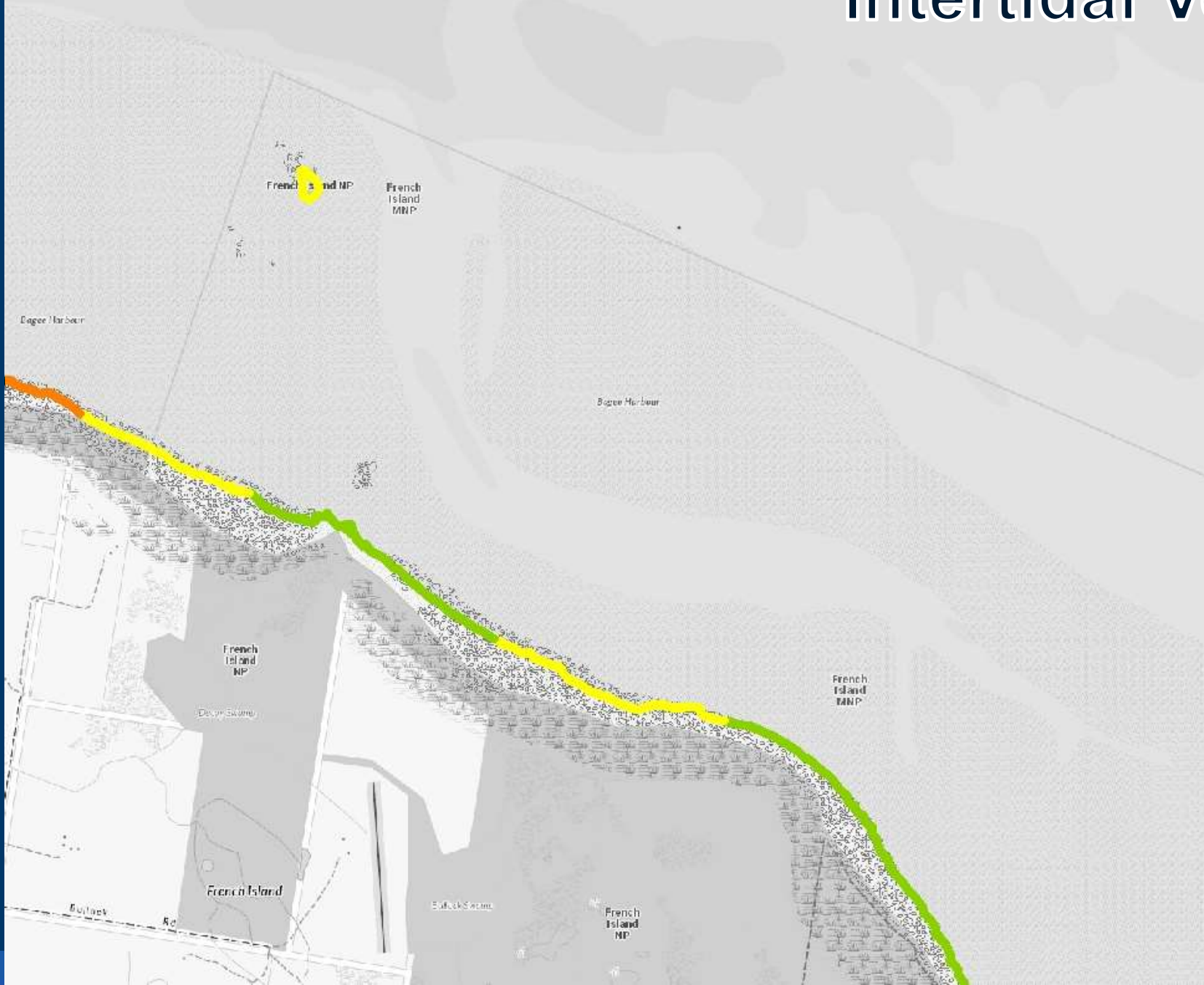
Reefs

Engineered coastal  
structures

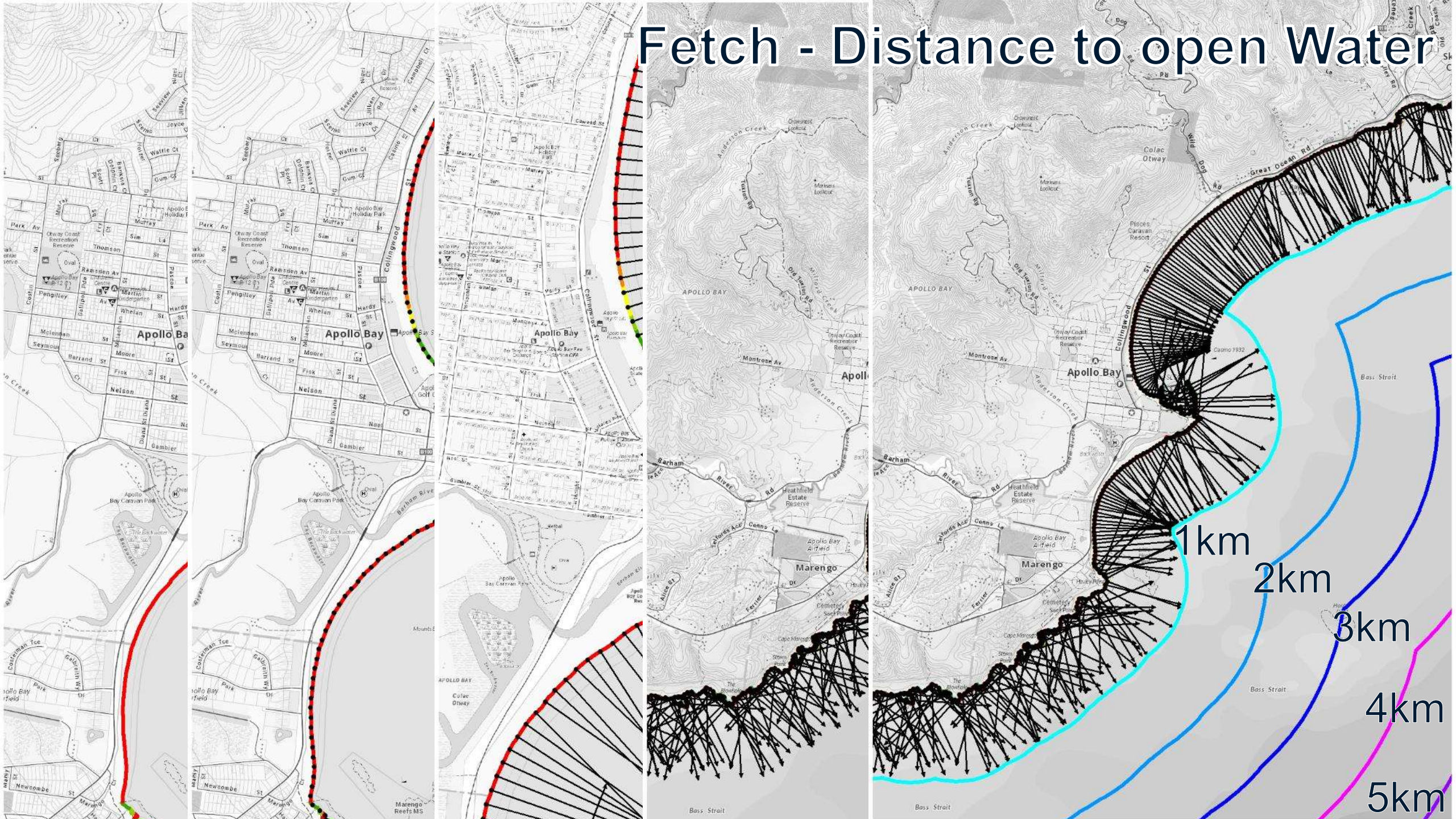




# Intertidal Vegetation



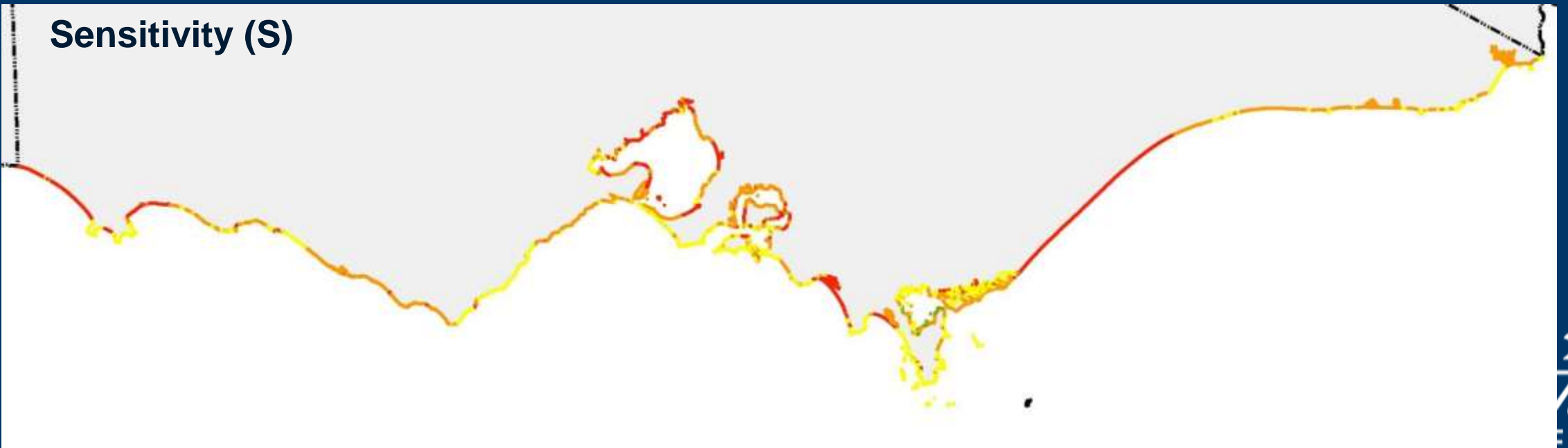
# Fetch - Distance to open Water



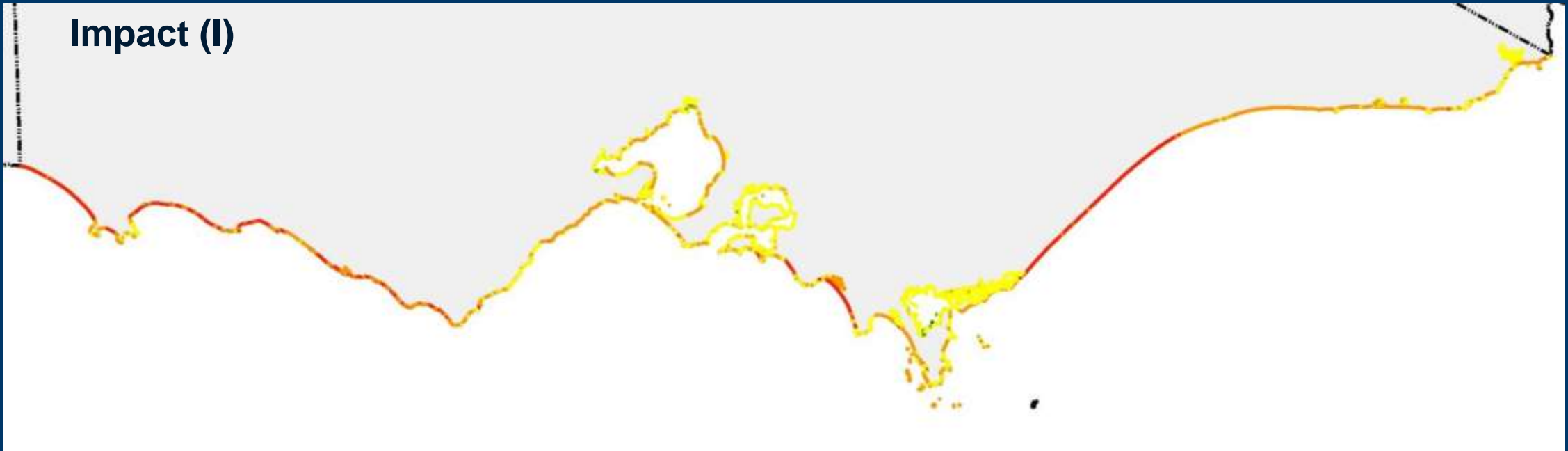
Exposure (E)



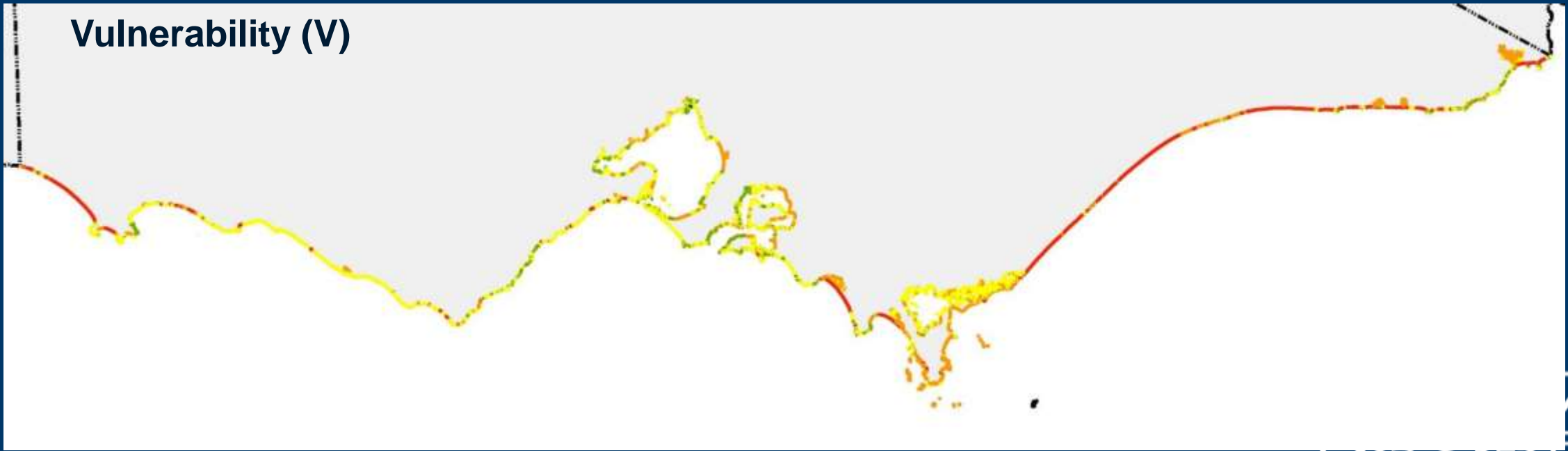
Sensitivity (S)



# Impact (I)



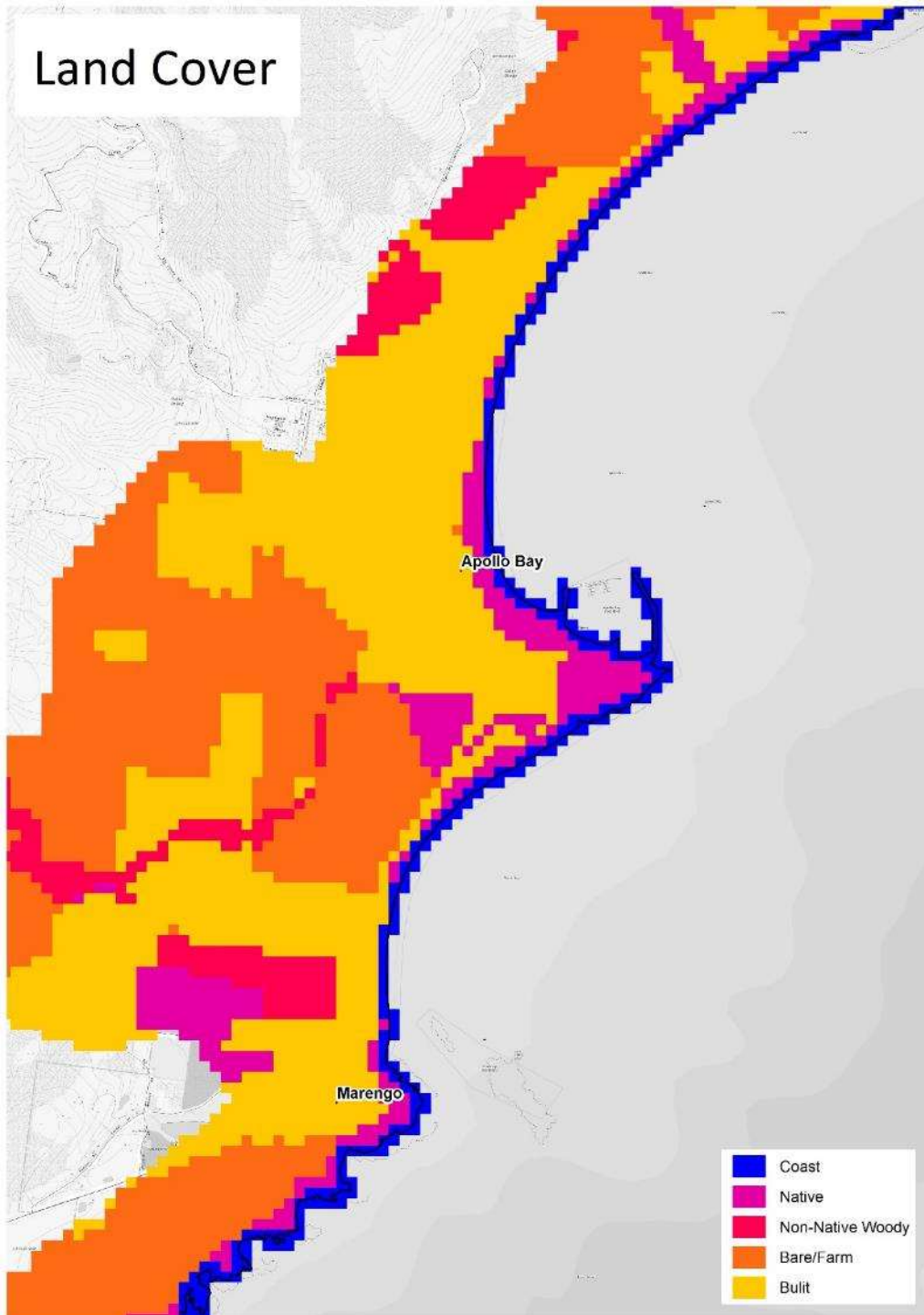
# Vulnerability (V)



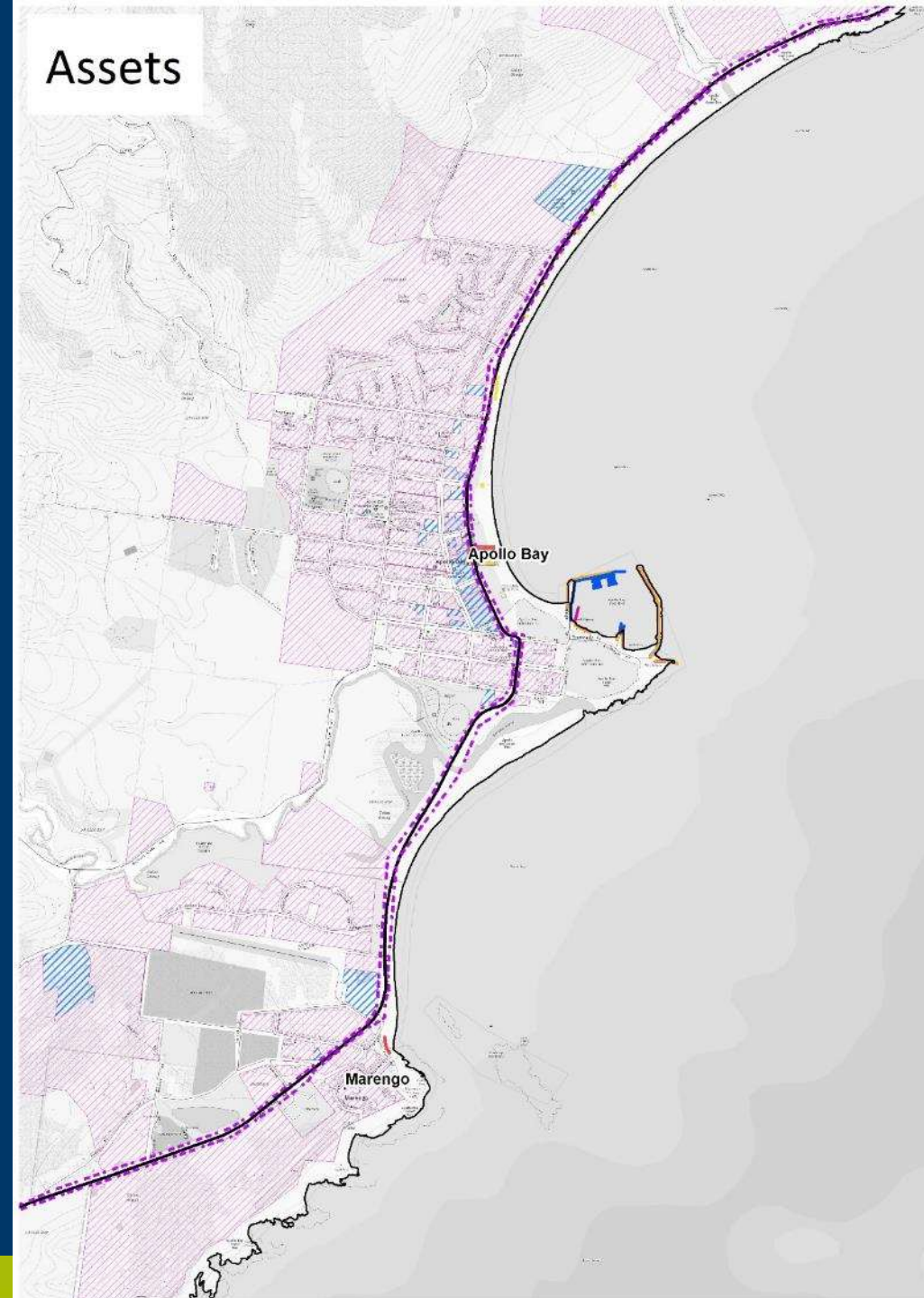
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2 9 A  
7 6 x 1 J  
E N K  
3  
3 6 4 5 5 7 8 8 5 8  
K



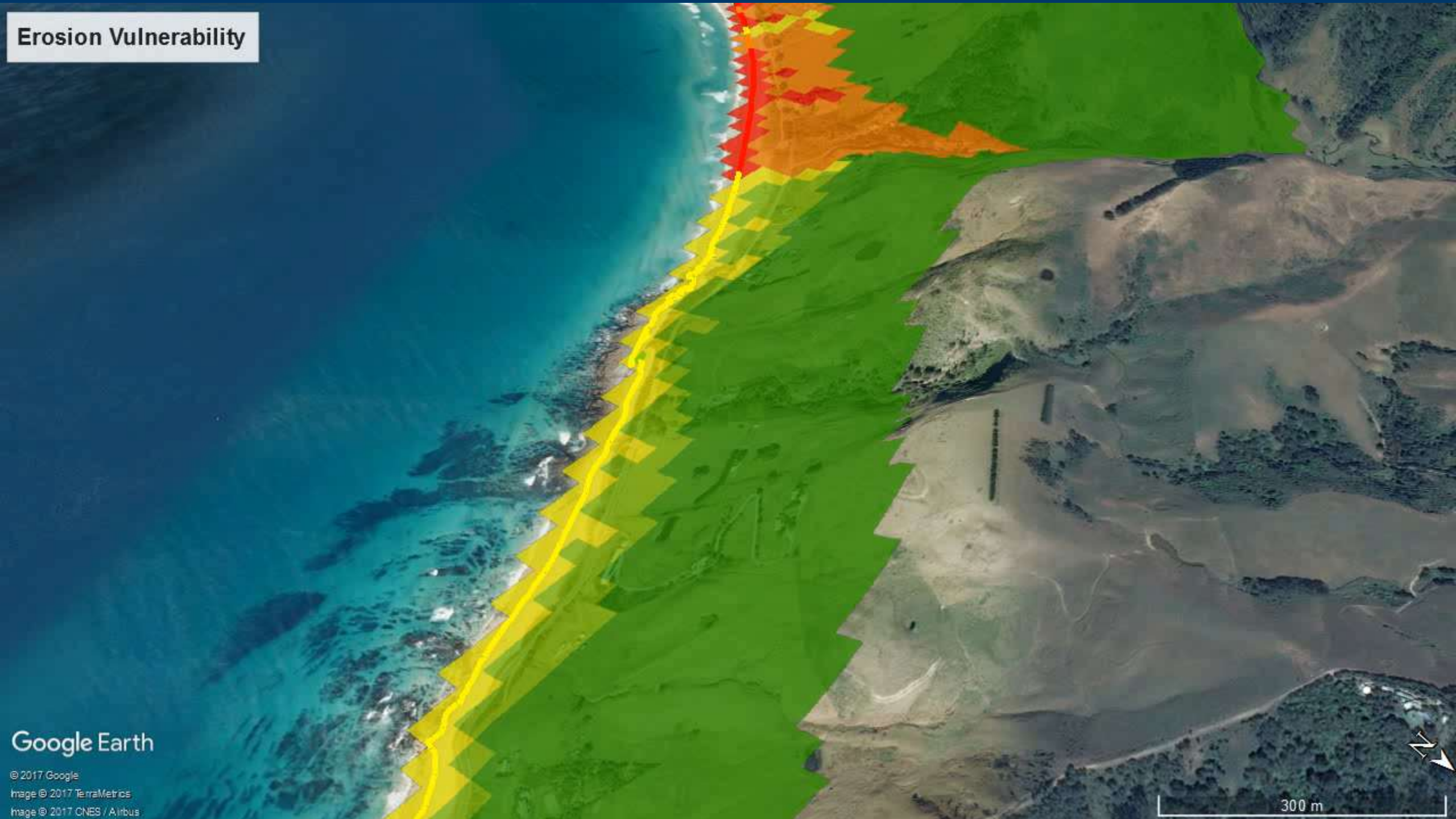
# Land Cover



# Assets



# Erosion Vulnerability

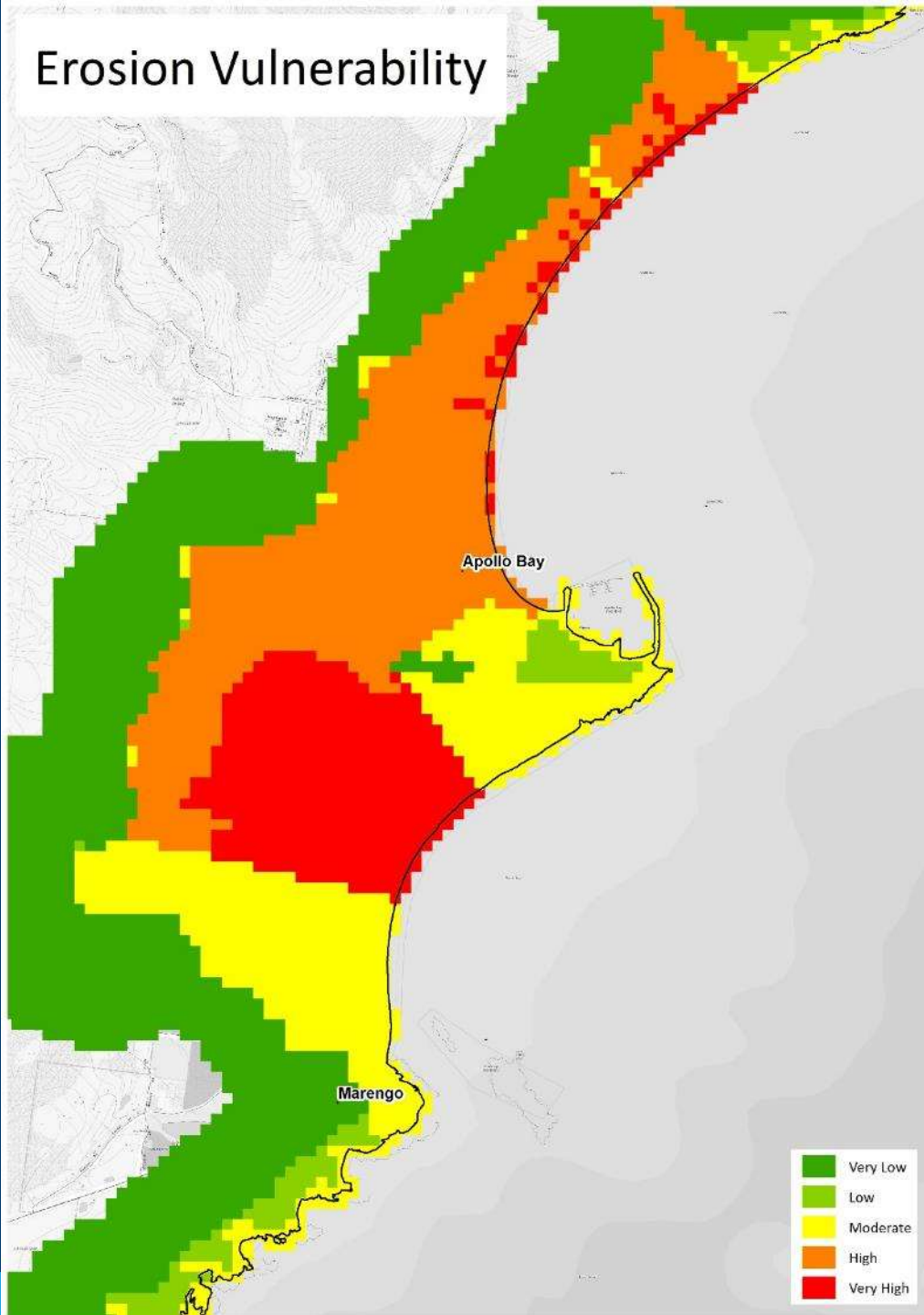


Google Earth

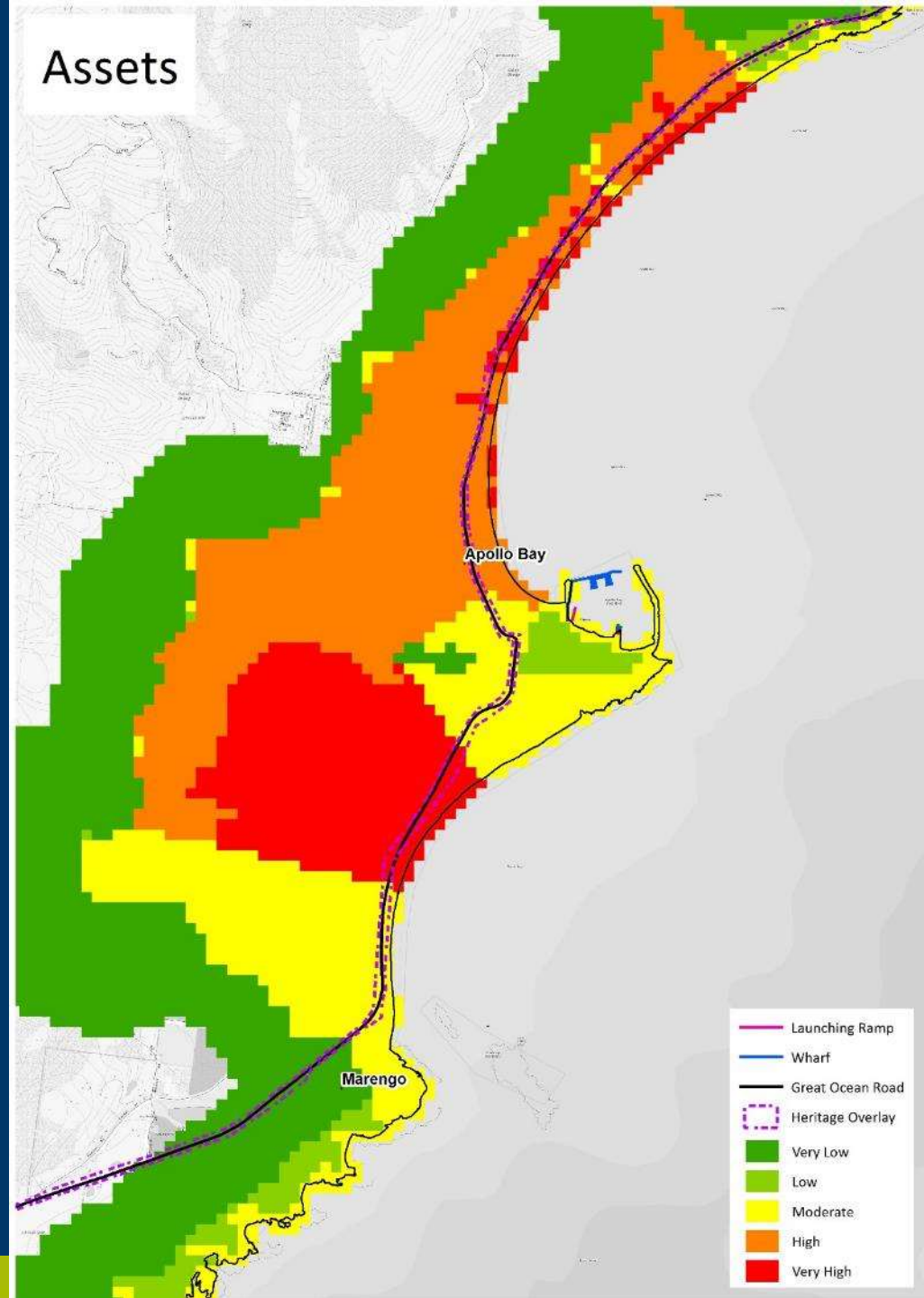
© 2017 Google  
Image © 2017 TerraMetrics  
Image © 2017 CNES / Airbus

300 m

# Erosion Vulnerability



# Assets



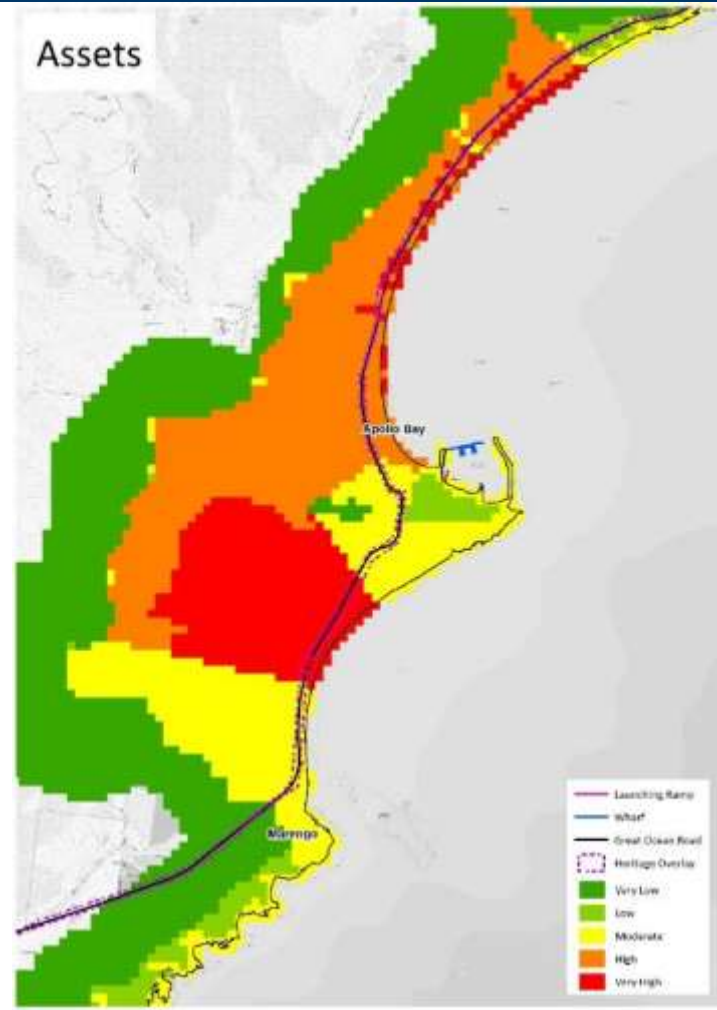
# Coastal Asset Impact Ratings

Feature	Feature Type	Unit	Quantity	Very Low 0 to 1	Low 1 to 8	Moderate 8 to 27	High 27 to 64	Very High 64 to 125
<b>Great Ocean Road</b>								
Great Ocean Road	Line	Km	66.37	0	47.38	12.72	4.08	2.2
				0.00%	71.38%	19.16%	6.15%	3.31%
Heritage Zone	Polygon	Ha	193.04					
Landscape Significance - National	Line	Km	110.44					
Landscape Significance - State	Line	Km	127.23					
Boat Ramps	Line	Km	0.03					
Apollo Bay Wharf	Line	Km	0.92					
Great Otway National Park	Polygon	Ha	2637.54					

**Erosion rate rise along Victoria's Great Ocean Road prompts effort to bolster beach sand dunes**  
 By Margaret Paul  
 Updated 26 May 2017, 11:08am



PHOTO: Erosion at Marengo beach on the Great Ocean Road has increased to one metre a year. (ABC News; Margaret Paul)

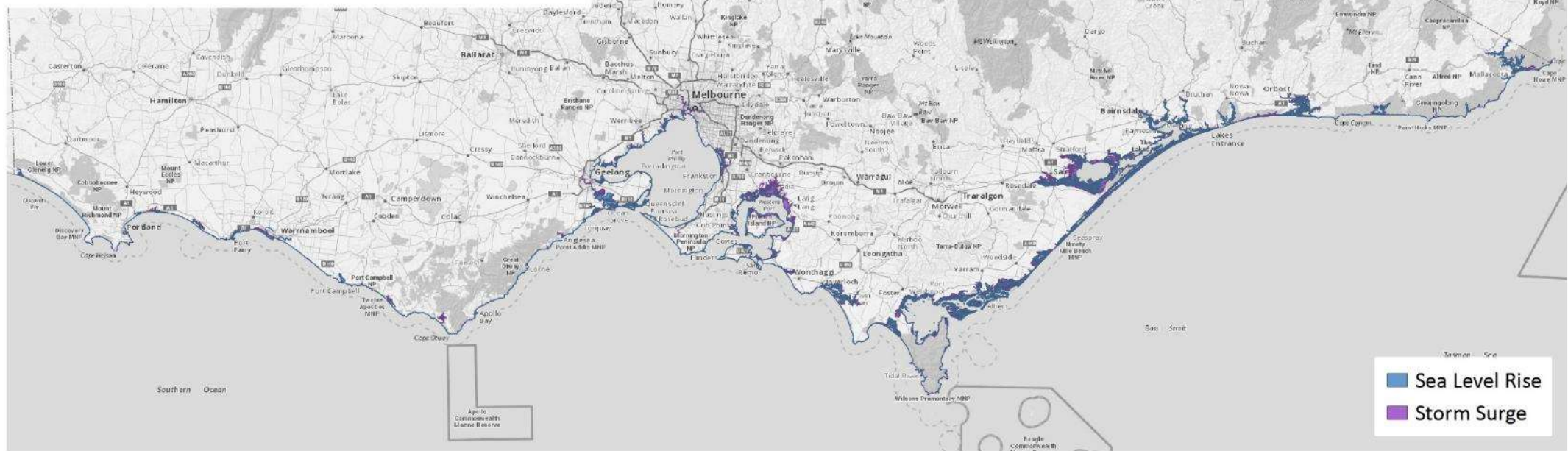


## Stage 2 - Inundation Factors

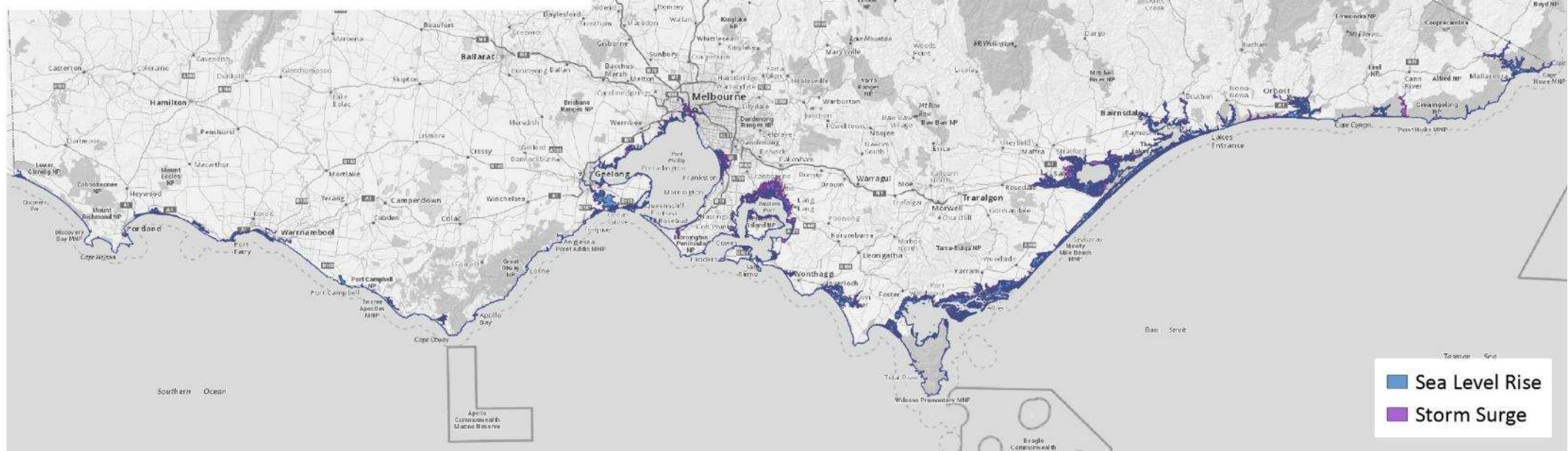
1. Sea Level Rise and Storm Surge
2. 1 in 100 Year Flood Events
3. Coastal Acid Sulphate Soils (CASS)
4. Assign to Study Region
5. Assign to Individual Assets



## Sea Level Rise and Storm Surge - 2040 (20cm)



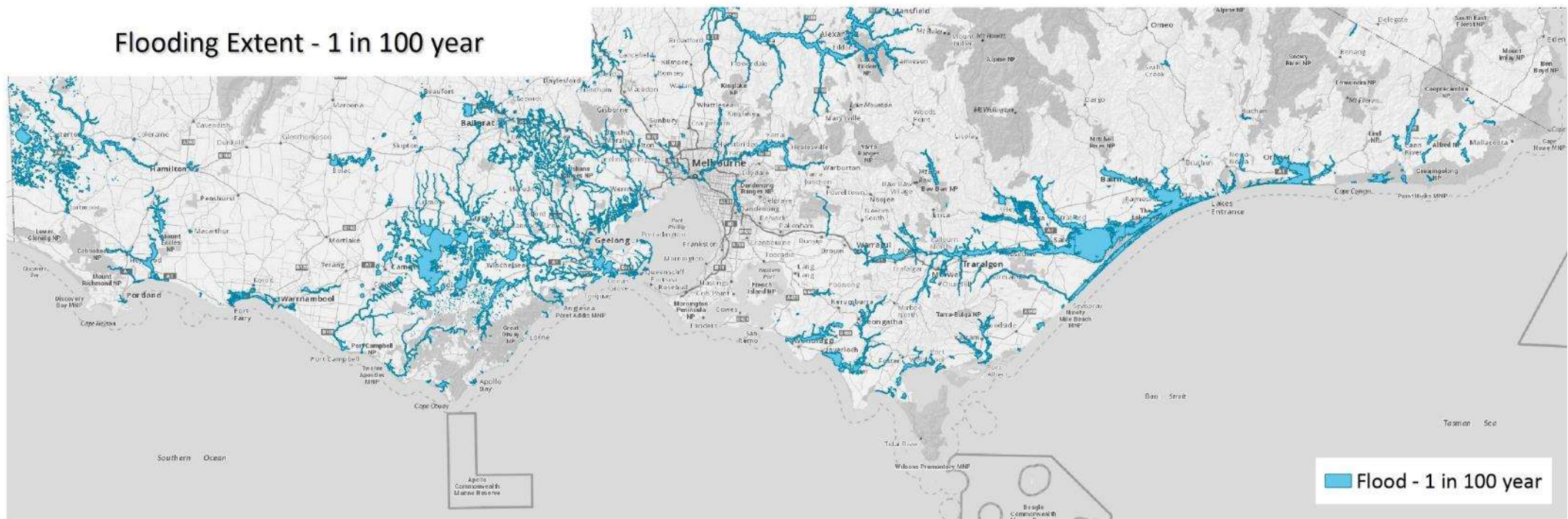
## Sea Level Rise and Storm Surge - 2100 (80cm)



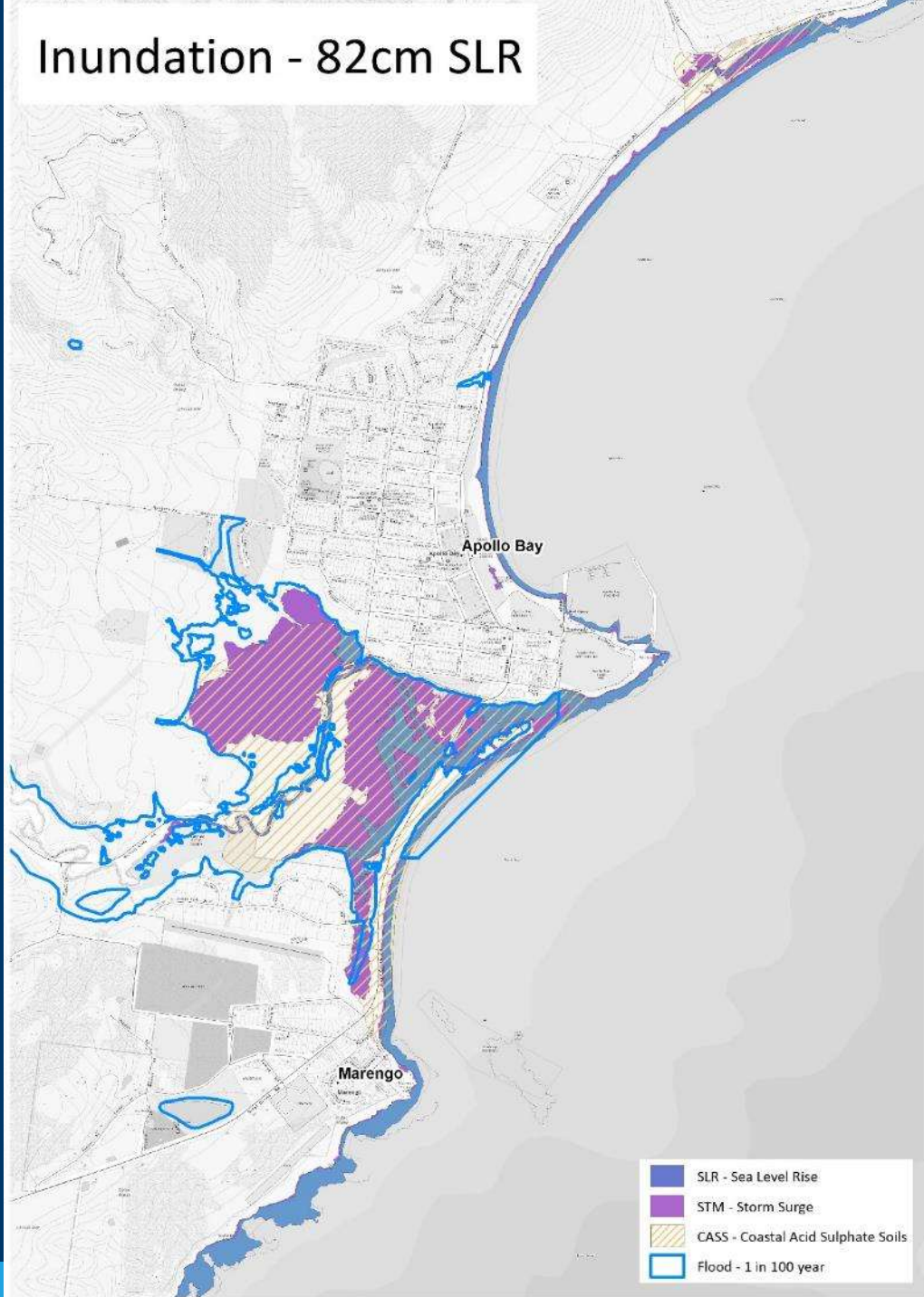
# Coastal Acid Sulphate Soils



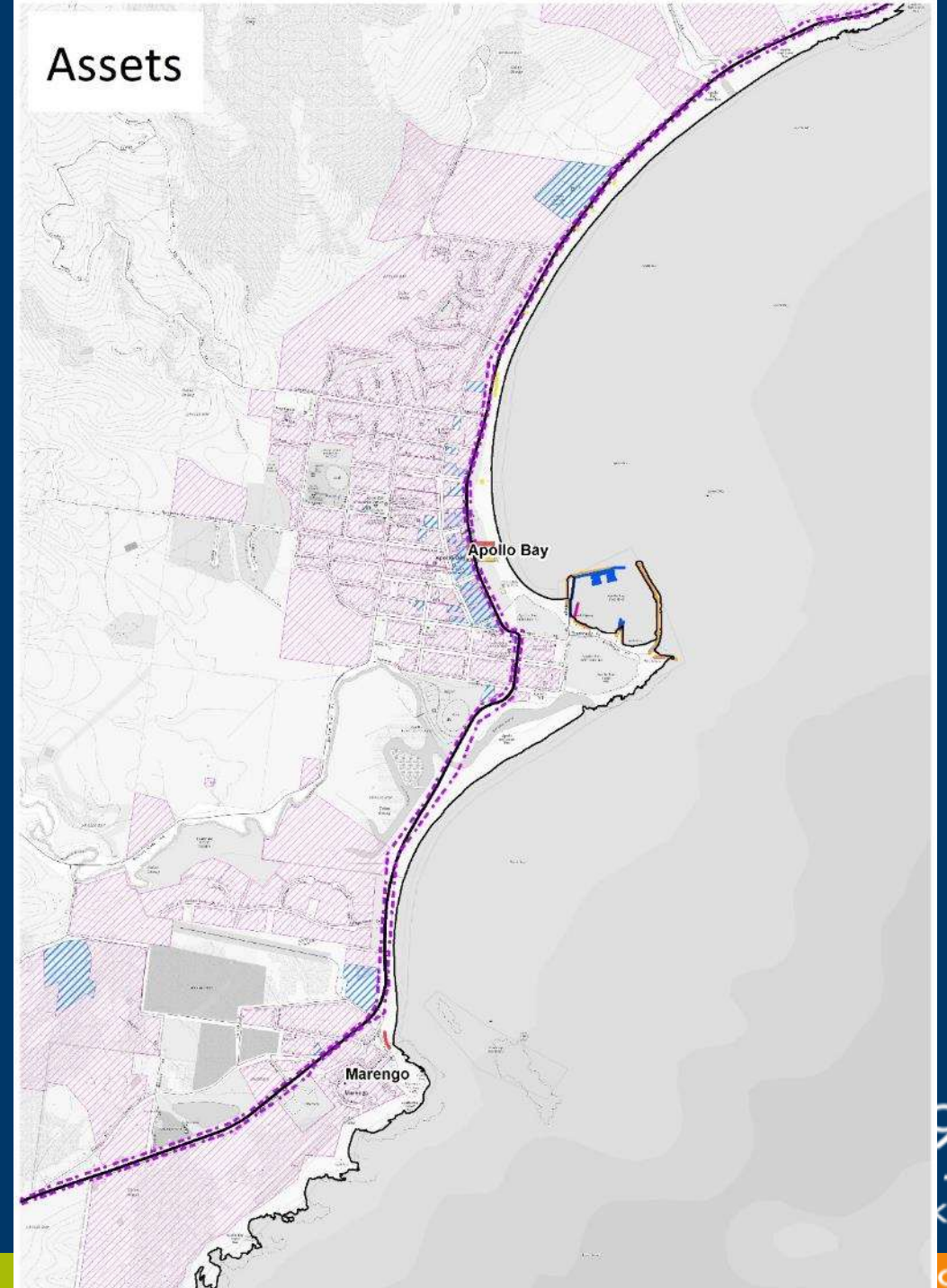
# Flooding Extent - 1 in 100 year



# Inundation - 82cm SLR

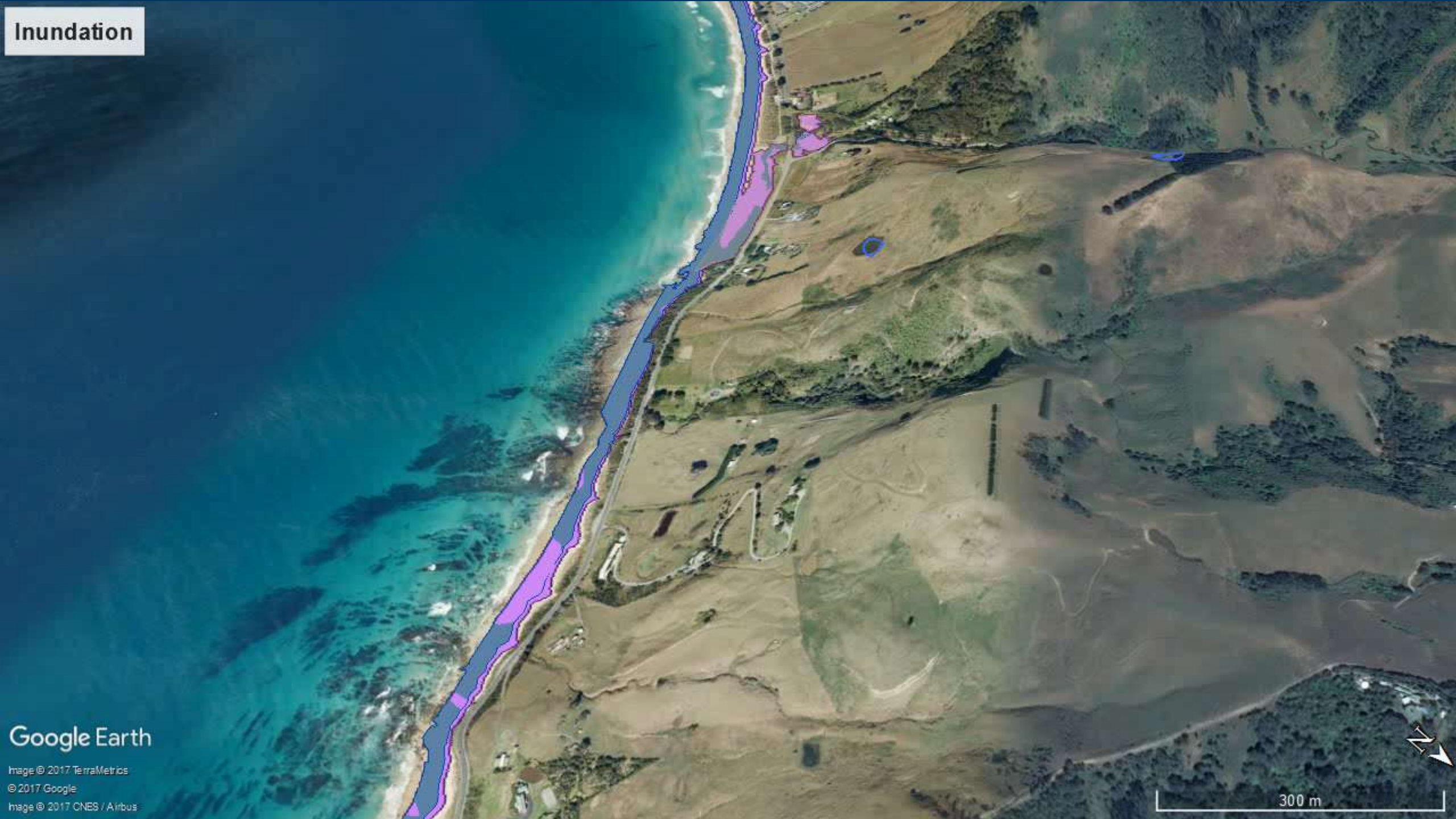


# Assets





# Inundation

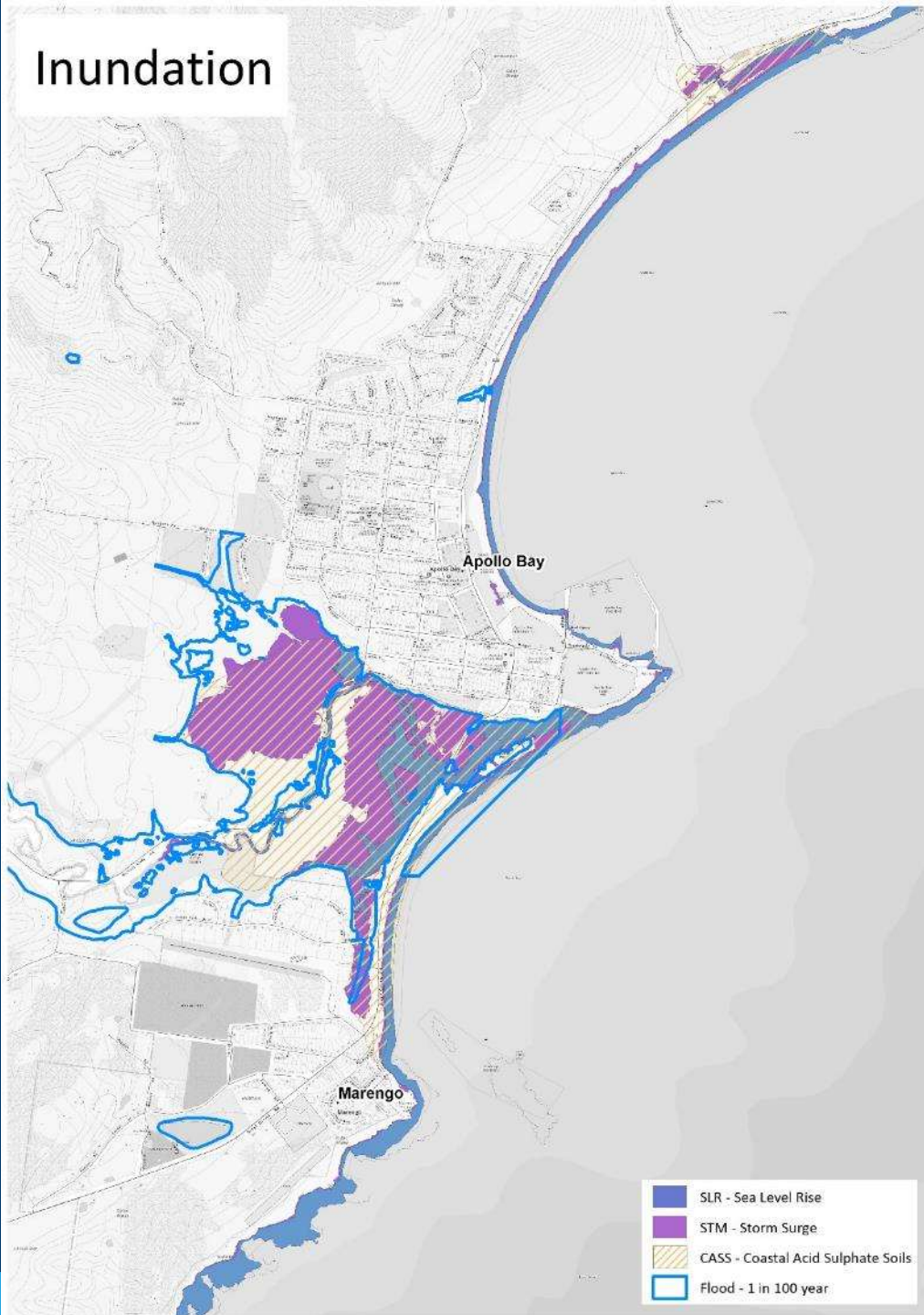


Google Earth

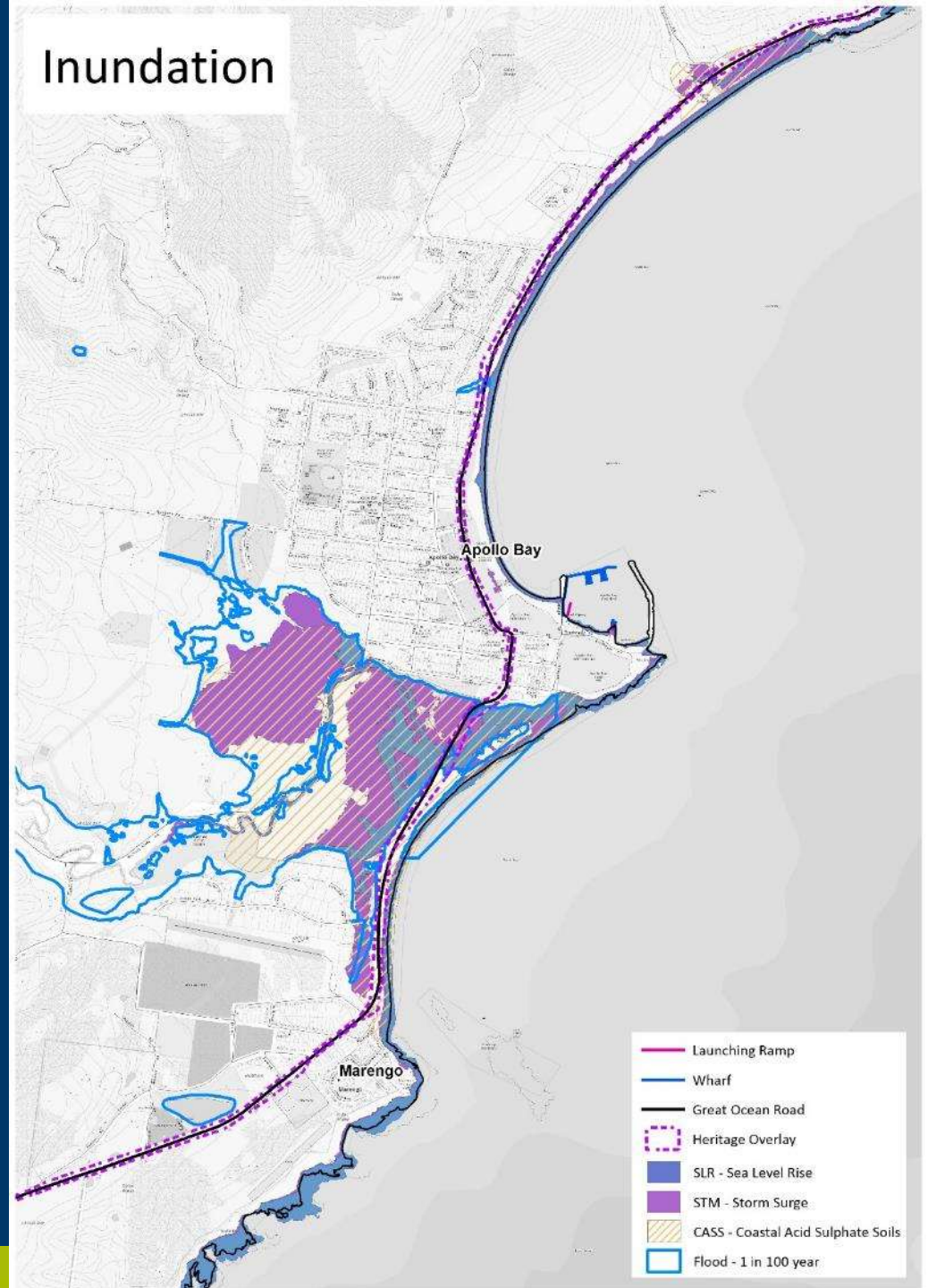
Image © 2017 TerraMetrics  
© 2017 Google  
Image © 2017 CNES / Airbus

300 m

# Inundation



# Inundation



# Coastal Asset Impact Ratings

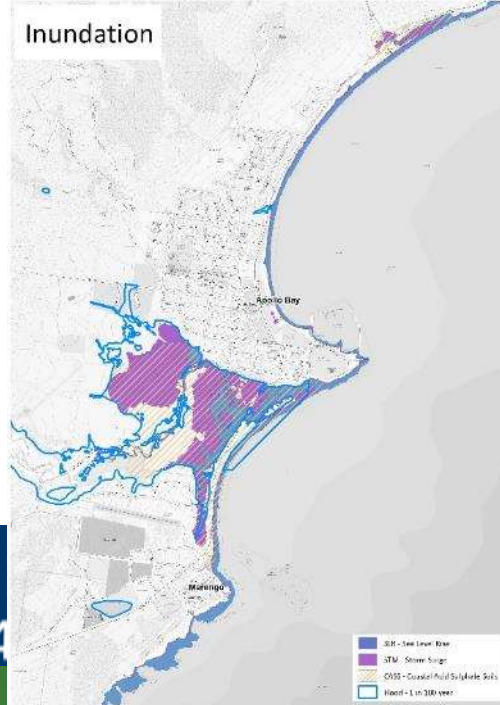
Feature	Feature Type	Unit	Quantity	2040	2100	2040	2100	2040	2100	2040	2100
				SLR	SLR	STM	STM	Flood	Flood	CASS	CASS
<b>Great Ocean Road</b>											
<b>Great Ocean Road</b>	Line	Km	66.37	11.54	16.41	16.41	21.08	2.94	2.04	3.49	3.96
				17.39%	24.72%	24.72%	31.76%	4.44%	3.08%	5.26%	5.97%
<b>Heritage Zone</b>	Polygon	Ha	102.04	28.24	40.24	40.20	51.89	9.88	7.00	11.20	12.21
<b>Landscape Significance - National</b>	Line	Km	1	0.15	0.20	0.14%	0.18%	0.15	0.20	5.81	5.65
<b>Landscape Significance - State</b>	Line	Km	1	0.12%	0.16%	0.12%	0.16%	0.15	0.20	7.24	7.04
<b>Boat Ramps</b>	Line	Km	1	0.00	0.00	0.00%	0.00%	0.00	0.00	0.00	0.00
<b>Apollo Bay Wharf</b>	Line	Km	1	0.00	0.00	0.00%	0.00%	0.00	0.00	0.00	0.00
<b>Great Otway National Park</b>	Polygon	Ha	2	16.33	14.43	0.62%	0.55%	16.33	14.43	0.95	0.95

## Erosion rate rise along Victoria's Great Ocean Road prompts effort to bolster beach sand dunes

By Margaret Paul  
Updated 26 May 2017, 11:08am



PHOTO: Erosion at Marengo beach on the Great Ocean Road has increased to one metre a year. (ABC News: Margaret Paul)



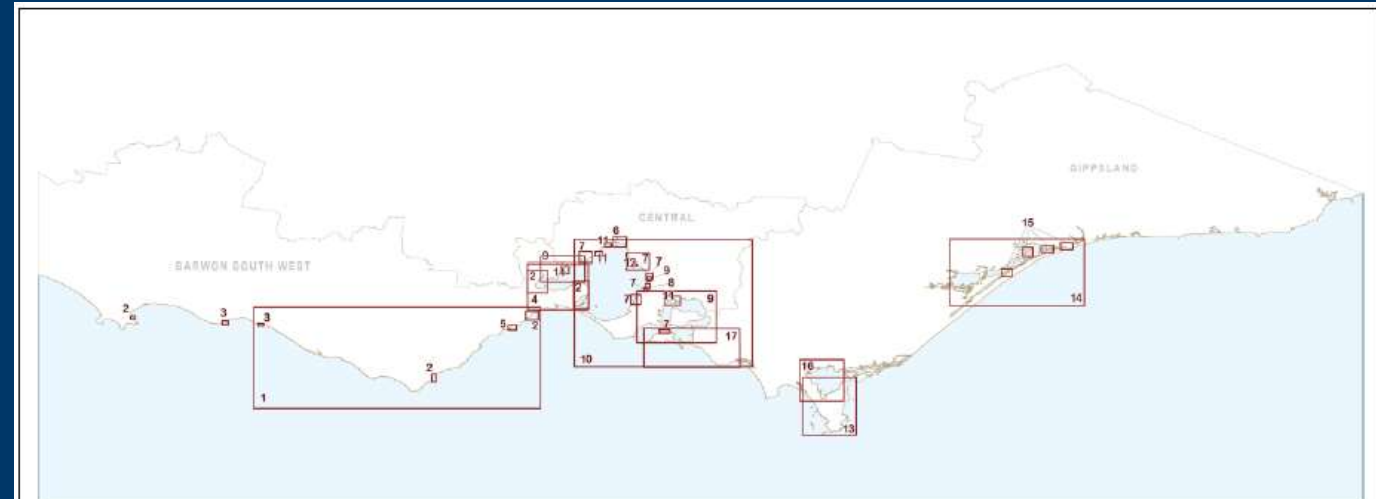
# Coastal Asset Impact Ratings

1. Assign erosion and inundation impact rating to significant (economic, social and environmental) assets
2. Summarise findings for coastal sediment compartment units (to support planning decisions)

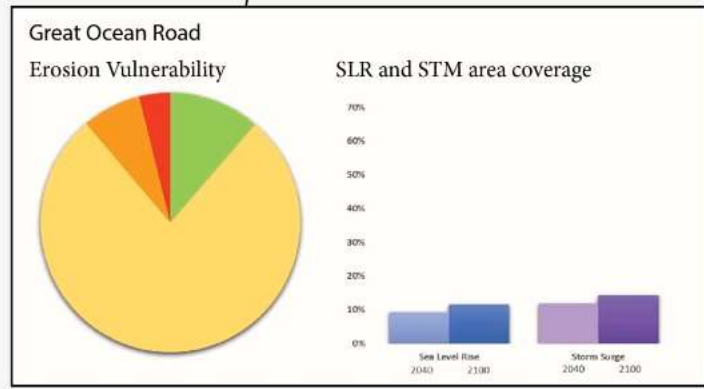
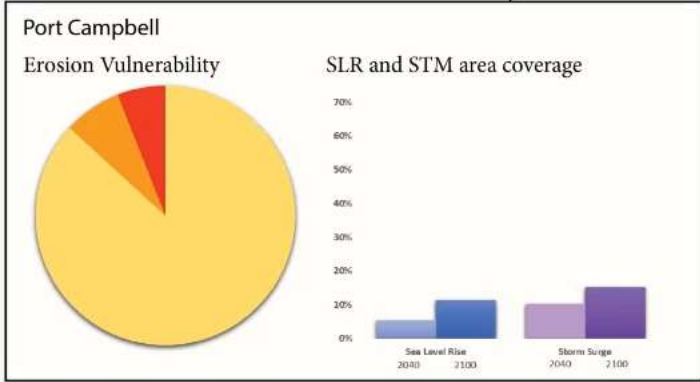
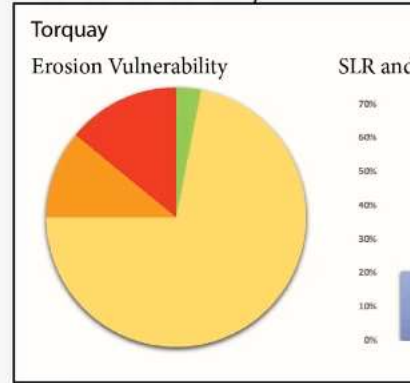
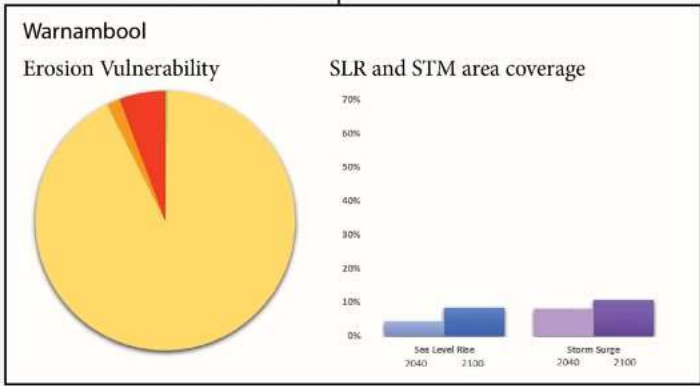
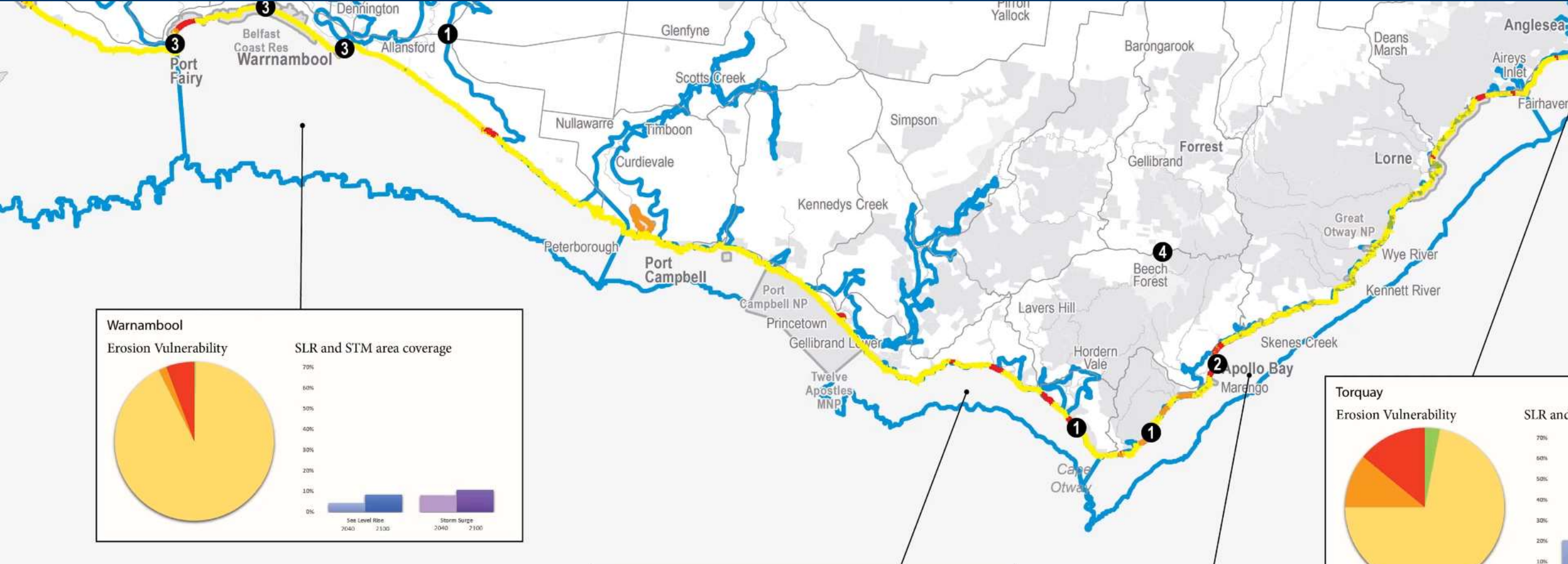


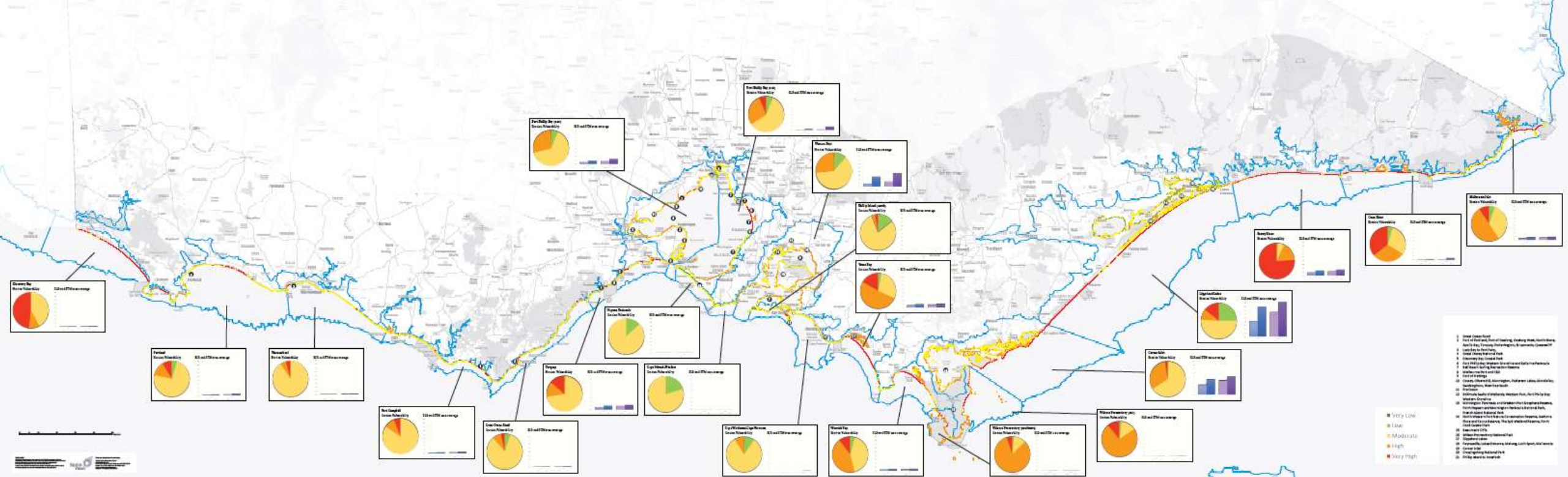
# DELWP Priority Assets

Priority Asset	Significance
<b>Barwon South West</b>	
Great Ocean Road	<ul style="list-style-type: none"> <li>• Australian Natural Heritage site</li> <li>• Nationally significant Tourist destination</li> <li>• Regionally significant tourist destination</li> <li>• Nationally significant landscape</li> <li>• State significant landscape</li> </ul>
Port of Portland, Port of Geelong, Geelong West, North Shore, Apollo Bay, Torquay, Portarlington, St Leonards, Queenscliff	<ul style="list-style-type: none"> <li>• Asset/utility of national importance</li> <li>• Regional Boating facilities</li> <li>• Regionally strategic port and harbour</li> </ul>
Lady Bay (Warrnambool) to Port Fairy	<ul style="list-style-type: none"> <li>• State marine precinct</li> <li>• Regional Boating facilities</li> <li>• Regionally significant landscape</li> </ul>
Great Otway National Park	<ul style="list-style-type: none"> <li>• National Park</li> <li>• Natural Resource Area of Significance</li> </ul>
Discovery Bay Coastal Park	<ul style="list-style-type: none"> <li>• State significant landscape</li> <li>• Regionally significant landscape</li> <li>• Coastal Park</li> </ul>
Port Phillip Bay Western Shoreline and Bellarine Peninsula	<ul style="list-style-type: none"> <li>• RAMSAR listed wetland</li> <li>• Significant Open Space</li> </ul>
Bells Beach Surfing Recreation Reserve	<ul style="list-style-type: none"> <li>• Victorian heritage register</li> <li>• Nationally significant landscape</li> </ul>
<b>Central</b>	
Melbourne Port and CBD	<ul style="list-style-type: none"> <li>• Integrated economic triangle</li> <li>• State Boating precinct</li> <li>• Internationally significant Tourism destination</li> </ul>
Port of Hastings	<ul style="list-style-type: none"> <li>• Integrated economic triangle</li> <li>• State Boating precinct</li> </ul>
Cowes, Olivers Hill, Mornington, Patterson Lakes, Mordialloc Creek, Sandringham, Werribee South	<ul style="list-style-type: none"> <li>• Regional Boating precincts</li> </ul>
Frankston	<ul style="list-style-type: none"> <li>• Metropolitan activity centre</li> </ul>
Edithvale Seaford wetlands, Western Port, Port Phillip Bay Western Shoreline	<ul style="list-style-type: none"> <li>• RAMSAR listed wetland</li> <li>• Significant Open Space</li> </ul>
Mornington Peninsula and Western Port Biosphere Reserve, Point Nepean and Mornington Peninsula National Park, French Island National Park	<ul style="list-style-type: none"> <li>• UNESCO Biosphere Reserve</li> <li>• National Park</li> <li>• Significant Open Space</li> </ul>
North Western Port Nature Conservation Reserve, Jawbone Flora and Fauna Reserve, The Spit Wetland Reserve, Point Cook Coastal Park	<ul style="list-style-type: none"> <li>• National Park</li> <li>• Significant Open Space</li> </ul>
Beaumaris Cliffs	<ul style="list-style-type: none"> <li>• Site of International geological and geomorphological significance</li> <li>• Register of National Estate</li> </ul>
<b>Gippsland</b>	
Wilson Promontory National Park	<ul style="list-style-type: none"> <li>• State significant Tourist destination</li> <li>• UNESCO Biosphere Reserves</li> <li>• State significant landscape</li> <li>• National Park</li> </ul>
	<ul style="list-style-type: none"> <li>• State significant Tourist destination</li> <li>• RAMSAR listed wetland</li> <li>• Nationally significant wetlands</li> </ul>



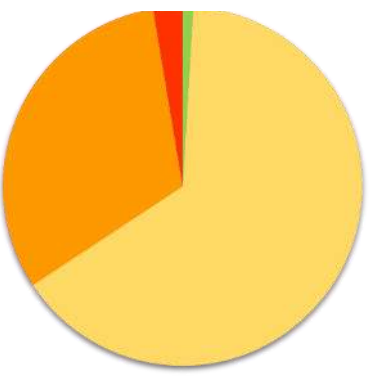
- |   |   |   |
|---|---|---|
| 1. Great Ocean Road   | 7. Cowes, Olivers Hill, Mornington, Patterson Lakes, Mordialloc Creek, Sandringham, Werribee South  | 13. Wilson Promontory National Park                                   |
| 2. Port of Portland, Port of Geelong, Geelong West, North Shore, Apollo Bay, Torquay, Portarlington, St Leonards, Queenscliff | 8. Frankston  | 14. Gippsland Lakes region  |
| 3. Lady Bay (Warrnambool) to Port Fairy   | 9. Edithvale Seaford Wetlands, Western Port, Port Phillip Bay Western shoreline   | 15. Paynesville and Lakes Entrance, Metung, Loch Sport and Mallacoota |
| 4. Port Phillip Bay Western Shoreline and Bellarine Peninsula   | 10. Mornington Peninsula and Western Port Biosphere Reserve, Point Nepean and Mornington Peninsula National Park, French Island National Park | 16. Corner Inlet  |
| 5. Bells Beach surfing recreation reserve   | 11. North Western Port Nature Conservation Reserve, Jawbone Flora and Fauna Reserve, The Spit Wetland Reserve, Point Cook Coastal Park        | 17. Phillip Island to Inverloch                                       |
| 6. Melbourne Port and CBD   | 12. Beaumaris Cliffs  |   |



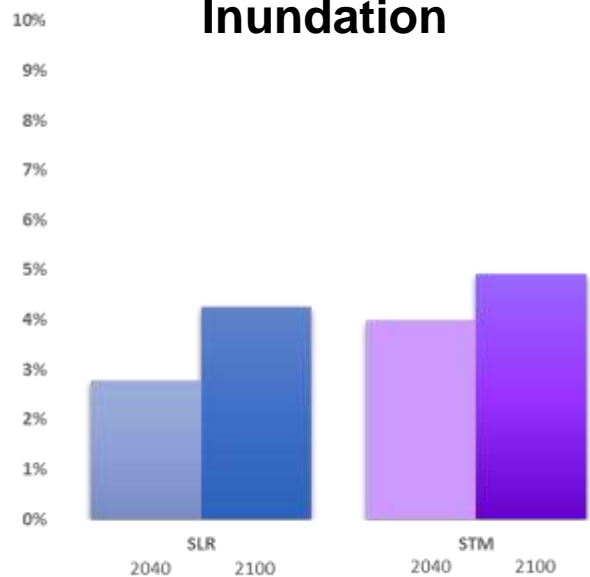


## Corner Inlet

### Erosion

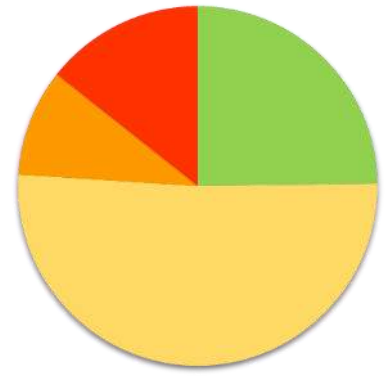


## Inundation

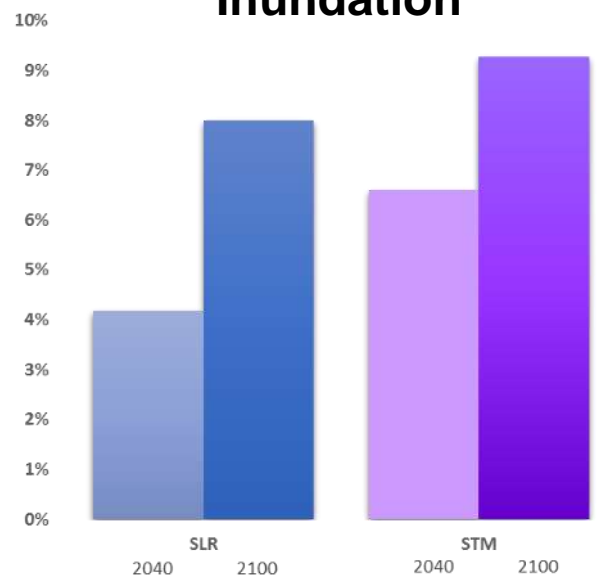


## Gippsland Lakes

### Erosion



## Inundation



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[YouTube: Victorian Coastal Climate Change Impacts to Inform Monitoring Program](#)

