An aerial photograph of a river delta, likely the Murray-Darling Basin in Australia. The image shows a complex network of waterways and land. A prominent, straight road or canal runs diagonally from the upper left towards the center. The surrounding landscape is a mix of green, brown, and blue, indicating different land uses and water levels. The river itself is a deep blue-green color, contrasting with the lighter, more textured land areas.

Cape to Cape Resilience Project

Risk and vulnerability - Summary report

Final report

June 2022

alluvium



Alluvium recognises and acknowledges the unique relationship and deep connection to Country shared by Aboriginal and Torres Strait Islander people, as First Peoples and Traditional Owners of Australia. We pay our respects to their Cultures, Country and Elders past and present.

Artwork by Vicki Golding. This piece was commissioned by Alluvium and has told our story of water across Country, from catchment to coast, with people from all cultures learning, understanding, sharing stories, walking to and talking at the meeting places as one nation.

This report has been prepared by Alluvium Consulting Australia Pty Ltd for **DEPARTMENT OF ENVIRONMENT, LAND, WATER AND PLANNING** under the contract titled **INVERLOCH REGIONAL AND STRATEGIC PARTNERSHIP COMMUNITY AND STAKEHOLDER ENGAGEMENT SUPPORT.**

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Glossary of terms and abbreviations

Adaptation	The process of adjustment to actual or expected disturbances such as coastal hazards. In human systems, adaptation seeks to proactively manage or avoid harm or make use of beneficial opportunities. Some natural systems may benefit from human intervention in helping to facilitate these adjustment process.
AEP	Annual Exceedance Probability (AEP) – on average, the probability of an event occurring in any given year. A higher AEP means it is more likely the event will occur in any one year. The 10%, 5% and 1% AEPs have been modelled for the following time periods/planning horizons: present day, 2040, 2070 and 2100.
Coastal adaptation	Future modification of behaviour through change in coastal land management, land-use or infrastructure, that reduces or prevents adverse impacts associated with coastal hazards.
Coastal erosion	The process of winds, waves and coastal currents shifting sediment away from a localised area of the shoreline. For the Cape to Cape Resilience Project, coastal erosion is estimated based on short term (storm event) erosion and long term erosion from both historic change and future changes due to sea level rise.
Coastal hazards	Natural coastal processes that may negatively impact on the marine and coastal environment, including impacts on human use, values, property or infrastructure. Hazards include coastal erosion and inundation (flooding) due to storm tide and sea level rise.
Coastal vulnerability	The susceptibility of people and places along the coast to adverse impacts from coastal hazards. Includes the degree of exposure, and ability to cope with, respond to and adapt to coastal hazards.
Consequence	The consequence (impact/outcome) of a value or use being exposed to coastal hazard/s are tailored based on local stakeholder and community feedback and informed by the Cultural and Community Values studies. Consequence ratings can also vary for hazard types (erosion and inundation) and consider short and long term impacts.
DELWP	Victorian State Government Department of Environment, Land, Water and Planning
Event	Where weather conditions affecting a specific place are notably different from typical, day-to-day conditions normally experienced at that location (e.g. a storm event). Coastal storm events are driven by a wide variety of natural processes, combining meteorology (weather) such as wind, rainfall and temperature, and oceanography (conditions of the sea) such as tides, currents, and waves. Events vary in magnitude (size) and duration (time). They may last from hours up to several days.
Likelihood	Likelihood of exposure to coastal hazards is determined by the probability (chance) of an event occurring. An ‘event’ is a storm or weather event that may cause inundation (flooding) or erosion along the coast. An event might include high winds, high tides and/or rainfall leading to high catchment (river) flow. For this assessment, we have various scenarios from more frequent to rarer events, and multiple sea level rise scenarios as well as different catchment flows. Likelihood can be expressed as annual exceedance probability (AEP) - the probability of an event occurring in any given year.
MHWS	Mean High Water Springs - the highest water level reached by spring tides, under average meteorological conditions.
Permanent inundation	Regular inundation from tides, increasing with sea level rise
Planning horizon	A planning horizon is an indicative timeframe by which a projected sea level rise scenario is anticipated to occur. While each sea level rise projection has been linked to a time period, the stated time is indicative and may need to be revised as more localised sea level projections are developed and/or updated. For example, Victoria’s policy setting requires planning for not less than 0.8 m sea level rise by 2100, however recent global estimates suggest a 1.1 m to 1.4 m sea level rise could be expected by 2100.
RaSP	Regional and Strategic Partnerships (RaSP) are a new tool under the <i>Marine and Coastal Act 2018</i> . RaSPs bring stakeholders together on regionally significant issues. The Inverloch RaSP is the first created under the new Act, gazetted on 6 August 2020. The RaSP brings together Traditional Owners and nine agencies. They each have a role in managing coastal and foreshore values, assets and infrastructure around Inverloch.

Risk assessment	A systematic process of evaluating the potential risks (likelihood and consequence) of coastal hazards, helping to inform a response and adaptation actions.
Resilience	The capacity of social, economic, and environmental systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.
SLR	Sea Level Rise - An increase in the mean level of the ocean. Relative sea level rise occurs where there is a local increase in the ocean level relative to the land, which might be due to ocean rise and/or land subsidence.
Storm tide inundation	Inundation resulting from storm activity, combining storm surge and the predicted tide height. For the Cape to Cape Resilience Project, storm tide inundation modelling also includes a rainfall (catchment and urban) component contributing to flooding. This combined scenario is referred to as temporary inundation for this assessment.
Vulnerability	Coastal vulnerability considers the susceptibility of people and places along the coast to adverse impacts from coastal hazards. Includes the degree of exposure, and ability to cope with, respond to and adapt to coastal hazards.
	<p>Further definitions of terms relevant to coastal hazard adaptation and the Cape to Cape Resilience Project can be found on the Cape to Cape Resilience Project website:</p> <p>marineandcoasts.vic.gov.au/coastal-programs/cape-to-cape-resilience-project</p>

1 Introduction

Alluvium Consulting Australia Pty Ltd (Alluvium) are working with the Department of Environment, Water, Land and Planning (DELWP) towards the development of a Cape to Cape Resilience Plan for the coastal communities of Inverloch, Venus Bay and surrounds. This work is being undertaken as part of the Inverloch Regional and Strategic Partnership (RaSP) which is a partnership bringing together nine agencies and Traditional Owners to address a regionally significant issue. The partners each have a role in managing coastal and foreshore values, uses and infrastructure in the Inverloch region.

The Cape to Cape Resilience Project commenced early in 2021 and has already delivered various Coastal Hazard Assessment (CHA) outcomes, Community Values Study and Cultural Values Assessment (Figure 1). This report brings together technical, strategic and engagement findings from this work to provide an appreciation of risk and vulnerability across the region.

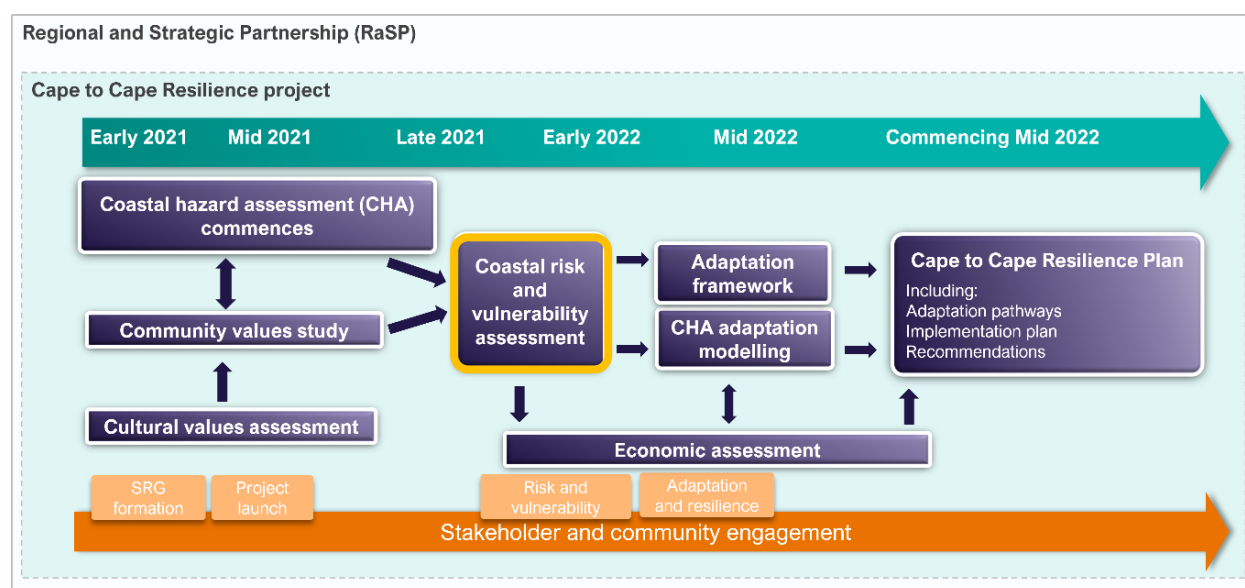


Figure 1. Cape to Cape Resilience Project timeline

1.1 Statewide coastal hazard adaptation

Coastal management reform in Victoria, led by DELWP, has involved the release of several key pieces of legislation, policies and guidance material over recent years. The *Marine and Coastal Act 2018* and *Marine and Coastal Policy (2020)* and *Strategy (2022)* are intended to be the primary management tools to guide coastal management in Victoria. Development of the Cape to Cape Resilience Plan considers a range of key objectives and guiding principles from the legislation in the planning and management of marine and coastal areas.

DELWP is also developing a statewide approach for coastal hazard risk management and adaptation called *Victoria's Resilient Coast – Adapting for 2100+*. This program includes a framework and guidelines to support state and local governments, land managers and communities to adapt to climate change impacts on the coast. Due for release in mid-2022, the guidelines will guide the development and implementation of adaptation opportunities to increase resilience, using a pathways approach to help inform decision making, planning, triggers and timing of actions.



1.2 This project

Overseen by the Inverloch RaSP, the Cape to Cape Resilience Project (the project) is a coastal hazard adaptation project that combines the latest science, technical assessments and community aspirations to develop a long-term plan to manage important coastal places, assets and other values.

The project is being scoped to align with stages of the *Victoria's Resilient Coast – Adapting for 2100+* guidelines (Figure 2 and Table 1)

The project includes:

- New research through a Coastal Hazard Assessment (CHA)
- Extensive community engagement and Community and Cultural Values Studies
- A coastal risk and vulnerability assessment (this report)
- Coastal resilience planning to develop the Cape to Cape Resilience Plan (a medium to long term plan including adaptation pathways for implementation).

The expected outcomes of the project include:

- Identification of coastal hazards from Cape Paterson to Cape Liptrap and the extent of potential impact
- Up-to date, local information on inundation, erosion and groundwater, including data and hazard mapping for the region
- Engaged and knowledgeable stakeholders who have been involved in the process and are able to make informed decisions on planning and asset management.
- Research, management strategies and resilience planning shaped by an understanding of community values
- Increased community understanding of local coastal hazards and management strategies
- Strategic approach to plan short, medium and long-term management of this coastline (<5 years, 5 – 25 years, >25 years, respectively), includes managing recent changes along Inverloch's coastline.

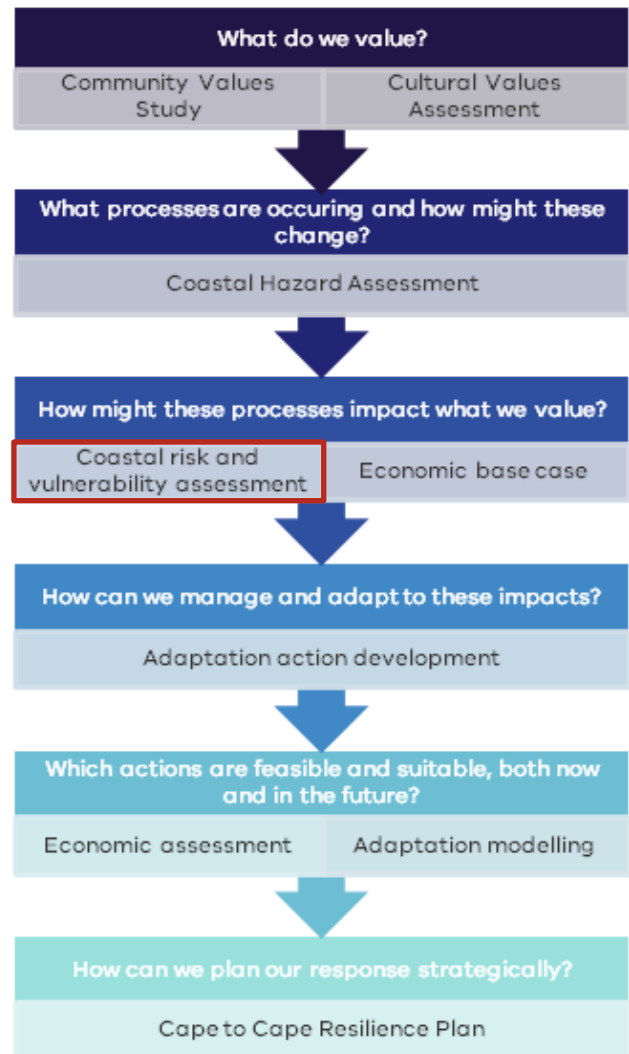


Figure 2. Key questions and outputs of the project. Risk and vulnerability assessment shown in red box.



Inverloch foreshore

Table 1. Stages of the Cape to Cape Resilience Project, including purpose, key questions and deliverables.

Victoria's Resilient Coast – Adapting for 2100+ framework	Purpose	Key questions	Cape to Cape Resilience Project key deliverables	Completion timeline	Document citation	Additional products
STAGE 1 Scoping and preparation	Provide a foundation for adaptation planning aligned to best practice guidance.	<ul style="list-style-type: none"> • Do we need action? • Who is involved? • Where's the study area? • What is our study scope? 	Project plan	Mar-21	DELWP 2021, Inverloch Regional and Strategic Partnership Project Plan, Victoria, March 2021.	Website establishment and content. DELWP & Alluvium. May 2021.
			Engagement plan	Mar - July 2021	Alluvium 2021, Cape to Cape Resilience Project Engagement Plan, Victoria, March 2021.	Project Update 1 - Introducing the Cape to Cape Resilience Project. DELWP & Alluvium. May 2021 Fact Sheet 1 - Project scene setting, introducing the RaSP. DELWP & Alluvium. May 2021. Project Update 2 - Data gathering, gap analysis, engagement commencement. DELWP & Alluvium. July 2021. Fact Sheet 2 - Coastal adaptation and hazards technical terminology. DELWP & Alluvium. July 2021.
STAGE 2 Values, vision and objectives	Ensure adaptation planning is underpinned by regional and place-based values.	<ul style="list-style-type: none"> • What do we value? • As a region and as a State? • What do we want the future to look like? 	Community values study	Oct-21	Alluvium 2021, Cape to Cape Resilience Project Community Values Study - Engagement Report - Values and Experiences, Victoria, October 2021.	Engage Victoria online survey & on-site drop in sessions - Community values and perspectives
			Cultural values assessment	Dec-21	Bunurong Land Council Aboriginal Corporation 2021, BLCAC Cultural Values Assessment: Cape to Cape Project, Victoria, December 2021.	
STAGE 3 Coastal hazard exposure	Assess coastal hazard exposure, including scenarios that enable best practice approaches to assessing current and emerging risk.	<ul style="list-style-type: none"> • What processes are occurring and how might these change? 	Inverloch region coastal hazard assessment	June 21 - Mar 22	Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 1 - Project Summary Report, Victoria, June 2022.	Fact Sheet 3 - Understanding coastal landscape context, processes and hazards. DELWP & Alluvium. Oct 2021. Fact Sheet 4 - Understanding coastal hazard modelling. DELWP & Alluvium. Oct 2021. Project Update 3 - Technical work (LiDAR, models, Assessment work), engagement update. DELWP & Alluvium. Nov 2021.
					Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 2 - Data Assimilation and Gap Analysis, Victoria, June 2022.	
					Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 3 - Technical Methodology , Victoria, June 2022.	
					Rosengren, N. & Miner, T., 2021, Inverloch Region Coastal Hazard Assessment – Coastal Geomorphology, Appendix A in Water Technology 2022c, Inverloch Region Coastal Hazard Assessment Report 3: Technical Methodology, Victoria, 2021.	
					Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 4 - Coastal Processes and Erosion Hazards , Victoria, June 2022.	
					Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 5 - Inundation Hazards, Victoria, June 2022.	
STAGE 4 Vulnerability and risk	Explore place-based coastal hazard vulnerability and risk, to enable strategic consideration of adaptation needs/priorities.	<ul style="list-style-type: none"> • How might these processes impact what we value? 	Coastal hazard asset exposure assessment	April - May 22	Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 6 - Coastal Hazard Asset Exposure Assessment, Victoria, June 2022.	Project Update 4 - Technical work update (hazard mapping, values, economics), engagement update. DELWP & Alluvium. April 2022. Fact Sheet 5 – Vulnerability and Risk. DELWP & Alluvium. April 2022
			Coastal hazard risk and vulnerability assessment		Alluvium 2022, Cape to Cape Resilience Project - Asset and Values Risk and Vulnerability Assessment, May 2022.	
			Economic base case		Natural Capital Economics & Alluvium, 2022, Cape to Cape Resilience Project – Economics Assessment, June 2022.	
STAGE 5 Adaptation actions and pathways	identify, assess, consult on and decide which adaptation options and actions are the most appropriate for managing the current and future coastal hazard risks in the study area. This includes a diversity of integrated actions across land management, planning and design, nature based and engineering themes.	<ul style="list-style-type: none"> • How can we manage and adapt to these impacts? 	Adaptation options and preferences	May - June 22	Alluvium 2022, Cape to Cape Resilience Project Adaptation Options - Engagement Report - Adaptation Engagement Outcomes, Victoria, May 2022	Fact Sheet 6 – Coastal Adaptation. DELWP & Alluvium. April 2022 Fact Sheet 7 – Adaptation Actions. DELWP & Alluvium. April 2022
			Adaptation framework summary paper		Alluvium 2022, Cape to Cape Resilience Project – Adaptation Framework Summary Paper, Victoria, June 2022.	
			Adaptation feasibility modelling		Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 7 - Adaptation Assessment, Victoria June 2022	
			Economic assessment & cost benefit analysis		Natural Capital Economics & Alluvium, 2022, Cape to Cape Resilience Project – Economics Assessment, June 2022.	
STAGE 6 Plan and implement	Confirm the plan of action for coastal hazard risk management and adaptation, and commence implementation. This includes priority actions in the adaptation pathways, shared roles and responsibilities, triggers for review and resources/requirements.	<ul style="list-style-type: none"> • Which options are feasible and suitable, both now and in the future? • How can we plan our response strategically? 	Cape to Cape Resilience Plan		Inverloch RaSP Stage 2- TBC 2023	
			Cape to Cape Implementation plan/s		Inverloch RaSP Stage 2-& Partner Agencies TBC 2023 onwards	
STAGE 7 Ongoing monitoring and review	Ensure coastal hazard risk management and adaptation is accompanied by ongoing monitoring and evaluation process that enables effective implementation, learnings and improvement.	<ul style="list-style-type: none"> • How can our response be adaptive to changing conditions? • How are we tracking in implementing our plan? 	Cape to Cape Resilience Plan including implementation, monitoring and evaluation		Inverloch RaSP TBC 2023 onwards	

1.3 This report

This risk and vulnerability assessment brings together findings of the Coastal Hazard Assessment and the Community and Cultural Values Studies. This report asks the following key question: *How might coastal processes impact what we value?*

It examines what may be at risk and vulnerable to coastal hazards in the absence of adaptation (intervention), and how this risk might change over time. This understanding of risk and vulnerability highlights where and when an adaptation response might be required and informs how we might be able to manage and adapt to these impacts.

This report is structured as follows:

Table 2. Components of the risk and vulnerability assessments

Report Section	Technical assessment	Notes
2.2	Risk definition	A leading practice approach, aligned to Victoria's Resilient Coast pilot guidelines (DELWP 2022)
2.3	Coastal Hazard Assessment outputs	Linked to Inverloch Region Coastal Hazard Assessment - Report 4 - Coastal Processes and Erosion Hazards (Water Technology 2022) and Inverloch Region Coastal Hazard Assessment - Report 5 - Inundation Hazards (Water Technology 2022)
2.4	Values, uses and infrastructure database	Spatial asset types and subtypes detailed in Attachment A.
2.4	Exposure analysis	Linked to Inverloch Region Coastal Hazard Assessment - Report 6 - Coastal Hazard Asset Exposure Assessment (Water Technology 2022)
2.5	Risk likelihoods	
2.6	Consequence categories	Assigned consequence for values, uses and infrastructure provided in Attachment A.
2.7	Risk assessment matrix	
2.8	Risk classification	
3.1	Risk review	Risk results for key values, uses and infrastructure presented in Section 3, with full risk tables provided in Attachment B.

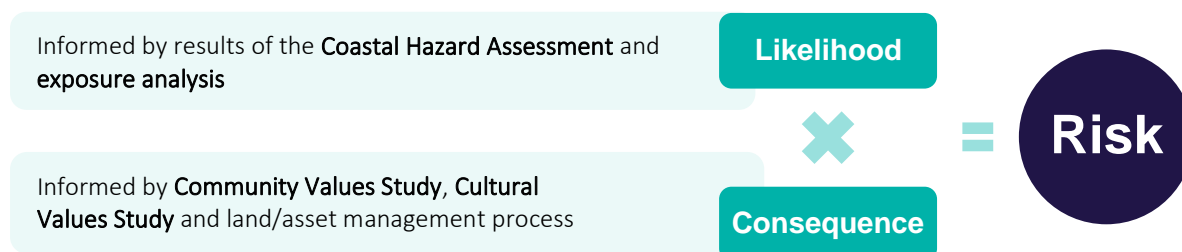


Amazon Wreck

2 Technical approach

2.1 Risk definition

The risk and vulnerability assessment involves assessing the risk of impact from coastal hazards on a range of values, uses and infrastructure. In accordance with AS/NZS ISO 31000:2009, risk is defined as the combination of likelihood of occurrence of an event and the consequence if the event occurs.



Likelihood of exposure to coastal hazards is determined by the probability (chance) of an event occurring. An 'event' is a storm or weather event that may cause inundation (flooding) or erosion along the coast. An event might include high winds, high tides and/or rainfall leading to high catchment (river) flow.

The **consequence** (impact/outcome) of a value or use being exposed to coastal hazard/s considers impacts on various aspects including lifestyle, community, safety, cultural landscapes, property, infrastructure and environmental values. Consequence ratings can also vary for hazard types (erosion and inundation) and consider both short and long term impacts.

For the Cape to Cape Resilience Project, likelihood is defined through the Coastal Hazard Assessment and the hazard exposure analysis. Consequence ratings are tailored based on local stakeholder and community feedback and informed by the Cultural and Community Values Studies.

Our approach to assessing risk and vulnerability for the Cape to Cape region has taken a leading practice approach, aligned to Victoria's Resilient Coast pilot guidelines (DELWP, 2022).

This includes:

- Developing tailored consequence categories and assigning a typical consequence of erosion and temporary inundation to each asset type
- Developing a tailored risk assessment and risk tolerance categories
- Assessing risk for each asset in the spatial database (point, linear and polygon assets), and mapping outputs to review spatial distribution of risks across the region, hot spot areas, vulnerabilities and potential for cumulative impacts.

This approach enables:

- A strategic risk assessment across the region for the purposes of adaptation planning
- Assessment of risk for individual assets
- Identification of hot spot areas
- Cumulative impacts to be reviewed at the aggregated scale.

2.2 Coastal Hazard Assessment outputs

The Inverloch Region Coastal Hazard Assessment (CHA), undertaken by Water Technology, enhances the understanding of coastal hazards along the coast from Cape Paterson to Cape Liptrap. The CHA is informed by extensive analyses of the region's geological formation, local conditions, and historic and recent changes along the coastline. With this understanding, various models were developed to simulate local coastal, estuarine and catchment processes. The models assessed storm tide inundation, waves, sediment transport and shoreline response (erosion/accretion) for a range of storm event scenarios and planning horizons (including projected sea level rise).

The assessment has focused on three types of coastal hazards:

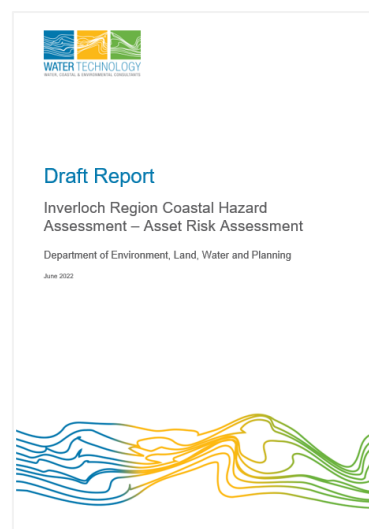
- Erosion
- Permanent inundation (regular inundation from tides)
- Temporary inundation (combined storm tide and catchment flooding)

A range of coastal hazard scenarios were analysed in the Inverloch Region CHA (Water Technology, 2022). These scenarios considered a combination of planning horizons, sea level rise, wind, wave, storm tide and catchment inflows. They were defined by DELWP, in line with the current planning policy and the best available information.

Table 3. Coastal hazard scenarios, as per Inverloch Region CHA (Water Technology, 2022)

Planning Horizon	Sea Level Rise	Wind Speed Event	Wave Height AEP	Storm Tide Event	Catchment Flow Event	Urban Flow Event
2021	0	10%	10%	10%	1%	1%
		5%	5%	5%	1%	1%
		1%	1%	1%	10%	20%
2040	0.2	10%	10%	10%	1%	1%
		5%	5%	5%	1%	1%
		1%	1%	1%	10%	20%
2070	0.5	10%	10%	10%	1%	1%
		5%	5%	5%	1%	1%
		1%	1%	1%	10%	20%
2100	0.8	10%	10%	10%	1%	1%
		5%	5%	5%	1%	1%
		1%	1%	1%	10%	20%
2100	1.1	10%	10%	10%	1%	1%
		5%	5%	5%	1%	1%
		1%	1%	1%	10%	20%
2100	1.4	10%	10%	10%	1%	1%
		5%	5%	5%	1%	1%
		1%	1%	1%	10%	20%

Details of the technical reports for Inverloch Region CHA (Water Technology, 2022) can be found in Table 1.



Outputs of this modelling produces coastal hazard estimates or ‘hazard extents’. These are mapped to help determine areas along the coastline that may be exposed to temporary inundation, erosion and sea level rise (Figure 3). The extents are also utilised in the exposure analysis, detailed in Section 2.4 below. These extents are based on present day ground surface elevations and assume no adaptation or intervention measures.

Full details of the Inverloch Region CHA and the exposure mapping can be found in set of reports (Water Technology, 2022) delivered as part of the Cape to Cape Resilience Project, for the Inverloch RaSP.

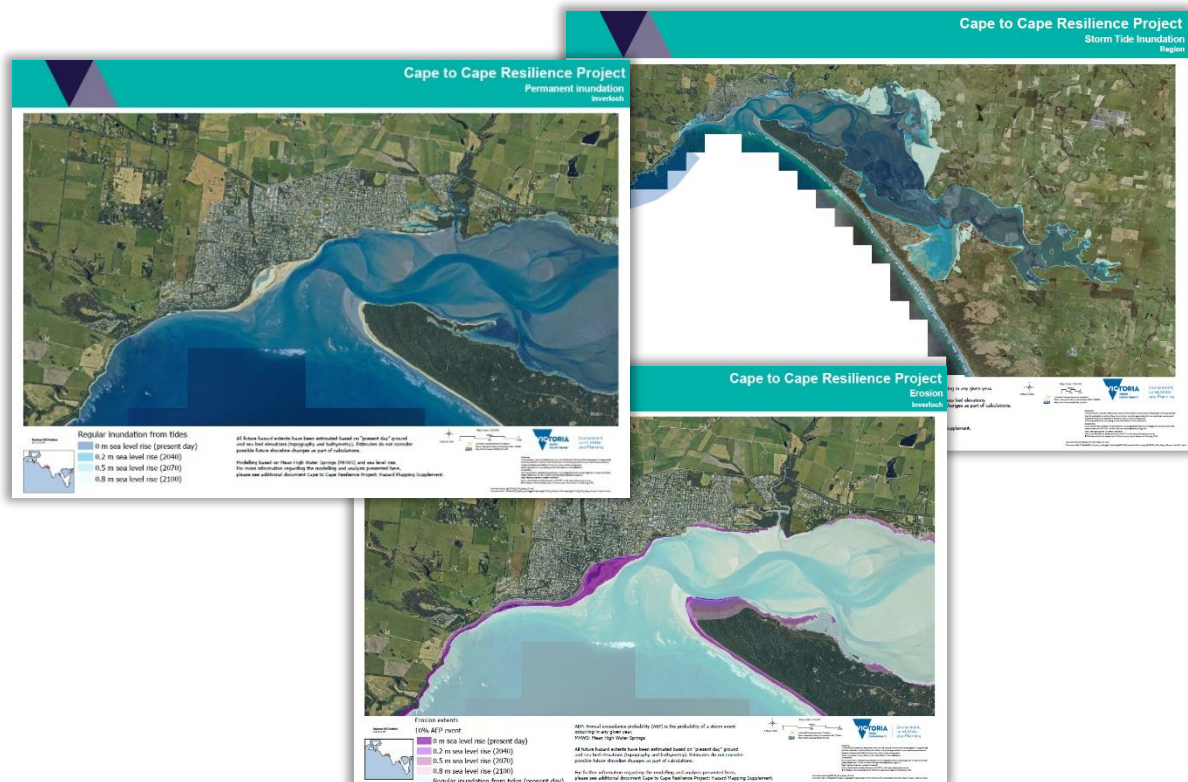


Figure 3. Example coastal hazard extent mapping

2.3 Values, uses and infrastructure database collation

Information and data on values, uses and infrastructure in the coastal zone across the Cape to Cape region has been compiled in spatial Geographical Information Systems (GIS) database. In addition to publicly available data, RaSP partners and other asset managers have been engaged to supply relevant spatial data.

The data base collated for the project is used to explore the likelihood and consequence (risk) of coastal hazard impacts across the Cape to Cape region. The region-wide assessment enables identification of:

- High risk values and asset types
- Changing exposure and risk profiles across different locations
- Changing exposure and risk profiles from present day to 2100
- Hotspot locations / issues.

The primary purpose of the data collation, exposure and risk assessment is to enable strategic planning and adaptation initiatives to be targeted at priority areas and issues. The data compiled include a range of point, linear and polygon data that spans the asset themes outlined in Figure 4.

Values and asset data included in the spatial database is listed in Attachment A (including consequence ratings). Due to the amount of asset data compiled, fields/attributes have been condensed to those required for the purpose of the regional scale risk assessment. Some of the metadata provided had limited descriptive information, therefore where unknown, assumptions have been made about asset types or materials.



Figure 4. Asset types/themes



2.4 Exposure analysis

Approach

The exposure assessment (Inverloch Region CHA - Report 6, Water Technology, 2022) has been used as the basis for the risk and vulnerability assessment. The technical approach to the exposure analysis combined the mapped coastal hazard extents and the values and assets database, to analyse the values, uses and infrastructure located in identified hazard areas. A GIS analysis process has been used to intersect all coastal hazard layer scenarios (erosion and inundation) with all asset data layers. This has included:

- Spatial intersects using a vector on vector approach for extent assessments – this enables spatial information to be tagged relative to where assets are impacted by hazards, and provides overall information on lengths/areas and % exposed. E.g. for roads, outputs include length impacted, % impacted relative to the total length in region, and spatial mapping of impacted parts of the asset.
- Spatial intersects using a vector on raster approach for depth inundation assessments – completed for the asset types needed to inform the depth-damage assessments, inducing the economic base case (Application of Economics for Coastal Hazard Adaptation, Alluvium 2022b)
- Spatial intersects completed for all coastal hazard scenarios in the CHA.

This approach provides information for the strategic risk assessment, as well as detailed information of specific assets as a spatial product that can feed back into existing systems and programs for RaSP partners.

Note that exposure analysis assumes no adaptation (intervention) measures to manage and/or mitigate hazard impacts

Scenarios included in the risk assessment

The risk assessment has included the scenarios as specified in Inverloch Region CHA – shown in Table 4, Table 5, Table 6 – with the risk methodology tailored to best utilise these scenarios.

- **Temporary inundation (combined storm tide and catchment flooding)** – Table 4
Temporary inundation extents combined various storm tide and catchment flooding events, represented as Annual Exceedance Probabilities (AEP)¹. These inundation hazard scenarios are based on statistical analysis of local event joint probabilities (informed by Australian Rainfall and Runoff as described in the Inverloch Region CHA).
- **Erosion** - Table 5
The erosion extents comprise of sea level rise response, a short-term response based on 10%, 5% and 1% AEP storm tide events and a long-term rate of change.

Erosion Hazard Extent = Short Term Erosion (event response) + Long Term Change + Response to SLR

The CHA analyses used two different erosion rates to estimate erosion rates for long term change - one based on long-term, historical erosion rates ('long term rate'), and the other based on more recent, rapid erosion rates ('rapid rate'). The risk analysis uses the *long term rate* scenarios (in line with best practice methods), with some consideration of the *rapid rate* scenarios for sensitivity.

- **Permanent inundation (regular tidal inundation due to sea level rise)** - Table 6
Permanent inundation extents combined the present day MHWS² for Cape to Cape region, with various sea level rise scenarios, out to 2100.

More comprehensive detail of these scenarios can be found in the Inverloch Region CHA (Water Technology, 2022).

¹ Annual Exceedance Probability (AEP) – on average, the probability of an event occurring in any given year

² Mean High Water Springs (MHWS) - the highest water level reached by spring tides, under average meteorological conditions.

Table 4. Risk assessment hazard scenarios: temporary inundation (combined storm tide and catchment flooding)

Planning horizon	Present day		2040		2070		2100		2100 (sensitivity)*		2100 (sensitivity)*	
Sea level rise	0 m SLR		0.2 m SLR		0.5 m SLR		0.8 m SLR		1.1 m SLR		1.4 m SLR	
Temporary inundation (combined coastal and catchment flooding)	Storm tide	Rainfall	Storm tide	Rainfall	Storm tide	Rainfall	Storm tide	Rainfall	Storm tide	Rainfall	Storm tide	Rainfall
	10% AEP	1% AEP catchment 1% AEP urban flow event	10% AEP	1% AEP catchment / 1% AEP urban flow event	10% AEP	1% AEP catchment 1% AEP urban flow event	10% AEP	1% AEP catchment 1% AEP urban flow event	10% AEP	1% AEP catchment 1% AEP urban flow event	10% AEP	1% AEP catchment 1% AEP urban flow event
	5% AEP		5% AEP		5% AEP		5% AEP		5% AEP		5% AEP	
	1% AEP	10% AEP catchment 20% AEP urban flow event	1% AEP	10% AEP catchment 20% AEP urban flow event	1% AEP	10% AEP catchment 20% AEP urban flow event	1% AEP	10% AEP catchment 20% AEP urban flow event	1% AEP	10% AEP catchment 20% AEP urban flow event	1% AEP	10% AEP catchment 20% AEP urban flow event

*Modelled temporary inundation events also consider both storm tide and rainfall (catchment and urban flows). This emphasises possible storm tide impacts by reflecting the limited capacity for inland areas and networks to handle coastal flooding during storm tide event

Table 5. Risk assessment hazard scenarios: erosion

Planning horizon	Present day		2040		2070		2100		2100 (sensitivity)*		2100 (sensitivity)*	
Sea level rise	0 m SLR		0.2 m SLR		0.5 m SLR		0.8 m SLR		1.1 m SLR		1.4 m SLR	
Erosion	Short term response (event)	Long term response (erosion rate)	Short term response (event)	Long term response (erosion rate)	Short term response (event)	Long term response (erosion rate)	Short term response (event)	Long term response (erosion rate)	Short term response (event)	Long term response (erosion rate)	Short term response (event)	Long term response (erosion rate)
	10% AEP event	Erosion rate based on long-term historical erosion rates	10% AEP event	Erosion rate based on long-term historical erosion rates	10% AEP event	Erosion rate based on long-term historical erosion rates	10% AEP event	Erosion rate based on long-term historical erosion rates	10% AEP event	Erosion rate based on long-term historical erosion rates	10% AEP event	Erosion rate based on long-term historical erosion rates
	5% AEP event		5% AEP event		5% AEP event		5% AEP event		5% AEP event		5% AEP event	
	1% AEP event		1% AEP event		1% AEP event		1% AEP event		1% AEP event		1% AEP event	
Erosion (sensitivity)*	5% AEP event	Erosion rate based on continuation of recent erosion rates	5% AEP event	Erosion rate based on continuation of recent erosion rates	5% AEP event	Erosion rate based on continuation of recent erosion rates	5% AEP event	Erosion rate based on continuation of recent erosion rates	5% AEP event	Erosion rate based on continuation of recent erosion rates	5% AEP event	Erosion rate based on continuation of recent erosion rates

*While not included in coastal hazard mapping, higher (more rapid) erosion rate and increased projected sea level rise scenarios have also been assessed and included the inundation analysis

Table 6. Risk assessment hazard scenarios: permanent inundation

Planning horizon	Present day	2040	2070	2100	2100 (sensitivity)*	2100 (sensitivity)*
Permanent inundation	MHWS + 0 m SLR	MHWS + 0.2 m SLR	MHWS + 0.5 m SLR	MHWS + 0.8 m SLR	MHWS + 1.1 m SLR	MHWS + 1.4 m SLR

*While not included in coastal hazard mapping, increased projected sea level rise scenarios have also been assessed and included the inundation analysis

2.5 Risk likelihoods

Value and asset exposure to the defined coastal hazard scenarios is the ‘likelihood’ component of the risk assessment and an initial appreciation for vulnerabilities along the coast.

Likelihood ratings are summarised below (Table 7).

Table 7. Likelihood ratings for inundation and erosion

Likelihood	Temporary inundation (storm tide and catchment flooding)	Erosion Short term + Long term
Likely*	(MHWS + sea level rise)	10% AEP storm tide + long term erosion rates
Possible	<i>The greater of the two scenarios</i> <div> 10% AEP storm tide + 1% AEP catchment 1% AEP storm tide + 10% AEP catchment 20% AEP urban flow event </div>	5% AEP storm tide + long term erosion rates
Unlikely	<i>The greater of the two scenarios</i> <div> 5% AEP storm tide + 1% AEP catchment 1% AEP storm tide + 10% AEP catchment 20% AEP urban flow event </div>	1% AEP storm tide + long term erosion rates
Rare	<i>The greater of the two scenarios for two planning horizons ahead#</i> <div> 5% AEP storm tide + 1% AEP catchment 1% AEP storm tide + 10% AEP catchment 20% AEP urban flow event </div>	1% AEP storm tide + rapid erosion rates

*Permanent inundation (MHWS + sea level rise) also assigned likely

#For example, present day uses the 2070 hazard extents, while 2040 would utilise 2100 (with 0.8 m SLR)



Ayr Creek, at Inverloch Coastal Reserve

2.6 Consequence categories

To understand the consequence of coastal hazard exposure on the region, a tailored set of consequence categories have been developed and applied to the region's values, uses and infrastructure. These categories have been informed by:

- Existing risk management approaches for DELWP, Victorian State Government and other RaSP partners
- Similar assessments for coastal adaptation planning around Australia
- The Community and Cultural Values Studies
- Feedback from RaSP partners, including assigning suitable budgets, levels of tolerance and recovery periods relevant for the region.

Consequence classifications are general in nature and represent the typical consequence of erosion or inundation impacts on assets classes and types. Categories and definitions are linked to the key values highlighted in the Community Values Study (Figure 5).











Culture and Country	Environment	Community and lifestyle			Place and planning		
Cultural landscapes	Environmental values	Lifestyle	Access	Public safety	Cultural landscapes	Property and infrastructure	Economy and growth
✓	✓	✓	✓	✓	✓	✓	✓
 Cultural, historic and spiritual connections to the coast			 Water quality that is safe and reliable for human consumption, recreational use, healthy ecosystems and primary industry				
 Coastal landscapes, seascapes, character and views			 Safe, reliable and ecologically sensitive access to coastal areas				
 Healthy coastal and marine ecosystems			 Desirable places to live, work, visit and play, with reliable public services and amenities				
 Abundant and diverse native coastal and marine flora and fauna			 The ability to live in a coastal community				
 Natural resilience to coastal hazards and sea-level rise impacts			 Clarity, consistency and confidence in foreshore management and responsibilities				

Figure 5. Consequence categories (top) are closely linked to values identified in the Community Values Study

Consequence classifications and definitions (Table 8) are used to assigned a consequence rating, with the highest consequence rating adopted across the criteria. Discretion is and should be applied for site specific / locality implications.

An assessment of the general consequence of erosion and inundation has been completed for each asset class and modified by type, to inform regional scale perspectives on coastal hazard risk distribution across the region. Consequence has been defined for each hazard type and has been assigned to all individual values, assets and infrastructure (parcels, points, lines and natural assets).

For many assets, erosion has a higher consequence than temporary inundation, as erosion represents a permanent loss of land/asset (through scour), which is different to temporary periods of combined storm tide and catchment inundation. For this analysis, the consequence of permanent inundation or areas subject to regular tidal inundation is considered similar to erosion, reflecting a more permanent change/loss.

The full listing of asset types and assigned consequence categories is provided in Attachment A.

Table 8. Consequence categories for the Cape to Cape Resilience Project

Consequence	Culture and Country	Environment	Community and lifestyle			Place and planning	
	Cultural landscapes	Environmental values	Lifestyle	Access	Public safety	Property and infrastructure	Economy and growth
	Specific consideration of traditional cultural values and the ability to maintain and pass on traditional knowledge and practices to future generations	Considers elements such as ecological values, ecosystem services, and cultural and traditional uses.	Considers lifestyle elements of modern and traditional lifestyle such as community services, cultural connection, recreational and social activities and day to day business activities.	Considers access for recreational activities such as boating and fishing, nature-based activities as well as access to cultural and ceremonial sites.	Considers threats to human health and safety such as injury, disease, mental and physical well being.	Considers the threat of damage to built assets and any interdependencies such as regional access and ability to deliver critical services	Includes existing business and potential economic growth opportunities, especially for locally owned and operated enterprises.
Extreme	Severe and widespread, permanent impact on multiple sites of cultural significance, including loss of land, connection to land, and ability to continue Recovery unlikely.	Severe and widespread, permanent impact on multiple regionally or nationally significant environmental values of the region. Recovery unlikely.	Widespread semi-permanent impact (~1 year) to highly utilised community services, wellbeing, or culture of the community with no suitable alternatives.	Widespread and permanent impact on access to key sites and activities Recovery unlikely.	Loss of lives and/or permanent disabilities.	Widespread major damage or loss of property or infrastructure with total value >\$25 million. Full recovery/repair may take many years.	Regional economic decline, widespread business failure and impacts on state economy.
Major	Severe and widespread semi-permanent impact on one or more sites of cultural significance, including loss of land, connection to land, and ability to continue traditional practices. Full recovery may take many years.	Severe and widespread semi-permanent impact on one or more regionally or nationally significant environmental values of the region. Full recovery may take many years.	Major widespread long-term (~1 month) disruption to well-utilised services, wellbeing, or culture of the community with very few alternatives available.	Severe and semi-permanent impact on access to key sites and activities Full recovery may take many years.	Widespread serious injuries/illnesses.	Major damage or loss of property or infrastructure with total value >\$10 million. Full recovery/repair may take several years.	Lasting downturn of local economy with isolated business failures and major impacts on regional economy.
Moderate	Substantial impact on one or more sites of local cultural significance. Full recovery may take several years.	Substantial impact on one or more locally significant environmental values of the region. Full recovery may take several years.	Minor medium-to long-term (~1 week) or major short-term disruption to moderately utilised services, wellbeing, or culture of the community with limited alternatives.	Substantial impact on access to key sites and activities requiring significant works to repair or restore access. Full recovery may take less than 1 year.	Isolated serious injuries/illnesses and/or multiple minor injuries/illnesses.	Moderate - major damage to property or infrastructure with total value >\$1 million. Full recovery may take less than 1 year.	Significant impacts on local economy and minor impacts on regional economy.
Minor	Small, contained and reversible short-term impact on sites of cultural significance. Full recovery may take less than 1 year.	Small, contained and reversible short-term impact on isolated ecosystem services and natural features of the region. Full recovery may take less than 1 year.	Small to medium short-term disruption (~1 day) to moderately utilised services, wellbeing, finances, or culture of the community with some alternatives available, or more lengthy disruption of infrequently utilised services.	Small to medium short term disruption of access to key sites and activities which may require some works to repair or restore access.	Minor and isolated injuries and illnesses.	Minor damage to properties or infrastructure with total value >\$100,000.	Individually significant but isolated impacts on local economy.
Negligible	Little to no impact to sites of cultural significance.	Little to no environmental impact.	Very small short-term disruption (~1 hour) to services, wellbeing, finances, or culture of the community with numerous alternatives available.	Very little to no impact on access to key or sensitive sites and activities.	Negligible injuries or illnesses.	Minimal damage to properties or infrastructure with total value <\$100,000.	Minor short-term impact on local economy.

2.7 Risk assessment matrix

Once consequence and likelihood ratings have been determined, a risk matrix is used to assess the overall level of risk for each value or use, under different scenarios.

A risk assessment matrix has been tailored for the Cape to Cape Resilience Project (Table 9), informed by existing Statewide risk assessments, guidance (DELWP, 2021), the VRC framework and other leading practice approaches (Figure 6).

Quantifying risk provides a basis to strategically prioritise and manage (mitigate) risk, through an adaptation response. We may be able to 'cope' or 'live with' a certain level of risk before we reach a 'trigger' point where risk reaches unacceptable levels. Consideration of risk tolerance is provided for each risk category (Table 10).

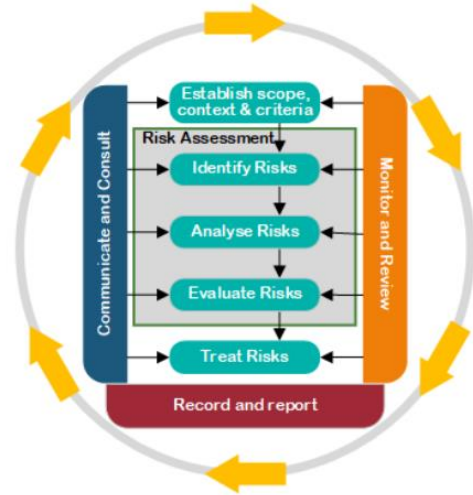


Figure 6. DELWP's Risk Management Process

Table 9. Tailored risk assessment matrix for the Cape to Cape Resilience Project

		Consequence				
Likelihood		Negligible	Minor	Moderate	Major	Extreme
	Likely	Medium	Medium	Significant	High	High
	Possible	Low	Medium	Significant	Significant	High
	Unlikely	Low	Medium	Medium	Significant	Significant
	Rare	Low	Low	Medium	Medium	Significant

Table 10. Tailored risk tolerance categories for the Cape to Cape Resilience Project

Risk	Risk tolerance	Action required
High	High risk: a risk that, following an understanding of likelihood and consequence, is so high that it requires actions to avoid or reduce the risk.	Immediate and/or ongoing action is needed to treat, eliminate, or reduce risk to acceptable levels
Significant	Medium to significant risk: a risk that, following an understanding of likelihood and consequence, is low enough to allow the exposure to continue, and at the same time high enough to require new treatments or actions to reduce the risk. Society can live with this risk but believe that as much as is reasonably practical should be done to reduce the risks further.	Short term action is needed to treat, eliminate, or reduce risk to acceptable levels
Medium		Short to longer term action is needed to treat, eliminate, or reduce risk to acceptable levels
Low	Low risk: a risk that, following an understanding of likelihood and consequence, is sufficiently low to require no new treatments or actions to reduce the risk further. Individuals and society can live with this risk without feeling the necessity to reduce the risks any further.	Manage and monitor the risk as part of current operations, provide for periodic maintenance/review.

2.8 Risk classification and mapping

To complete the risk assessment:

- Each asset (points, lines and parcels) in the database is overlayed with the coastal hazard extents and is assigned a likelihood category for erosion and inundation, based on this exposure
- Each asset is then assigned the consequence category relevant to its asset class, and type, where relevant, for both erosion and inundation
- Risk is calculated utilising the risk matrix where Risk = likelihood x consequence for each asset
- Outputs are summarised by length, number or area and mapped for different localities to review the distribution of assets at risk and consider hot spots and cumulative impacts.
- Risk is attributed to all spatial asset data and provided as a spatial database product.

An example of this assessment in GIS (Figure 7), shows increasing numbers, areas and lengths of assets (buildings and linear infrastructure) at risk, as erosion extents increase, out to 2100.

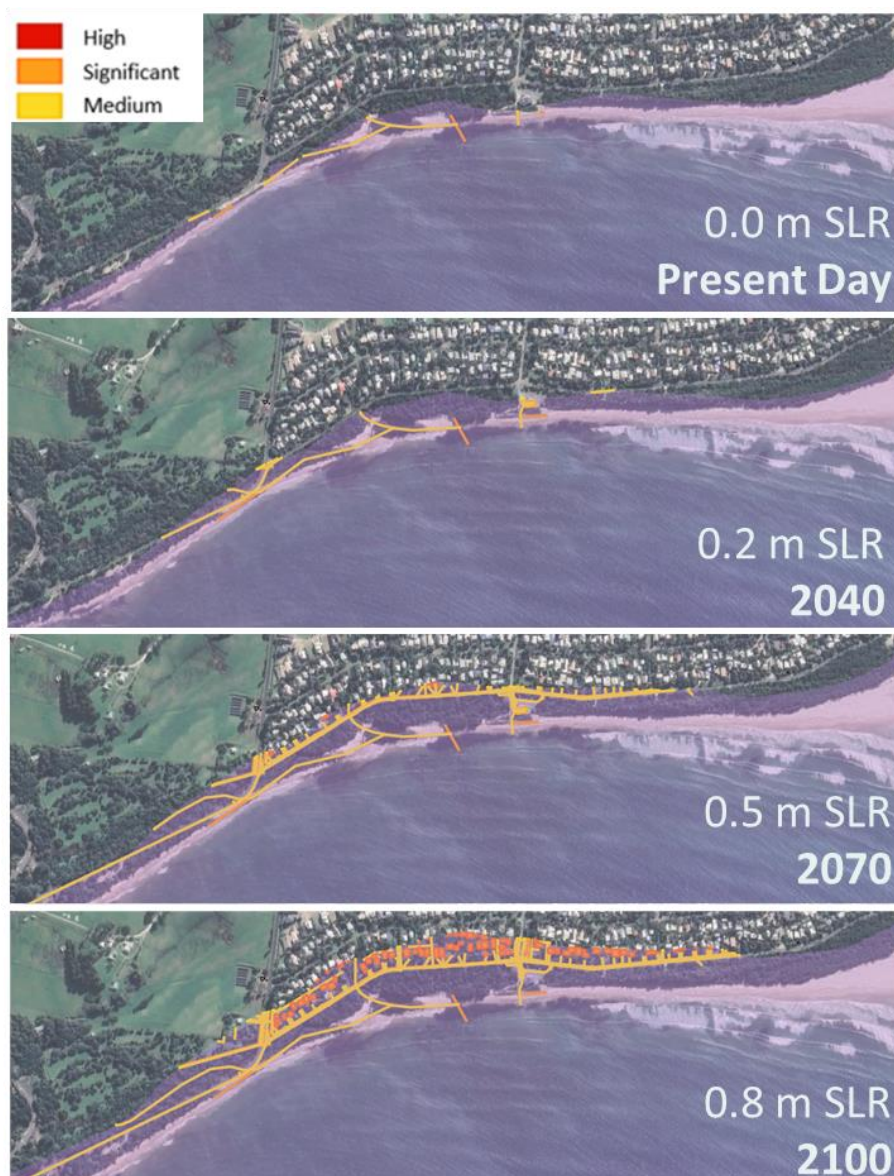


Figure 7. Example of spatial risk analysis in GIS: Risk results for 1% AEP erosion from present day out to 2100 at Inverloch Surf Beach

3 Vulnerability and risk assessment

This section provides:

- An appraisal of key coastal vulnerabilities - at the regional scale and in line with understanding of core community values
- An overview of risk results for key values, uses and infrastructure for erosion, permanent inundation and temporary inundation (full results provided in Attachment B)
- A summary of emerging risk profiles for the region and reporting localities.

Approach

Vulnerability and risk can be assessed at various scales from a regional level to individual sites and assets, for different coastal hazards and over different timeframes. To provide insight into the distribution of coastal hazards risk across the Cape to Cape study area, the analysis has also been undertaken at different geographical scales. In addition to region-wide analysis, three different reporting localities were also assessed for the Cape to Cape Resilience Project study area (Figure 13):

1. **Inverloch:** Inverloch township (based on the Inverloch locality boundary).
2. **Bass Coast:** The area surrounding Inverloch within the Bass Coast Shire LGA.
3. **South Gippsland:** The area surrounding Inverloch within the South Gippsland Shire LGA.

The exposure and risk assessments have considered a sub-set of the region's assets (shown within the red box)³.

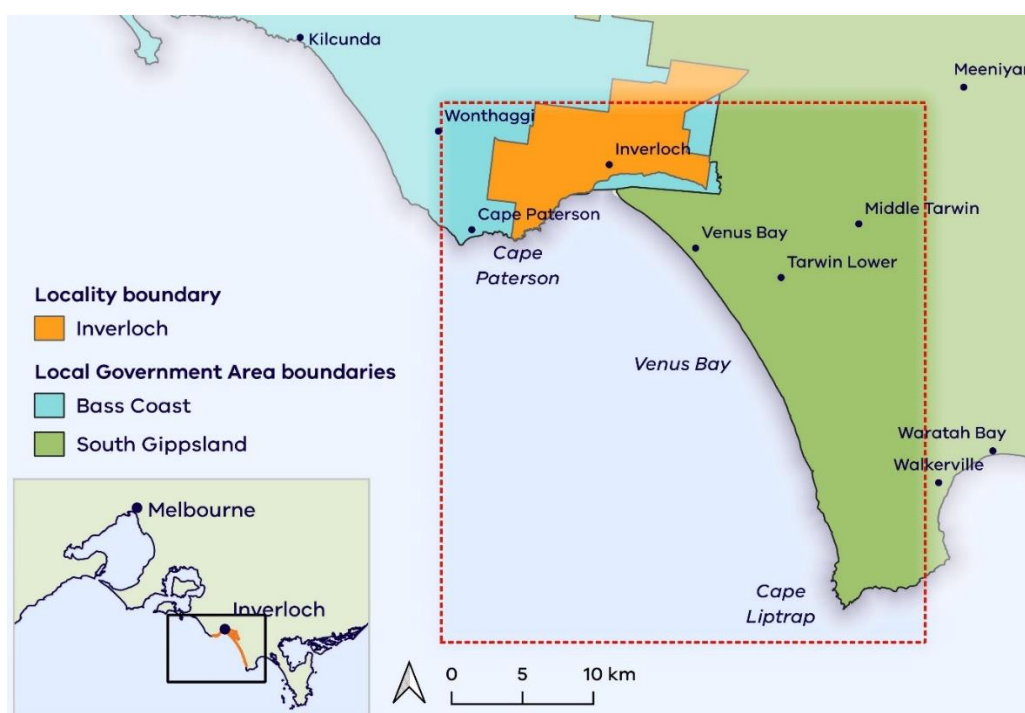


Figure 8. Sub-region split for risk and vulnerability assessment with red dotted line indicating approximate extent of exposure and risk analysis.

Note: Inconsistencies in boundaries around the eastern edge of Inverloch are due to locality mapping and LGA mapping using different boundaries. This means that some values, uses and infrastructure included in the risk assessment for Bass Coast will include areas around the inlet and to the east of Inverloch locality.

³ The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported risk assessment totals and percentages are based on this sub-set of data, and do not account for entire LGA areas and assets.

3.1 Regional vulnerabilities

To set the scene for the risk assessment, an overview of the vulnerability for the Cape to Cape region to coastal hazards is considered in Table 11.

The vulnerability assessment draws on the current understanding of:

- The geographical extent and range of values, infrastructure and uses that are likely to be impacted by coastal hazards inundation, from present day to 2100
- The relative vulnerability across the region
- Exposure, sensitivity, and adaptive capacity of the region in relation to coastal hazards and climate change implications
- Discussions with DELWP and RaSP partners and the Cape to Cape community during the project, also informs the understanding of coastal hazard vulnerability for the region.

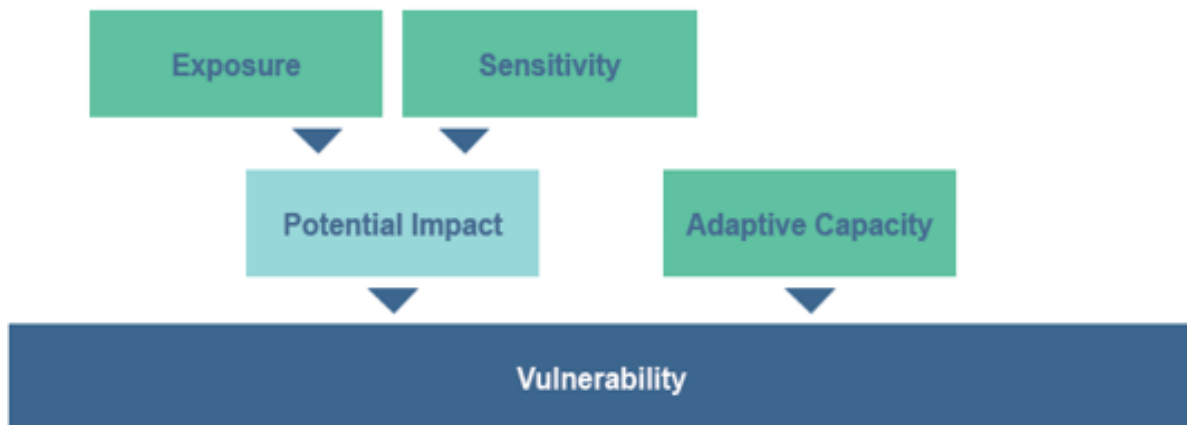


Figure 9. A high level approach for coastal hazard vulnerability assessment



Inverloch Coastal Reserve

Table 11. High level coastal hazard vulnerability assessment for the Cape to Cape region

Vulnerability criterion	Findings
Exposure <i>Exposure to coastal hazards refers to the number of values, uses/activities and infrastructure which can be potentially affected.</i>	<ul style="list-style-type: none"> - Situated around the complex and dynamic estuaries and tidal mudflats of Anderson Inlet, the Cape to Cape coastline is subject to erosion and inundation processes. These processes are driven by the offshore wind and wave climate of Bass Strait, as well as the fluvial drivers of numerous coastal creeks and wetlands spanning the coastline, and in particular, the inlet entrance. - The region is currently facing coastal hazard impacts, with the coastline at and around Inverloch experiencing significant erosion in recent years. Public assets, values and infrastructure are now at risk of damage and loss. Low lying areas across the region are also prone to coastal and riverine flooding. - Predicted changes in climate to 2100, including sea level rise (0.8 m), are likely to result in a greater area and number of built and natural assets being exposed to erosion. Exposure to increasing temporary and more permanent inundation is substantial and is anticipated across the region, especially areas facing onto Anderson Inlet. Erosion exposure is also substantial, impacting areas both on the open coast at Inverloch Surf Beach and within the inlet.
Sensitivity <i>possible consequences and impacts that coastal hazards may have on exposed values, uses/activities and infrastructure.</i>	<ul style="list-style-type: none"> - The current and the increasing extents of erosion, temporary and permanent inundation is expected to have substantial impacts for conservation and resource areas, rural areas, open space and public use areas and some residential areas. - Access to some areas and services may also be impacted, including the key thoroughfare of Bunurong Road and access to Venus Bay township. - Some natural values and coastal, estuarine and catchment ecosystem services may also be sensitive to increased extents of salt water inundation and erosion, with potential impacts (permanent change, loss) on high ecological value coastal wetlands, saltmarsh, mangroves, and others. - Other elements of sensitivity to consider are the potential disruption to the economic activities and businesses, in particular local tourism, where changes to the coastal areas may see impacts on recreation and usage and declining visitation. - Social sensitivity is mainly driven by demographics, considered in early stages of the Cape to Cape Resilience Project through the Community Values Study and Cultural Values Assessment, and community engagement throughout the project, informs the adaptation approaches.
Adaptive capacity <i>ability of systems, institutions, humans, and/or natural environments to adjust to potential damage, to take advantage of opportunities, or to respond to consequences</i>	<ul style="list-style-type: none"> - A strong broader economy of the Cape to Cape region, engaged communities, and stable political context for the region are favourable elements that underpin adaptive capacity. While tourism, with the natural environment as a key drawcard, is recognised as a key part of the region's economy and links to many local industry sectors, there is some breadth and diversity in the local economies and sectors. This is a positive indicator of the economy's adaptive capacity and resilience. - Some technological and facility limitations do exist, with limited infrastructure and services to some smaller coastal communities and rural areas. - RaSP partners already have plans in place for disaster management across the region, and have been working collaboratively to respond to current hazard risks to date. Working with key stakeholders and broader community, they can continue to build adaptive capacity. - Adaptive capacity in relation to natural assets and ecosystems is less certain and will vary between natural asset types.
Potential to benefit <i>opportunity for benefit to resulting from adaptation</i>	<ul style="list-style-type: none"> - The Cape to Cape communities are likely to benefit from the increased focus on land use planning associated with mitigating the risk of coastal hazards. - Investment into coastal hazard adaptation can enhance social and amenity values of foreshore environments as well as reduce the risk from hazards. - Additional proactive work on building adaptation into local industry, particularly in the agricultural sector, will help to build resilience and assist to safeguard the economy. - There is also scope to increase the resilience of natural ecosystems by reducing other stressors, e.g. disturbances (access, fire, etc.), and enabling opportunities for landward migration of ecosystems (removing barriers and hard structures).

3.2 Values, uses and infrastructure risk review

A review of the risk results has been completed initially for key values, uses and infrastructure including:

- Planning Scheme Zones
- Buildings and development areas
- Linear assets – coastal protection structures, transport and utilities
- Point assets – cultural sites, infrastructure and utilities
- Natural values and assets

Tabulated risk results are discussed in the following sections, with full tabulated results in Attachment B.

Results are aggregated to the three reporting localities. Collation of spatial data in GIS has allowed more detailed interpretation of the spatial distribution of risk across a smaller scale and for individual assets.

Summaries and results from the coastal hazard risk assessment have been presented in Attachment B:

Planning scheme zones and buildings

- Summary (Table 16)
- Erosion (Table 17)
- Permanent inundation (Table 18)
- Temporary inundation (Table 19)

Buildings and development areas

- Summary (Table 20)
- Erosion (Table 21)
- Permanent inundation (Table 22)
- Temporary inundation (Table 23)
- Case study: Development areas (Table 24, Table 25)

Linear assets (utilities networks and roads)

- Summary (Table 26)
- Erosion (Table 27)
- Permanent inundation (Table 28)
- Temporary inundation (Table 29)

Point features and assets (facilities, utilities networks and roads)

- Summary (Table 30)
- Erosion (Table 31)
- Permanent inundation (Table 32)
- Temporary inundation (Table 33)

Natural values and assets.

- Summary (Table 34)
- Erosion (Table 35)
- Permanent inundation (Table 36)
- Temporary inundation (Table 37)

Risk ratings have been assigned for each planning horizon and hazard type - by reporting locality (section 3.3) and some smaller areas (sub-localities) within the Inverloch locality are also considered (section 3.4). These risk summaries also considered the results of the broader risk analysis (Attachment B) and provide a more detailed appreciation of emerging risk and to inform development of adaptation response,

3.3 Risk summary: Regional

Risks have been assessed for each planning horizon and hazard type - by reporting locality. Key observations from the region-wide risk assessment include:

- **Erosion** – There is generally low risk across the region currently, with known hot spots areas in and around Inverloch. Risk then starts to increase by 2040, particularly in natural and rural open space areas. There is a notable jump in parts of the region's built up areas at risk by 2070.
- **Permanent inundation** – Current risk rating is low, with the exception of some known low-lying areas. Increasing risk will be seen in low-lying areas in the future, especially within Anderson Inlet, with risk increasing for more built-up areas by 2070. At risk land use and environmental values (including mangroves, saltmarsh and other coastal and estuarine vegetation) progressively increase out to 2100, especially in and around Anderson Inlet.
- **Temporary inundation** – Some risk is evident now, steadily increasing to 2100. There is some alignment with the existing Land Subject to Inundation Overlay (LSIO) and riverine flood mapping. However, there is a notable increase in risk by 2070 and notable exposure and risk from smaller, more frequent events (in addition to larger events).

And for each reporting locality:

- **Inverloch** – There are notable increases in coastal hazard risk at Inverloch for all three hazard types by 2070. Erosion is generally the dominant risk for Inverloch. There are known erosion hot spots in the present day, with risk significantly increasing by 2070, posing risks to built up areas and its utilities, roads, buildings and environmental values. This also puts reliable access and services at risk. This risk continues to increase out to 2100. There is also existing risk from temporary inundation, again impacting built up areas and utilities, with risk set to increase. Permanent inundation poses a lower risk now, but increases to medium risk by 2070.
- **Bass Coast Shire (ex. Inverloch)** – Temporary inundation is the dominant risk for this sub-region, with risk currently low, but increasing by 2040 and again by 2100. Risk from erosion and permanent inundation remains low, until 2100.
- **South Gippsland Shire** – Temporary inundation and permanent inundation are the dominant risks, currently at medium for each of these, increasing to significant by 2100. Risk from erosion remains low, until 2070 when it increases to medium. Temporary and permanent inundation put large areas at increasing risk, with risks to land use (including conservation and farming areas) and environmental values (including mangroves, saltmarsh and other coastal and estuarine vegetation). Key access routes and some utilities are also at risk.

An overall qualitative interpretation of the coastal hazard risk profile for the region's reporting localities is provided in Table 12. Based on the analysis completed in the exposure, vulnerability and risk assessments, this risk profile provides an appreciation of relative risk of erosion and inundation (permanent and temporary) across the Cape to Cape region and how it is likely to change from present day to 2100.

Table 12. Regional risk rating for each locality

Risk rating:					Low		Medium		Significant		High	
					Low		Med		Sign		High	
	Erosion				Permanent inundation				Temporary inundation			
Sea level	0.0 m	0.2 m	0.5 m	0.8 m	0.0 m	0.2 m	0.5 m	0.8 m	0.0 m	0.2 m	0.5 m	0.8 m
Planning horizon	Present day	2040	2070	2100	Present day	2040	2070	2100	Present day	2040	2070	2100
Inverloch	Med*	Sign*	Sign	High	Low	Low	Med	Med	Med	Med	Sign	Sign
Bass Coast Shire (ex. Inverloch)	Low	Low	Low	Med	Low	Low	Low	Med	Low	Med	Med	Sign
South Gippsland Shire	Low	Low	Med	Med	Med	Med	Sign	Sign	Med	Med	Sign	Sign

* at some locations within the area

This risk analysis provides key information on the different types of hazard risk, and the timing of the emerging risk into the future. This is important to inform appropriate adaptation measures, and the timing and sequence of implementation.

The risk profile is indicative only and intended to inform discussions around adaptation response and options that will be targeted and timed to reduce risk as part of the adaptation process (explored in later stages of resilience planning).

3.4 Risk summary: Inverloch sub-localities

In response to recent hazard exposure along Inverloch's foreshore, and the higher exposure and risk for some of these areas, the initial focus of the coastal hazard adaptation response is on the 6 km of coastline from Flat Rocks to Screw Creek. For a more detailed appreciation of emerging risk and to inform development of adaptation response, the area has been split further into six sub-localities:



Figure 10. *Inverloch sub-localities*

Table 13 provides an overall qualitative interpretation of the coastal hazard risk profile for these sub-localities along the Inverloch coast.

Similar to the regional assessment, the risk profile is indicative only and intended to inform discussions around adaptation response and actions that will be targeted and timed to reduce risk as part of the adaptation process. This includes timing and sequencing of implementation, links to other actions, and required planning.

Table 13. Risk rating for each Inverloch sub-localities

													Risk rating:			
													Low	Medium	Significant	High
	Erosion				Permanent inundation				Temporary inundation				Key values, uses and infrastructure at risk			
	Present day	2040	2070	2100	Present day	2040	2070	2100	Present day	2040	2070	2100				
	0.0m SLR	0.2 m SLR	0.5m SLR	0.8 m SLR	0.0m SLR	0.2 m SLR	0.5m SLR	0.8 m SLR	0.0m SLR	0.2 m SLR	0.5m SLR	0.8 m SLR				
1. Flat Rocks to Wreck Creek (Bunurong Rd)	Med*	Med	Sign *	Sign	Low	Low	Low	Low	Med*	Med*	Med	Med	•Temporary/permanent access disruption (roads) •Public/traffic safety •Linear infrastructure networks adjacent to road •Reduction/loss of visual amenity			
2. Inverloch Surf Beach (Bunurong Rd to Ozone St)	Med*	Med	Sign	High	Low	Low	Low	Low	Low	Med*	Med	Med	•Reduction/loss of amenity and recreation of sandy beach •Reduction/loss of hazard buffer (Surf Pde and surrounds) •Ecosystem impacts •Public utilities/infrastructure networks (incl sewerage PS) and major linear networks in road reserve, and facility impacts (Inverloch SLSC) •Temporary/permanent access disruption (roads, utilities) •Private property/asset impacts (flooding via Wreck Ck) •Private property/asset impacts (erosion at Surf Pde)			
3. Coastal reserve (Ayr Creek) – Inlet Entrance to the Glade	Low	Med*	Med*	Sign*	Low	Low	Low	Low	Med*	Med*	Med*	Med*	•Temporary/permanent access disruption (roads – Surf Pde and Ramsey Blvd, and to the reserve) •Public utilities/infrastructure networks (incl sewerage PS) •Temporary/permanent impacts to coastal reserve, access, facilities – carpark, toilet block, picnic facilities •Ecosystem impacts, including on freshwater systems •Public utilities/infrastructure networks			
4. Inverloch Boat Ramp	Low	Low **	Low**	Low **	Low	Low	Low	Med	Low	Med*	Med*	Med	•Erosion remains low provide protection structure maintained •Temporary/permanent access disruption (ramp, parking, roads) •Public utilities/infrastructure networks (incl sewerage PS) •Ramp functionality/public safety in storm and high tide events			
5. Inverloch Foreshore Dog Beach	Med*	Med*	Med	Sign	Low	Low	Low	Low	Low	Med*	Med*	Med	•Public safety risk (falling, stability) of earthen erosion scarp •Reduction/loss of amenity and recreation of dog beach •Reduction/loss of hazard buffer •Public utilities/infrastructure networks •Erosion impacts - coastal reserve and (low value) facilities •Temporary/permanent access disruption (roads) •By 2100, private property impacts (erosion - The Esplanade)			
6. Inverloch Foreshore – Holiday Park to Screw Creek	Low	Low	Low	Low	Low	Med*	Med*	Sign*	Med*	Med*	Med	Med	•Temporary/permanent access disruption (roads) •Private property and asset - flooding impacts/damages. Includes Holiday Park cabins, some new development areas. •Loss of commercial viability of foreshore camping – increasing temporary flooding (especially storm tides) and eventually permanent inundation •Public utilities/infrastructure networks (incl sewerage PS)			

* at some locations within the area
** assumes presence of coastal protection structures at boat ramp. In absence of structures, risk rating would increase.
Note: there may be some localised changes to landform since Lidar survey undertaken which may impact temporary and permanent inundation extent and flood flow paths


3.5 Risk and vulnerability of Cape to Cape community values

In addition to the region-wide and sub-locality assessment, risk and vulnerability has also been considered in relation to the community values:

	Cultural, historic and spiritual connections to the coast		Water quality that is safe and reliable for human consumption, recreational use, healthy ecosystems and primary industry
	Coastal landscapes, seascapes, character and views		Safe, reliable and ecologically sensitive access to coastal areas
	Healthy coastal and marine ecosystems		Desirable places to live, work, visit and play, with reliable public services and amenities
	Abundant and diverse native coastal and marine flora and fauna		The ability to live in a coastal community
	Natural resilience to coastal hazards and sea-level rise impacts		Clarity, consistency and confidence in foreshore management and responsibilities

As social, cultural and ecosystem vulnerability is a core element of adaptation planning this understanding is useful in informing a range of strategic adaptation actions in response to this vulnerability.

Table 14. High level coastal hazard vulnerability assessment for the values of the Cape to Cape region and its coastal areas

High-level value (from Community Values Study)	Key risk and vulnerabilities to values
 Cultural, historic and spiritual connections to the coast	<p>For the Cape to Cape region, there are culturally important sites and places that are likely to be increasingly exposed to coastal hazards, which may lead to their destruction or degradation. Some of these significant locations are sensitive and irreplaceable, and have very limited capacity to adapt, but importantly, they still retain values, even if they are physically destroyed.</p> <p>Cultural vulnerability arising due to coastal hazards must not only consider threats to known and recognised cultural sites and places, but also the region's entire natural landscape and its ecosystems. Culture and cultural identity are strongly linked to the natural landscape and reciprocal relationships Aboriginal people have with the environment, including key processes, and species of flora and fauna. Environmental change, as well as how we intervene through adaptation, have the potential to impact on these areas. Hazards and loss of some coastal areas may also influence access and the ability to connect with Country and to take part in cultural practices and ceremonies.</p> <p>Sensitive sites and connections to the region's history also extends further back in time, with numerous recognised fossil sites, through to the region's more recent European history and coastal activities. Located within and indirectly linked to coastal areas, these sites and places are increasing vulnerable and may be impacted.</p> <p>Key to managing these areas and their emerging hazard risks will be finding ways to understand and share knowledge, where culturally appropriate. This region's history – the values, acknowledged and lived experience, and the stories, enabling their continuation in future generations.</p>

High-level value (from Community Values Study)

Key risk and vulnerabilities to values



Coastal landscapes, seascapes, character and views

While shifting landscapes are part of the appeal of coastal areas to some, rapid change can raise community concern. The recent experience at Inverloch, with the loss of beach and range of values that are connected to this location - environment, recreation, lifestyle and liveability - has raised some community concern. Project hazard extents mean the region's coastal areas are become increasingly exposed to coastal hazards. Further change or loss of Inverloch Surf Beach may impact the beach vibe and coastal village feel of the region.

As these are dynamic environments that are experiencing changing conditions, it is unlikely that the beaches and coastlines can be retained in the form that our communities currently know. This will be a challenge for Cape to Cape region, similar to many coastal communities.

Shifting personal perceptions, attachment and emotions linked to the environment can be challenging. However, there are opportunities to celebrate the many things the Cape to Cape coastline has to offer. Through expanding its appeal and diversifying the coastal experience, attachment with the coastal areas can also continue to adapt and evolve with changing conditions. Importantly, community values and connection with place, including aesthetic and character, must be recognised and considered in identifying suitable management for these areas.



Healthy coastal and marine ecosystems



Abundant and diverse native coastal and marine flora and fauna

Some natural values and coastal, estuarine and catchment ecosystem services of the Cape to Cape region are currently threatened by the impacts of erosion and temporary inundation (combined storm tide and catchment), with projected extent and magnitude of impacts increasing with sea level rise. This includes impacts to the recently diminishing sandy dune systems on the open coast at Inverloch, and impacts within the inlet and the surrounding catchments, and these complex and sensitive ecosystem processes.

Conservation and resource areas account for a significant proportion of areas at risk from coastal hazards, with impacts identified from all three hazard types (erosion, temporary and permanent inundation), from current day to 2100. High ecological value areas, including significant vegetation classes, coastal wetlands, saltmarsh, mangroves – are increasingly vulnerable. This may influence biodiversity and many ecosystem functions of these terrestrial and aquatic environments, and see damage and loss of important habitat, feeding and breeding areas. It also means the recognised ecosystem services (the human benefit from the natural environment and healthy ecosystems) provided by these environments are vulnerable.

There is acknowledged uncertainty about ecosystem response, sensitivity and its ability to adapt to changing conditions (especially combined with other regional climate changes stressors). Adaptative capacity of key species may be limited, especially in locations nearer to built up areas, where infrastructure and development restrict the ability to migrate further landward, or threaten water quality and productivity.

**High-level value
(from Community Values Study)**

Key risk and vulnerabilities to values



Natural resilience to coastal hazards and sea-level rise impacts

Natural resilience offered by features of the Cape to Cape coastlines is likely to see decline in some areas into the future. This will see increasing exposure of values and assets due to decreasing natural protection. Increasing coastal hazard impacts may continue to diminish the sandy, dune system that currently provides a (narrowing) buffer to coastal hazards for areas at and adjacent to Inverloch Surf Beach. Shifts in local wind and wave climate conditions and increasing sea levels may see not only growing impacts from storm events, but changes in sediment transport process and sand supply need to replenish these areas, being permanently lost to this part of the system. Vegetation that aids shoreline stability and reduction of wave energy, on our dunes and within the Inlet (such as saltmarsh, and mangroves), are also located within hazard extents and are increasingly vulnerable.

Human intervention, such development of townships and services on previously dynamic dune systems, limits the adaptive capacity of the dunes to naturally respond and adjust to changing conditions and hazards. This includes shifting dunes and landward migration of vegetation. However, there are opportunities to strengthen and enhance our dunes systems and coastlines, vegetation communities, through adaptation, including through nature-based measures.



Water quality that is safe and reliable for human consumption, recreational use, healthy ecosystems and primary industry

Good water quality is integral to the Cape to Cape communities, its environment and ecosystems, and its economy. There are increasing inundation and erosion risks to infrastructure networks across the region, especially from 2070 onwards. This may have some significant social and environmental implications on water supply and quality. Sewerage breaks and network overflows (a possible risk for Inverloch in the future) could result in shorter, post storm-event water quality impacts, through to longer lasting effects on sensitive ecosystems and human health. Network disruption to water supply in some communities means that reliable, clean water supply is potentially vulnerable in some locations. Saline intrusion may impact private water bores such as those in Venus Bay. There may also be impacts to agriculture and local industry.

Proactive management of these current and emerging risks through monitoring, well-planned maintenance and upgrades will be needed to ensure the reliability of these at-risk networks in the longer term.



Safe, reliable and ecologically sensitive access to coastal areas

Increasing coastal hazard risks are likely to impact our ability to always retain access some areas of the Cape to Cape region and its coast. This may impact on how we use and enjoy in these areas, the activities we can do, and have broader lifestyle implications. There are roads currently experiencing some occasional, temporary disruption. These temporary access disruptions are likely to increase in frequency and extent in the longer term. There are also some areas where road network access may be more permanently disrupted through complete loss of the road due erosion (i.e. Bunurong Road), or through rising sea levels (i.e. Inverloch-Venus Bay Road). Many coastal facilities, trails and beach access point are also increasing exposed.

Linked closely to access are public safety implications, during and following storm events. Flood waters pose a very high risk to public safety – driving through flood waters, water contamination. Access to previously public areas may become unsafe as a result of coastal hazards. This includes steep and unstable erosion scarps, complete loss of land/beach, cliff and land instability and building and infrastructure damage.

**High-level value
(from Community Values Study)**

Key risk and vulnerabilities to values



Desirable places to live, work, visit and play, with reliable public services and amenities

For many living in the Cape to Cape region, proximity to the coast is a key drawcard. However, it also means possible exposure to coastal processes and the effects of climate change into the future. This sees impacts on public and private assets, coastal and community values and the use and enjoyment of these coastal and marine areas. Current and increasing inundation and erosion hazards pose risks across the region, particularly for built-up, developed areas of the region, including the services and facilities that support these communities and their visitors. Areas around Inverloch Surf Lifesaving Club, Wreck Creek, Surf Parade and the eastern end of Bunurong Road and some coastal reserve /open space areas have recently been experiencing coastal hazard impacts. This vulnerability is expected to increase.



The ability to live in a coastal community

Coastal hazards have the potential to impact tourism and the broader local economy, in particular the change/loss of the Surf Beach, with possible impacts on recreation and usage and declining visitation to the region.

A significant number of buildings are at risk of coastal hazards impacts into the future, particularly in Inverloch. In some areas, homes are vulnerable to both erosion and inundation risks, while other areas the hazard risk is to erosion, or to inundation. This may mean increasing impacts for private asset owners – such as asset damage/loss following an event, along with potential implications on house prices, insurance premiums and development approvals, along with disruption to the services that connect to these properties. Coastal reserve and open space areas enjoyed by the community are increasingly at risk, as are some residential areas.

Parts of all infrastructure network (drainage, water, gas, electricity, sewerage and telecommunications) that support each coastal community are increasingly at risk across the region, especially from 2070 onwards. These utility network impacts may result in disruption to service supply for the parts of the broader community (including local business and industry), not just the nearby properties within hazard areas. Similarly, the road network is increasingly vulnerable, from an individual property/site scale through to significant township access roads.

Future service reliability of these networks has some significant implications on liveability, safety and appeal of living in these communities. Proactive management of these current and emerging risks through well-planned maintenance and upgrades will be needed to ensure the long-term reliability of these at-risk networks.

The adaptive capacity of existing infrastructure networks is considered moderate, while future networks have a higher adaptive capacity. However, any maintenance, upgrade and extension to the network provides an opportunity to increase the resilience of the network – through either avoiding risk or managing the risk. Proactive management of these current and emerging risks through well-planned maintenance and upgrades will be needed to ensure the reliability of these at-risk networks in the longer term.



Clarity, consistency and confidence in foreshore management and responsibilities

The risk assessment shows multiple values, uses and assets are vulnerable to exposure from coastal hazards. This includes public and private infrastructure owned and managed by multiple agencies and organisations.

Coordination and strong partnerships, working collaboratively to manage emerging risks will be important for successful management. Reactive management can create panic and tensions that can be unsettling for cohesive working relationships, and can result in poor decision making. Planned, proactive management approaches provide the time to work through appropriate adaptation pathways and resolve any perceived challenges and barriers.

4 Next steps

Outcomes

Key outcomes from the risk and vulnerability assessment include:

- Consequence assigned to all collated assets in the database
- Risk (likelihood x consequence) assessed for built and natural assets at the regional and locality scales, for multiple planning horizons.
- An understanding of the risk profile for the different localities of the Cape to Cape region and for sub-localities at Inverloch.

The next stages of the Cape to Cape Resilience Project will utilise the outcomes of the risk and vulnerability assessment to explore the strategic adaptation response and associated adaptation action development to manage risk across the Cape to Cape region. Stage 1 of the Cape to Cape Resilience Project makes a start on some preliminary thinking and strategic adaptation, with Stage 2 to build upon all the work to date.

Working with RaSP stakeholders and combined with community engagement, this assessment will guide strategic thinking, and guide further assessments (including coastal modelling and economic assessment) that will help inform decision making on longer-term adaptation pathways and a Resilience Plan for the region.

5 References

Alluvium 2021, Cape to Cape Resilience Project Community Values Study - Engagement Report - Values and Experiences, Victoria, October 2021.

Alluvium 2021, Cape to Cape Resilience Project Engagement Plan, Victoria, March 2021.

Alluvium 2022, Cape to Cape Resilience Project - Adaptation Framework Summary Paper, Victoria, June 2022.

Alluvium 2022, Cape to Cape Resilience Project - Adaptation Engagement Outcomes, Victoria, October 2021.

Bunurong Land Council Aboriginal Corporation 2021, BLCAC Cultural Values Assessment: Cape to Cape Project, Victoria, December 2021.

DELWP 2021, Inverloch Regional and Strategic Partnership Project Plan, Victoria, March 2021.

DELWP 2021, Risk Management Guidelines. Prepared by Department of Land, Water and Planning

DELWP 2022, Victoria's Resilient Coast – Adapting for 2100+: Pilot Guidelines – A statewide approach to coastal hazard risk management and adaptation. Prepared by Department of Land, Water and Planning.

Inverloch RaSP Stage 2- TBC 2023

Inverloch RaSP Stage 2-& Partner Agencies TBC 2023 onwards

Inverloch RaSP TBC 2023 onwards

Natural Capital Economics & Alluvium, 2022, Cape to Cape Resilience Project – Economics Assessment, June 2022.

Rosengren, N. & Miner, T., 2021, Inverloch Region Coastal Hazard Assessment – Coastal Geomorphology, Appendix A in Water Technology 2022c, Inverloch Region Coastal Hazard Assessment Report 3: Technical Methodology, Victoria, 2021.

Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 1 - Project Summary Report, Victoria, June 2022.

Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 2 - Data Assimilation and Gap Analysis, Victoria, June 2022.

Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 3 - Technical Methodology , Victoria, June 2022.

Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 4 - Coastal Processes and Erosion Hazards , Victoria, June 2022.

Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 5 - Inundation Hazards, Victoria, June 2022.

Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 6 - Coastal Hazard Asset Exposure Assessment, Victoria, June 2022.

Water Technology 2022, Inverloch Region Coastal Hazard Assessment - Report 7 - Adaptation Assessment, Victoria June 2022

Table 15. Assigned consequences for all asset types - for erosion and temporary flooding

Geometry	Class	Detail	Detail desciprtion	Erosion / Perm inund. consequence	Temp. flooding consequence
Polygon	Beach and foreshore assets	Community space	Caravan park	Moderate	Minor
Polygon	Beach and foreshore assets	Community space	Parking area	Minor	Negligible
Polygon	Beach and foreshore assets	Education centre	Education complex	Major	Moderate
Polygon	Beach and foreshore assets	Excavation site	Quarry	Moderate	Minor
Polygon	Beach and foreshore assets	Power facility	Power sub station	Major	Moderate
Polygon	Beach and foreshore assets	Recreational resource	Skate park	Minor	Negligible
Polygon	Beach and foreshore assets	Recreational resource	BMX track	Minor	Negligible
Polygon	Beach and foreshore assets	Reserve	Conservation park	Moderate	Moderate
Polygon	Beach and foreshore assets	Reserve	Cemetery	Major	Moderate
Polygon	Beach and foreshore assets	Residential building	Retirement village	Major	Moderate
Polygon	Beach and foreshore assets	Sporting facility	Golf course	Minor	Negligible
Polygon	Beach and foreshore assets	Sporting facility	Sports ground	Minor	Negligible
Polygon	Beach and foreshore assets	Sporting facility	Netball court	Minor	Negligible
Polygon	Beach and foreshore assets	Sporting facility	Bowling green	Minor	Negligible
Polygon	Beach and foreshore assets	Sporting facility	Tennis court	Minor	Negligible
Polygon	Beach and foreshore assets	Sporting facility	Sports complex	Moderate	Minor
Linear	Coastal protection structures	Breakwater		Major	Major
Linear	Coastal protection structures	Coastal levees	Levee	Major	Moderate
Linear	Coastal protection structures	Retaining wall	Retaining wall	Major	Moderate
Linear	Coastal protection structures	Revetment	Revetment	Major	Major
Linear	Coastal protection structures	Sea Wall	Sea Wall	Major	Moderate
Linear	Coastal protection structures	Seawall	Seawall	Major	Moderate
Linear	Coastal protection structures	Wharf	Wharf	Moderate	Moderate
Polygon	Buildings	Building footprints	Unknown	Moderate	Minor
Polygon	Buildings	Building footprints	Blank	Moderate	Minor
Polygon	Buildings	Building footprints	Commercial 1 zone	Major	Moderate
Polygon	Buildings	Building footprints	Commercial 2 zone	Major	Moderate
Polygon	Buildings	Building footprints	Farming zone	Moderate	Minor
Polygon	Buildings	Building footprints	General residential zone - schedule 1	Major	Moderate
Polygon	Buildings	Building footprints	Industrial 1 zone	Major	Moderate
Polygon	Buildings	Building footprints	Industrial 3 zone	Major	Moderate
Polygon	Buildings	Building footprints	Low density residential zone	Major	Moderate
Polygon	Buildings	Building footprints	Mixed use zone	Moderate	Moderate
Polygon	Buildings	Building footprints	Public conservation and resource zone	Moderate	Moderate
Polygon	Buildings	Building footprints	Public park and recreation zone	Moderate	Minor
Polygon	Buildings	Building footprints	Public use zone - cemeter/crematorium	Major	Moderate
Polygon	Buildings	Building footprints	Public use zone - education	Major	Moderate
Polygon	Buildings	Building footprints	Public use zone - health and community	Major	Major
Polygon	Buildings	Building footprints	Public use zone - local government	Moderate	Moderate
Polygon	Buildings	Building footprints	Public use zone - service and utility	Major	Moderate
Polygon	Buildings	Building footprints	Road zone - category 1	Moderate	Minor
Polygon	Buildings	Building footprints	Rural activity zone	Major	Moderate
Polygon	Buildings	Building footprints	Rural conservation zone	Moderate	Moderate
Polygon	Buildings	Building footprints	Rural living zone	Major	Moderate
Polygon	Buildings	Building footprints	Special use zone - schedule 5	Moderate	Moderate
Polygon	Buildings	Building footprints	Special use zone - schedule 7	Moderate	Moderate
Polygon	Buildings	Building footprints	Township zone	Major	Moderate
Point	Cultural	Important sites	Artefact Scatter	Major	Moderate
Point	Cultural	Important sites	Shell Midden	Major	Moderate
Point	Cultural	Important sites	Stone Feature	Major	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Blank	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Coastal barriers	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Dissected Plains	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Flood plains and morasses	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Hills and low hills	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Plains with dunes	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Plains without dunes	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Prior stream plains	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Ranges	Moderate	Minor
Polygon	Environmental	Groundwater dependant ecosystems	Tidal	Minor	Negligible
Polygon	Environmental	Significant terrestrial vegetation	Swamp Scrub	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Sandy beach	Major	Minor
Polygon	Environmental	Significant terrestrial vegetation	Sand healthland/wet healthland Mosaic	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Wet Heathland	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Swampy Riparian Woodland	Moderate	Negligible

Geometry	Class	Detail	Detail desciprtion	Erosion / Perm inund. consequence	Temp. flooding consequence
Polygon	Environmental	Significant terrestrial vegetation	Riparian Scrub	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Mangrove Shrubland	Moderate	Negligible
Polygon	Environmental	Significant terrestrial vegetation	Lowland Forest	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Heathy Woodland	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Grassy woodland/swamp scrub mosaic	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Estuarine wetland/estuarine swamp scrub mosaic	Moderate	Negligible
Polygon	Environmental	Significant terrestrial vegetation	Damp sands herb-rich woodland/swamp srub complex	Moderate	Moderate
Polygon	Environmental	Significant terrestrial vegetation	Damp sands herb-rich woodland/swamp srub mosaic	Moderate	Moderate
Polygon	Environmental	Significant terrestrial vegetation	Damp sands herb-rich woodland	Moderate	Moderate
Polygon	Environmental	Significant terrestrial vegetation	Damp heathy woodland/lowland forest mosaic	Moderate	Moderate
Polygon	Environmental	Significant terrestrial vegetation	Damp forest	Moderate	Moderate
Polygon	Environmental	Significant terrestrial vegetation	Coastal tussock grassland	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Coastal saltmarsh	Moderate	Negligible
Polygon	Environmental	Significant terrestrial vegetation	Coastal Headland Scrub	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Coastal dune scrub/coastal dune grassland mosaic	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Coastal banksia woodland/coastal dune scrub mosaic	Moderate	Minor
Polygon	Environmental	Significant terrestrial vegetation	Coast Banksia Woodland	Moderate	Minor
Polygon	Environmental	National Parks	Marine national park	Moderate	Minor
Polygon	Environmental	Wetlands	Estuary	Minor	Negligible
Polygon	Environmental	Wetlands	Coastal saltmarsh	Moderate	Negligible
Polygon	Environmental	Wetlands	Permanent freshwater lakes	Moderate	Moderate
Polygon	Environmental	Wetlands	Temporary freshwater lakes	Moderate	Moderate
Polygon	Environmental	Wetlands	Temporary freshwater swamps	Moderate	Moderate
Polygon	Environmental	Wetlands	Temporary saline swamps	Moderate	Negligible
Polygon	Environmental	Wetlands	Unknown	Moderate	Minor
Polygon	Environmental	Coarse sediment		Negligible	Negligible
Polygon	Environmental	Hard substrata		Negligible	Negligible
Polygon	Environmental	Mangroves		Moderate	Negligible
Polygon	Environmental	Mixed biota		Minor	Negligible
Polygon	Environmental	Mixed hard/soft substrata		Negligible	Negligible
Polygon	Environmental	Mixed macrophytes		Minor	Negligible
Polygon	Environmental	Mixed soft substrata		Negligible	Negligible
Polygon	Environmental	Saltmarsh		Moderate	Negligible
Polygon	Environmental	Sand		Negligible	Negligible
Polygon	Environmental	Seagrass		Negligible	Negligible
Polygon	Environmental	Soft substrata		Negligible	Negligible
Polygon	Infrastructure	Open space/parks		Minor	Negligible
Point	Infrastructure	Surf lifesaving clubs		Major	Moderate
Point	Infrastructure	Community facilities		Moderate	Minor
Point	Infrastructure	Playgrounds		Minor	Negligible
Point	Infrastructure	BBQ		Minor	Negligible
Polygon	Planning and landuse	Commercial services		Moderate	Minor
Polygon	Planning and landuse	Cropping		Moderate	Minor
Polygon	Planning and landuse	General purpose factory		Moderate	Minor
Polygon	Planning and landuse	Grazing modified pastures		Moderate	Minor
Polygon	Planning and landuse	Manufacturing and industrial		Moderate	Minor
Polygon	Planning and landuse	Natural feature protection		Moderate	Minor
Polygon	Planning and landuse	Navigation and communication		Moderate	Minor
Polygon	Planning and landuse	Other conserved area		Moderate	Moderate
Polygon	Planning and landuse	Plantation forests		Moderate	Minor
Polygon	Planning and landuse	Production nurseries		Moderate	Minor
Polygon	Planning and landuse	Protected landscape		Major	Major
Polygon	Planning and landuse	Strict nature reserves		Moderate	Minor
Polygon	Planning and landuse	Public services		Moderate	Moderate
Polygon	Planning and landuse	Recreation and culture		Moderate	Minor
Polygon	Planning and landuse	Roads		Moderate	Minor
Polygon	Planning and landuse	Urban residential		Major	Moderate
Polygon	Planning and landuse	Rural residential without agriculture		Major	Moderate
Polygon	Planning and landuse	Rural residential with agriculture		Major	Moderate
Polygon	Planning and landuse	Parks & Reserves		Moderate	Minor
Polygon	Planning and landuse	Bushfire Management Overlay		Negligible	Negligible
Polygon	Planning and landuse	Design And Development Overlay		Minor	Minor
Polygon	Planning and landuse	Development Plan Overlay		Minor	Minor
Polygon	Planning and landuse	Environmental Significance Overlay		Moderate	Moderate
Polygon	Planning and landuse	Heritage Overlay		Moderate	Moderate
Polygon	Planning and landuse	Land Subject To Innundation Overlay		Moderate	Negligible
Polygon	Planning and landuse	Restructure Overlay		Minor	Negligible
Polygon	Planning and landuse	Significant Landscape Overlay		Moderate	Minor

Geometry	Class	Detail	Detail description	Erosion / Perm inund. consequence	Temp. flooding consequence
Polygon	Planning and landuse	Vegetation Protection Overlay		Moderate	Minor
Polygon	Planning and landuse	Commercial 1 zone		Major	Moderate
Polygon	Planning and landuse	Commercial 2 zone		Major	Moderate
Polygon	Planning and landuse	Comprehensive development zone – schedule 1		Moderate	Minor
Polygon	Planning and landuse	Farming zone		Moderate	Minor
Polygon	Planning and landuse	General residential zone - schedule 1		Major	Moderate
Polygon	Planning and landuse	Industrial 1 zone		Major	Moderate
Polygon	Planning and landuse	Industrial 3 zone		Major	Moderate
Polygon	Planning and landuse	Low density residential zone		Major	Moderate
Polygon	Planning and landuse	Mixed use zone		Moderate	Moderate
Polygon	Planning and landuse	Public conservation and resource zone		Moderate	Moderate
Polygon	Planning and landuse	Public park and recreation zone		Moderate	Minor
Polygon	Planning and landuse	Public use zone - cemetery/crematorium		Major	Moderate
Polygon	Planning and landuse	Public use zone - education		Major	Moderate
Polygon	Planning and landuse	Public use zone - health and community		Major	Major
Polygon	Planning and landuse	Public use zone - local government		Moderate	Moderate
Polygon	Planning and landuse	Public use zone - other public use		Moderate	Minor
Polygon	Planning and landuse	Public use zone - service and utility		Major	Moderate
Polygon	Planning and landuse	Public use zone - transport		Minor	Minor
Polygon	Planning and landuse	Road zone - category 1		Moderate	Minor
Polygon	Planning and landuse	Road zone - category 2		Moderate	Minor
Polygon	Planning and landuse	Rural activity zone		Moderate	Minor
Polygon	Planning and landuse	Rural conservation zone		Moderate	Moderate
Polygon	Planning and landuse	Rural living zone		Major	Moderate
Polygon	Planning and landuse	Special use zone - schedule 5		Moderate	Moderate
Polygon	Planning and landuse	Special use zone - schedule 7		Moderate	Moderate
Polygon	Planning and landuse	Township zone		Major	Moderate
Polygon	Planning and landuse	Flow paths	Connector river	Moderate	Minor
Polygon	Planning and landuse	Flow paths	Connector stream	Moderate	Minor
Polygon	Planning and landuse	Flow paths	Watercourse channel drain	Moderate	Minor
Polygon	Planning and landuse	Flow paths	Watercourse stream	Moderate	Minor
Polygon	Transport	Pathways		Moderate	Minor
Polygon	Transport	Boat Ramps		Major	Minor
Polygon	Transport	Beach access points/tracks	Boardwalk	Minor	Negligible
Polygon	Transport	Beach access points/tracks	Ramp	Minor	Negligible
Polygon	Transport	Beach access points/tracks	Viewing platform	Minor	Negligible
Polygon	Transport	Beach access points/tracks	Other	Minor	Negligible
Polygon	Transport	Beach access points/tracks	In ground stairs	Minor	Negligible
Polygon	Transport	Beach access points/tracks	Elevated stairs	Minor	Negligible
Polygon	Transport	Beach access points/tracks	Solid stairs	Minor	Negligible
Polygon	Transport	Jetties		Moderate	Minor
Linear	Transport	Road		Moderate	Minor
Linear	Transport	Road	Trail	Moderate	Minor
Polygon	Utilities	Drainage network	Culverts	Minor	Negligible
Polygon	Utilities	Drainage network	Detention basins	Moderate	Minor
Polygon	Utilities	Drainage network	Water Sensitive Urban Design (WSUD)	Minor	Minor
Point	Utilities	Electricity	Poles	Minor	Negligible
Point	Utilities	Drainage network	Outfalls	Minor	Negligible
Point	Utilities	Drainage network	Pits	Minor	Negligible
Point	Utilities	Sewerage	Pipe valve	Minor	Negligible
Point	Utilities	Sewerage	Node	Moderate	Minor
Point	Utilities	Telecommunications		Moderate	Minor
Linear	Utilities	Drainage network	Pipes	Moderate	Minor
Linear	Utilities	Drinking Water	Drinking Water	Major	Moderate
Linear	Utilities	Electricity	Electricity - other	Moderate	Minor
Linear	Utilities	Sewerage	Sewerage - pipes	Moderate	Moderate
Linear	Utilities	Telecommunications	Telecommunications	Moderate	Minor
Polygon	Utilities	Sewerage	Pump station	Moderate	Moderate
Polygon	Utilities	Sewerage	Waste Water Treatment Plant (WWTP)	Major	Moderate
Linear	Utilities	Gas pipeline		Moderate	Minor

Planning scheme zones

Table 16. Key observations of risk results for planning scheme zones

Risk rating:

Low

Medium

Significant

High

	Erosion	Permanent Inundation (frequent flooding by tides)	Temporary inundation (combined storm tide and catchment flooding)
Region-wide	<ul style="list-style-type: none">Planning scheme zones at greatest risk from erosion are those associated with public open space, parks, conservation and resourcesZones increasingly impacted include road, rural activity, farming, and general residential zones.The risk to these zones is further reflected in other asset categories (e.g. transport, infrastructure and buildings)	<ul style="list-style-type: none">Planning scheme zones at risk from permanent inundation similar to erosion, include recreation, open space and park zones with 14-43% of the public conservation and resource zone at risk by 2100.The risk to these zones is further reflected in other asset categories (e.g. transport, infrastructure and buildings).	<ul style="list-style-type: none">Nearly all the planning scheme zone categories are exposed to temporary inundation, some in high proportions. However risk is generally lower due to the lower consequence of temporary inundation.Zones at significant risk include public and rural conservation and resource, residential, public use, special use, rural living and township zone.The risk to these zones is further reflected in other asset categories (e.g. transport, infrastructure and buildings).
Inverloch	<ul style="list-style-type: none">Around 23-37% of public open space, parks, conservation and resources are exposed in present day, increasing to 41-67% by 2100. Two thirds of public parks and recreation zones in Inverloch have a medium or significant risk of erosion by 2100.Approximately 3% of general residential zones are at medium to significant risk to erosion by 2040, increasing to 10% by 2070 and 13% by 2100.	<ul style="list-style-type: none">For Inverloch, public open space, parks, conservation and resources, and farming zones most at risk from permanent inundation. Around 22% conservation and resource zones are exposed in present day, steadily increasing to over 32% by 2100, with almost 500 Ha exposed.Approximately 4% of public open space, parks zones are at significant risk for present day, increasing to over 14% by 2100.Some farming zones are increasingly impacted, with up to 1.6 % (almost 800 Ha) at significant risk by 2100.Some residential areas are increasingly impacted, with 2% of the general residential zone at high risk by 2100, especially to the eastern side Inverloch township	<ul style="list-style-type: none">For Inverloch, parks and recreation, conservation and resource, residential, rural and special use zones were the larger areas exposed to temporary inundation.Around 38% of parks and recreation zone is currently at medium to significant risk, steadily increasing to ~49% by 2100, while 46% of conservation and resource zone is currently at medium to significant risk, but then remains relatively constant out to 2100 (47%).
South Gippsland	<ul style="list-style-type: none">Less than 5% of public open space, parks, conservation and resources are exposed in present day, which remains relatively constant, increasing through to 9% by 2100. These exposed areas have significant risk of erosion, from present day to 2100.Risk for rural areas, in particular rural living zone, while low at present, see a notable increase between 2040 and 2070, with <1% to over 10% at significant to high erosion risk. By 2100, this increases to over a third of these areas, to almost 35%.	<ul style="list-style-type: none">Farming and conservation and resource zones account are the largest impacted areas (but with relative small percentages due large portions of these zones accounted for in this reporting region).Risk of permanent inundation to farming areas, for present day are 2% at significant risk, 7% by 2100. However, this corresponds to large, exposed areas, with almost 600 Ha at risk for present day, increasing to 2300 Ha by 2100.Similarly, less than 6% of public open space, parks, conservation and resources are exposed in present day, steadily increasing to almost 15% by 2100. This sees almost 200 Ha at risk for present day, increasing to 400 Ha by 2100.Risk to rural areas, in particular rural living zone, for present day are 18% at high risk, notable increasing to 35% by 2040, 53% by 2070 and 62% by 2100.Exposure increases in other important zones from 2040 onwards, such as township and public use zones, with the high consequence of permanent inundation in these zones driving high risk.	<ul style="list-style-type: none">Notably, South Gippsland sees significant risk in low density residential (44% by 2100) and rural living (77% by 2100) zones. For many open space and conservation zones, exposure to temporary inundation is already high in the present day.Farming zone account for largest areas exposed, with 11% currently exposed and 9% (over 2800 Ha) at medium risk or above, increasing to 13% exposed and 12% (almost 3700 Ha) at medium risk or above by 2100
Bass Coast	<ul style="list-style-type: none">Around 17-18% of public open space, parks, conservation and resources are exposed in present day, which remains relatively constant through to 2100. These areas have significant risk of erosion, from present day to 2100 with majority of exposure driven by present day erosion hazards.	<ul style="list-style-type: none">Approximately 32% of Bass reporting region’s public open space, parks, conservation and resources are exposed in present day, steadily increasing to over 43% by 2100. This sees almost 550 Ha at risk for present day, increasing to ~750 Ha by 2100.While present day exposure is limited, some farming zones are increasingly impacted, with up to 2.3 % (almost 600 Ha) at significant risk by 2100.	<ul style="list-style-type: none">Farming and conservation and resource zones account for largest impacted areas. Almost 32% (55 Ha) of the conservation and resource zone is currently at significant risk, increasing to 43% (75 Ha) by 2100. Less than 1% of farming zone is currently at medium risk or above, increasing to ~5% (120 Ha) by 2100.

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Assessment has been based on best available local Planning Scheme data at time of data gathering and analysis (2021). It does not include recent amendments, including Amendment VC205 regarding Transport Zones.
- Hazard extents and exposure results assume there are no adaptation measures

Table 17. Risk results (erosion) for planning scheme zones – total area at risk, and % at risk relative to total area in the reporting region

Table 17. Risk results (erosion) for planning scheme zones – total area at risk, and % at risk relative to total area in the reporting region																				Risk rating:				Low		Medium		Significant		High			
		Low				Med				Sign				High																			
Planning scheme zone	Total area (m²)	Erosion																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Bass																																	
COMMERCIAL 1 ZONE	9,333.6																																
COMMERCIAL 2 ZONE	314,656.4																																
COMPREHENSIVE DEVELOPMENT ZONE - SCHEDULE 1	338,039.1																																
FARMING ZONE	25,128,201.4																																
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	1,238,012.4																																
INDUSTRIAL 1 ZONE	365,925.5																																
PUBLIC CONSERVATION AND RESOURCE ZONE	1,730,605.6		183.4	302,326.7		0.0%	17.5%			165.8	304,795.3			0.0%	17.6%				306,710.2			17.7%				231.6	308,402.1		0.0%	17.8%			
PUBLIC PARK AND RECREATION ZONE	1,320,775.3		13.8	1,843.5		0.0%	0.1%			66.4	1,910.1			0.0%	0.1%				2,089.8			0.2%					2,116.7				0.2%		
PUBLIC USE ZONE - SERVICE AND UTILITY	127,037.8																																
ROAD ZONE - CATEGORY 1	415,920.1			1,598.8			0.4%				1,838.2				0.4%				0.0	1,838.2			0.0%	0.4%			0.0	1,838.2		0.0%	0.4%		
ROAD ZONE - CATEGORY 2	34,093.0																																
RURAL ACTIVITY ZONE	4,260,463.4																																
RURAL LIVING ZONE	226,513.8																																
Inverloch																																	
COMMERCIAL 1 ZONE	44,226.4																																
FARMING ZONE	48,463,845.2			61,310.6			0.1%			0.0	98,949.1			0.0%	0.2%				173,459.8			0.4%				0.0	266,051.7		0.0%	0.5%			
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	5,222,135.4									180,020.9	1,584.3	548.7		3.4%	0.0%	0.0%		553,882.2	5,274.9	22,189.6		10.6%	0.1%	0.4%		635,378.2	5,600.6	67,038.4	12.2%	0.1%	1.3%		
INDUSTRIAL 3 ZONE	90,998.2																																
LOW DENSITY RESIDENTIAL ZONE	170,516.9																																
MIXED USE ZONE	18,463.7																		9.6			0.1%				869.8				4.7%			
PUBLIC CONSERVATION AND RESOURCE ZONE	1,520,665.4		2,203.1	568,722.8		0.1%	37.4%			4,163.8	591,756.7			0.3%	38.9%			1,183.3	617,213.3		0.1%	40.6%				3,323.7	627,530.2		0.2%	41.3%			
PUBLIC PARK AND RECREATION ZONE	621,721.9		4,148.5	139,895.0		0.7%	22.5%			134,497.2	191,791.5			21.6%	30.8%			140,130.5	243,256.1		22.5%	39.1%				129,717.8	286,445.2		20.9%	46.1%			
PUBLIC USE ZONE - CEMETERY/CREMATORIUM	37,330.9																																
PUBLIC USE ZONE - EDUCATION	20,165.4																																
PUBLIC USE ZONE - HEALTH AND COMMUNITY	2,366.8																																
PUBLIC USE ZONE - LOCAL GOVERNMENT	29,006.2																																
PUBLIC USE ZONE - OTHER PUBLIC USE	5,904.5																																
PUBLIC USE ZONE - SERVICE AND UTILITY	1,250,646.7																		4,715.6			0.4%				4,715.6				0.4%			
PUBLIC USE ZONE - TRANSPORT	5,753.9																	1,449.5			25.2%					1,450.0			25.2%				
ROAD ZONE - CATEGORY 1	1,136,795.0		871.3	10,387.2		0.1%	0.9%			33,879.8	23,216.7			3.0%	2.0%			24,270.4	40,896.2		2.1%	3.6%				23,876.0	49,372.4		2.1%	4.3%			
ROAD ZONE - CATEGORY 2	36,271.0																																
RURAL ACTIVITY ZONE	9,464,187.1									48,627.7	993.0			0.5%	0.0%			161,882.0	10,464.9		1.7%	0.1%				190,558.1	29,982.5		2.0%	0.3%			
RURAL LIVING ZONE	860,386.1																																
SPECIAL USE ZONE - SCHEDULE 5	313,789.7									1,699.8				0.5%				35,324.8	33.0		11.3%	0.0%				69,087.1	2,418.4		22.0%	0.8%			
South Gippsland																																	
COMMERCIAL 1 ZONE	2,270.4																																
FARMING ZONE	309,231,488.9			16,152.7			0.0%				34,305.9				0.0%				69,926.1			0.0%				0.0	109,614.4		0.0%	0.0%			
LOW DENSITY RESIDENTIAL ZONE	370,821.9																																
PUBLIC CONSERVATION AND RESOURCE ZONE	32,755,151.3		28,320.6	1,401,956.5		0.1%	4.3%			29,062.3	1,806,851.3			0.1%	5.5%			29,497.3	2,444,569.7		0.1%	7.5%				30,132.6	3,054,471.2		0.1%	9.3%			
PUBLIC PARK AND RECREATION ZONE	625,521.8																																
PUBLIC USE ZONE - CEMETERY/CREMATORIUM	39,211.4																																
PUBLIC USE ZONE - SERVICE AND UTILITY	159,293.1																																
ROAD ZONE - CATEGORY 1	1,155,627.1																																
ROAD ZONE - CATEGORY 2	1,048,353.7																																
RURAL CONSERVATION ZONE	2,007,420.2										136.0			0.0%					11,282.9			0.6%				34,719.8				1.7%			
RURAL LIVING ZONE	158,141.2				166.0			0.1%				507.6				0.3%			0.0	16,748.2		0.0%	10.6%			0.0	52,475.5		0.0%	33.2%			
SPECIAL USE ZONE - SCHEDULE 7	79,809.4																																
TOWNSHIP ZONE	2,693,013.5																																
Grand total	455,150,877.5		35,740.8	2,504,193.8	166.0	0.0%	0.6%	0.0%		432,183.8	3,058,128.2	1,056.3	0.1%	0.7%	0.0%	1,449.5	950,895.8	3,927,015.1	38,937.8	0.0%	0.2%	0.9%	0.0%	1,450.0	1,087,890.5	4,778,563.4	119,514.0	0.0%	0.2%	1.0%	0.0%		

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Assessment has been based on best available local Planning Scheme data at time of data gathering and analysis (2021). It does not include recent amendments, including Amendment VC205 regarding Transport Zones.
- Hazard extents and exposure results assume there are no adaptation measures

Table 18. Risk results (permanent inundation) for planning scheme zones – total area at risk, and % at risk relative to total area in the reporting region

Risk rating:

Low

Medium

Significant

High

Low

Med

Sign

High

Planning scheme zone	Total area (m²)	Permanent Inundation																																			
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR											
		m²				% of total				m²				% of total				m²				% of total				m²				% of total							
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High						
Bass																																					
COMMERCIAL 1 ZONE	9,333.6																																				
COMMERCIAL 2 ZONE	314,656.4																																				
COMPREHENSIVE DEVELOPMENT ZONE - SCHEDULE 1	338,039.1																																				
FARMING ZONE	25,128,201.4			43,169.9				0.2%				85,623.3				0.3%				317,874.1				1.3%					586,192.9			2.3%					
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	1,238,012.4																																				
INDUSTRIAL 1 ZONE	365,925.5																																				
PUBLIC CONSERVATION AND RESOURCE ZONE	1,730,605.6			548,220.5				31.7%				610,000.7				35.2%				706,849.2				40.8%					745,053.9			43.1%					
PUBLIC PARK AND RECREATION ZONE	1,320,775.3			1,562.3				0.1%				1,825.4				0.1%				1,825.8				0.1%					2,041.7			0.2%					
PUBLIC USE ZONE - SERVICE AND UTILITY	127,037.8																																				
ROAD ZONE - CATEGORY 1	415,920.1																																				
ROAD ZONE - CATEGORY 2	34,093.0																																				
RURAL ACTIVITY ZONE	4,260,463.4																																				
RURAL LIVING ZONE	226,513.8																																				
Inverloch																																					
COMMERCIAL 1 ZONE	44,226.4																																				
FARMING ZONE	48,463,845.2			117,184.4				0.2%				262,546.8				0.5%				526,003.3				1.1%					797,027.4			1.6%					
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	5,222,135.4				15,492.8				0.3%				27,790.5				0.5%				73,618.4				1.4%					-	111,718.8			2.1%			
INDUSTRIAL 3 ZONE	90,998.2																																				
LOW DENSITY RESIDENTIAL ZONE	170,516.9																																				
MIXED USE ZONE	18,463.7																																				
PUBLIC CONSERVATION AND RESOURCE ZONE	1,520,665.4			329,852.6				21.7%				361,812.6				23.8%				423,554.5				27.9%					491,050.5			32.3%					
PUBLIC PARK AND RECREATION ZONE	621,721.9			25,430.0				4.1%				31,416.9				5.1%				56,932.7				9.2%					89,810.7			14.4%					
PUBLIC USE ZONE - CEMETERY/CREMATORIUM	37,330.9																																				
PUBLIC USE ZONE - EDUCATION	20,165.4																																				
PUBLIC USE ZONE - HEALTH AND COMMUNITY	2,366.8																																				
PUBLIC USE ZONE - LOCAL GOVERNMENT	29,006.2			0.0				0.0%				1.4				0.0%				38.7				0.1%					208.3			0.7%					
PUBLIC USE ZONE - OTHER PUBLIC USE	5,904.5																																				
PUBLIC USE ZONE - SERVICE AND UTILITY	1,250,646.7																																				
PUBLIC USE ZONE - TRANSPORT	5,753.9																																				
ROAD ZONE - CATEGORY 1	1,136,795.0			421.7				0.0%				922.5				0.1%				3,410.5				0.3%					8,583.7			0.8%					
ROAD ZONE - CATEGORY 2	36,271.0																																				
RURAL ACTIVITY ZONE	9,464,187.1																																				
RURAL LIVING ZONE	860,386.1																																				
SPECIAL USE ZONE - SCHEDULE 5	313,789.7																																				
South Gippsland																																					
COMMERCIAL 1 ZONE	2,270.4																																				
FARMING ZONE	309,231,488.9			5,797,977.2				1.9%				9,411,891.7				3.0%				17,037,383.9				5.5%					22,638,032.0			7.3%					
LOW DENSITY RESIDENTIAL ZONE	370,821.9												199.8			0.1%					847.2				0.2%					4,053.4			1.1%				
PUBLIC CONSERVATION AND RESOURCE ZONE	32,755,151.3			1,918,895.9				5.9%				2,876,383.2				8.8%				4,211,742.0				12.9%					4,647,332.3			14.2%					
PUBLIC PARK AND RECREATION ZONE	625,521.8											8.9				0.0%				282.6				0.0%					482.3			0.1%					
PUBLIC USE ZONE - CEMETERY/CREMATORIUM	39,211.4																																				
PUBLIC USE ZONE - SERVICE AND UTILITY	159,293.1																																				
ROAD ZONE - CATEGORY 1	1,155,627.1			19,213.4				1.7%				25,023.5				2.2%				59,107.4				5.1%					93,278.8			8.1%					
ROAD ZONE - CATEGORY 2	1,048,353.7			29.2				0.0%				43.9				0.0%				886.4				0.1%					2,869.9			0.3%					
RURAL CONSERVATION ZONE	2,007,420.2			3,755.6				0.2%				25,042.1				1.2%				54,850.6				2.7%					69,858.2			3.5%					
RURAL LIVING ZONE	158,141.2				27,724.0				17.5%				55,358.5			35.0%					83,356.8				52.7%				97,186.0			61.5%					
SPECIAL USE ZONE - SCHEDULE 7	79,809.4																																				
TOWNSHIP ZONE	2,693,013.5											3.2				0.0%				386.8				0.0%					1,125.2			0.0%					
Grand Total	455,150,877.5			8,805,712.7	43,216.8			1.9%	0.0%			13,692,543.0	83,352.0			3.0%	0.0%			23,400,741.6	159,590.4			5.1%	0.0%			30,171,822.6	216,728.4			6.6%	0.0%				

- Notes:
- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
 - Assessment has been based on best available local Planning Scheme data at time of data gathering and analysis (2021). It does not include recent amendments, including Amendment VC205 regarding Transport Zones.
 - Hazard extents and exposure results assume there are no adaptation measures

Table 19. Risk results (temporary inundation - combined storm tide and catchment flooding) for planning scheme zones – total area at risk, and % at risk relative to total area in the reporting region

Risk rating:

Low

Medium

Significant

High

Low

Med

Sign

High

Planning scheme zone	Total area (m²)	Storm tide inundation																																
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR								
		m²				%				m²				%				m²				%				m²				%				
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	
Bass																																		
COMMERCIAL 1 ZONE	9,333.6																																	
COMMERCIAL 2 ZONE	314,656.4																																	
COMPREHENSIVE DEVELOPMENT ZONE - SCHEDULE 1	338,039.1																																	
FARMING ZONE	25,128,201.4	879,132.9	203,925.9			3.5%	0.8%			786,206.6	381,295.2			3.1%	1.5%			142,903.9	1,083,058.8			0.6%	4.3%			58,461.0	1,167,501.8			0.2%	4.6%			
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	1,238,012.4																																	
INDUSTRIAL 1 ZONE	365,925.5																																	
PUBLIC CONSERVATION AND RESOURCE ZONE	1,730,605.6			548,220.5				31.7%				610,000.7				35.2%				706,849.2				40.8%			745,053.9				43.1%			
PUBLIC PARK AND RECREATION ZONE	1,320,775.3	6.1	7,874.6			0.0%	0.6%			384.9	7,895.9			0.0%	0.6%			1,745.8	7,978.8			0.1%	0.6%			1,443.8	8,280.8			0.1%	0.6%			
PUBLIC USE ZONE - SERVICE AND UTILITY	127,037.8																																	
ROAD ZONE - CATEGORY 1	415,920.1	4.1				0.0%				69.8				0.0%				122.0	4.1			0.0%	0.0%			239.4				0.1%				
ROAD ZONE - CATEGORY 2	34,093.0																																	
RURAL ACTIVITY ZONE	4,260,463.4																																	
RURAL LIVING ZONE	226,513.8																																	
Inverloch																																		
COMMERCIAL 1 ZONE	44,226.4																																	
FARMING ZONE	48,463,845.2	1,255,541.6	391,626.8			2.6%	0.8%			1,557,979.5	546,203.4			3.2%	1.1%			616,490.3	1,647,168.4			1.3%	3.4%			159,475.7	2,104,183.0			0.3%	4.3%			
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	5,222,135.4		118,853.0	535,951.5		2.3%	10.3%				176,636.1	546,580.0			3.4%	10.5%			197,201.9	594,630.7			3.8%	11.4%			129,211.5	662,621.1			2.5%	12.7%		
INDUSTRIAL 3 ZONE	90,998.2																																	
LOW DENSITY RESIDENTIAL ZONE	170,516.9		348.2	34,890.3		0.2%	20.5%				15.4	34,891.5			0.0%	20.5%				35,131.5				20.6%		7.0	34,899.9			0.0%	20.5%			
MIXED USE ZONE	18,463.7		665.0			3.6%					655.9				3.6%				656.9				3.6%			655.9				3.6%				
PUBLIC CONSERVATION AND RESOURCE ZONE	1,520,665.4		40,950.7	656,774.3		2.7%	43.2%				34,530.8	676,944.5			2.3%	44.5%			27,570.7	693,613.1			1.8%	45.6%			11,547.6	709,636.3			0.8%	46.7%		
PUBLIC PARK AND RECREATION ZONE	621,721.9	29,306.6	234,225.0			4.7%	37.7%			24,329.6	257,696.6			3.9%	41.4%			40,769.3	263,531.6			6.6%	42.4%			22,274.8	282,026.1			3.6%	45.4%			
PUBLIC USE ZONE - CEMETERY/CREMATORIUM	37,330.9																																	
PUBLIC USE ZONE - EDUCATION	20,165.4																																	
PUBLIC USE ZONE - HEALTH AND COMMUNITY	2,366.8																																	
PUBLIC USE ZONE - LOCAL GOVERNMENT	29,006.2		119.7	2,073.5			0.4%	7.1%			156.2	2,086.4			0.5%	7.2%			208.5	2,177.4			0.7%	7.5%		156.4	2,229.5			0.5%	7.7%			
PUBLIC USE ZONE - OTHER PUBLIC USE	5,904.5	0.0	2,414.0			0.0%	40.9%			0.1	2,414.0			0.0%	40.9%			2,414.0				40.9%				2,414.1			40.9%					
PUBLIC USE ZONE - SERVICE AND UTILITY	1,250,646.7		1,694.4	1,679.7		0.1%	0.1%				2,095.5	1,683.6			0.2%	0.1%			526.0	3,374.1			0.0%	0.3%		121.0	3,779.1			0.0%	0.3%			
PUBLIC USE ZONE - TRANSPORT	5,753.9		488.4			8.5%					487.2			8.5%				2.0	484.2			0.0%	8.4%			486.2			8.5%					
ROAD ZONE - CATEGORY 1	1,136,795.0	32,546.9	70,067.1			2.9%	6.2%			63,085.1	83,806.5			5.5%	7.4%			73,083.7	102,613.9			6.4%	9.0%			28,806.0	146,891.6			2.5%	12.9%			
ROAD ZONE - CATEGORY 2	36,271.0	0.0	438.6			0.0%	1.2%				438.6			1.2%					438.6				1.2%			438.3			1.2%					
RURAL ACTIVITY ZONE	9,464,187.1	78,988.1	91,405.9			0.8%	1.0%			98,785.7	121,644.8			1.0%	1.3%			62,349.9	170,393.9			0.7%	1.8%			12,313.4	220,430.5			0.1%	2.3%			
RURAL LIVING ZONE	860,386.1		30.9	11,405.4		0.0%	1.3%				52.3	11,405.4			0.0%	1.3%			52.3	11,405.4			0.0%	1.3%			11,457.8				1.3%			
SPECIAL USE ZONE - SCHEDULE 5	313,789.7		14,472.5	21,199.2		4.6%	6.8%				17,376.2	32,496.6			5.5%	10.4%			17,424.3	35,671.8			5.6%	11.4%			3,223.2	49,872.8			1.0%	15.9%		
South Gippsland																																		
COMMERCIAL 1 ZONE	2,270.4																																	
FARMING ZONE	309,231,488.9	8,684,601.3	25,080,286.6			2.8%	8.1%			8,650,356.2	28,269,569.1			2.8%	9.1%			5,095,527.5	33,764,887.8			1.6%	10.9%			1,940,490.0	36,919,925.4			0.6%	11.9%			
LOW DENSITY RESIDENTIAL ZONE	370,821.9		53,236.0	5,709.2		14.4%	1.5%				152,278.5	9,162.7			41.1%	2.5%			119,922.8	58,945.2			32.3%	15.9%		17,426.9	161,441.1			4.7%	43.5%			
PUBLIC CONSERVATION AND RESOURCE ZONE	32,755,151.3		256,559.3	4,880,604.3		0.8%	14.9%				266,493.2	4,991,220.6			0.8%	15.2%			234,483.8	5,137,163.6			0.7%	15.7%		113,933.5	5,257,713.9			0.3%	16.1%			
PUBLIC PARK AND RECREATION ZONE	625,521.8	3,051.5	3,653.5			0.5%	0.6%			2,212.1	5,480.4			0.4%	0.9%			3,993.0	6,705.0			0.6%	1.1%			3,005.4	7,692.6			0.5%	1.2%			
PUBLIC USE ZONE - CEMETERY/CREMATORIUM	39,211.4																																	
PUBLIC USE ZONE - SERVICE AND UTILITY	159,293.1			4,534.9			2.8%				4,534.9				2.8%				4,534.9				2.8%			4,534.9				2.8%				
ROAD ZONE - CATEGORY 1	1,155,627.1	35,481.7	137,174.9			3.1%	11.9%			20,358.3	160,998.6			1.8%	13.9%			62,490.5	172,656.6			5.4%	14.9%			53,790.1	181,356.9			4.7%	15.7%			
ROAD ZONE - CATEGORY 2	1,048,353.7	10,815.6	2,233.0			1.0%	0.2%			12,728.0	6,949.1			1.2%	0.7%			10,692.3	13,048.6			1.0%	1.2%			4,063.8	19,677.0			0.4%	1.9%			
RURAL CONSERVATION ZONE	2,007,420.2		19,911.8	69,009.1		1.0%	3.4%				27,749.3	76,531.7			1.4%	3.8%			46,519.2	88,920.9			2.3%	4.4%		31,159.1	104,281.0			1.6%	5.2%			
RURAL LIVING ZONE	158,141.2		22,841.5	94,644.2		14.4%	59.8%				13,312.8	107,910.3			8.4%	68.2%			7,780.1	117,485.7			4.9%	74.3%		4,042.7	121,223.2			2.6%	76.7%			
SPECIAL USE ZONE - SCHEDULE 7	79,809.4																																	
TOWNSHIP ZONE	2,693,013.5		18,804.3	424.6		0.7%	0.0%				50,438.7	1,166.2			1.9%	0.0%			74,327.3	19,229.0			2.8%	0.7%		41,951.4	51,604.9			1.6%	1.9%			
Grand Total	455,150,877.5	11,009,476.2	26,774,301.5	6,867,120.9		2.4%	5.9%	1.5%		11,216,496.0	30,586,670.3	7,106,615.0		2.5%	6.7%	1.6%		6,110,170.1	37,962,058.1	7,509,132.4		1.3%	8.3%	1.6%		2,284,124.0	41,414,979.8	7,920,349.2	0.5%	9.1%	1.7%			

- Notes:
- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
 - Assessment has been based on best available local Planning Scheme data at time of data gathering and analysis (2021). It does not include recent amendments, including Amendment VC205 regarding Transport Zones.
 - Hazard extents and exposure results assume there are no adaptation measures

Buildings and development areas

Table 20. Key observations of exposure and risk results for buildings and development areas

	Erosion	Permanent Inundation (frequent flooding by tides)	Temporary inundation (combined storm tide and catchment flooding)
Region-wide	<ul style="list-style-type: none">Buildings are increasingly exposed to erosion, and are predominantly in residential zones. More than over 90 buildings are at significant to high risk by 2100 while another 700 buildings are at medium risk.It is noted that some access road and services to these building may also be impacted (temporarily or more permanently).	<ul style="list-style-type: none">Buildings exposed to permanent inundation are much fewer than erosion with around 50 buildings impacted by 2100, mostly situated in farming or general residential zones.It is noted that some access road and services to these building may also be impacted.	<ul style="list-style-type: none">Buildings are increasingly exposed to temporary inundation, and are mostly situated in farming or general residential zones and farming zones. More than 200 buildings are at medium to significant risk by 2100.It is noted that some access road and services to these building may also be temporarily impacted.
Inverloch	<ul style="list-style-type: none">While no buildings are currently at risk from erosion, by 2040 over 200 buildings are at medium risk (~5% of general residential buildings in Inverloch), increasing to over 650 by 2070 (~15% of general residential buildings in Inverloch), with over 80 buildings at significant or high risk by 2100.Most buildings impacted are in residential zones in south-western parts of Inverloch and areas east of the boat rampFrom the Development Overlay case study<ul style="list-style-type: none"><i>It is noted that elevation, landform and condition of these DPO areas may have been altered as part of recent site development</i>Only very small sections of the DPO areas are impacted by erosion out until 2100	<ul style="list-style-type: none">One building is currently at risk from permanent inundation, increasing to 3 by 2070 and almost 40 buildings by 2100Most buildings impacted are in residential zones in the eastern areas of Inverloch township.Some residential areas are increasing impacted, with 2% of the general residential zone at high risk by 2100, especially to the eastern side Inverloch township, with almost 40 houses potentially at risk by 2100 <i>* note that some recent housing developments are not well captured in these building numbers and have been assessed separately (Case Study - and Table 25)</i>From the Development Overlay case study<ul style="list-style-type: none"><i>It is noted that elevation, landform and condition of these DPO areas may have been altered as part of recent site development</i>Areas of the DPO areas are increasingly impacted by permanent inundation, with 2% of the currently at medium risk. This increases to 10% significantly at risk by 2070 and almost 15% above medium risk by 2100.Permanent inundation due to sea level rise are increasing impacting the DPO area land parcel from 2070 onward, with 7 parcels exposed (~2%) by 2070, increasing to 21 by 2100 (over 5%).	<ul style="list-style-type: none">Buildings exposed to temporary inundation are mostly in the general residential zone with 38 buildings currently at significant risk in Inverloch. This increases notably by 2100 to almost 200 exposed (over 4% of Inverloch buildings in the general residential zone), with more than 100 buildings at significant risk.Most buildings impacted are in residential zones in south-western and eastern areas of Inverloch townshipFrom the Development Overlay case study<ul style="list-style-type: none"><i>It is noted that elevation, landform and condition of these DPO areas may have been altered as part of recent site development</i>It is noted that catchment inundation dominates the exposure and risk results for some of the development areas. Much of these areas are already covered by land subject to inundation overlays (LSIO). The combined effects storm tide and catchment flooding further exacerbate this.Areas of the DPO areas are increasingly impacted by permanent inundation, with over 35% currently at medium risk. This increases to 42% by 2070 and almost 50% by 2100.There are more than two thirds of the land parcels exposed under the present day temporary flooding event of 10% AEP storm tide combined with 1% AEP catchment event. This increases to 75% of parcels for this same event under a 2100, 0.8m SLR scenario.A quarter of these land parcels impacted under the present day temporary flooding event of 1% AEP storm tide combined with smaller catchment event. This increases to over 40% (~160 parcels) for this same event under a 2100, 0.8m SLR scenario.
South Gippsland	<ul style="list-style-type: none">No buildings are currently at risk of erosionOne building is at medium risk by 2100	<ul style="list-style-type: none">One building currently at medium or greater risk of permanent inundationThis increases to 2 buildings by 2040, 9 buildings by 2070 and 15 buildings by 2100These at-risk buildings align with those anticipated to be impacted by permanent inundation	<ul style="list-style-type: none">One building currently at medium or greater risk of temporary inundationThis increases to 2 buildings by 2040, 9 buildings by 2070 and 14 buildings by 2100.These at-risk buildings align with those anticipated to be impacted by permanent inundation
Bass Coast	<ul style="list-style-type: none">No buildings are currently at risk of erosionOne building is at medium risk by 2070 onwards	<ul style="list-style-type: none">No buildings in Bass locality are at risk of permanent inundation out until 2100	<ul style="list-style-type: none">No buildings in Bass locality are at risk of temporary inundation out until 2100

Notes:

- Only limited information was available about the type and tenure of building footprints, so these were categorised utilising the planning scheme zone in which they were placed.
- The Inverloch Surf Life Saving Club building has been considered as part of the coastal facilities analysis (Table 30)
- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 21. Risk results (erosion) for buildings by planning scheme zones – total number at risk, and % at risk relative to total number in the reporting region

[illegible]

Notes:

- Only limited information was available about the type and tenure of building footprints, so these were categorised utilising the planning scheme zone in which they were placed.
- The Inverloch Surf Life Saving Club building has been considered as part of the coastal facilities analysis (Table 31)
- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 22. Risk results (permanent inundation) for buildings by planning scheme – total number at risk, and % at risk relative to total number in the reporting region

Table 22. Risk results (permanent inundation) for buildings by planning scheme – total number at risk, and % at risk relative to total number in the reporting region																												Risk rating:				Low		Medium		Significant		High	
		Low				Med				Sign				High																									
Buildings (by planning scheme zone)	Total Number	Permanent Inundation																																					
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR													
		No.				%				No.				%				No.				%				No.				%									
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High								
Bass																																							
UNKNOWN	2																																						
COMMERCIAL 1 ZONE	3																																						
COMMERCIAL 2 ZONE	10																																						
FARMING ZONE	214																																						
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	1146																																						
INDUSTRIAL 1 ZONE	63																																						
PUBLIC CONSERVATION AND RESOURCE ZONE	94																																						
PUBLIC PARK AND RECREATION ZONE	7																																						
PUBLIC USE ZONE - SERVICE AND UTILITY	2																																						
RURAL ACTIVITY ZONE	23																																						
RURAL LIVING ZONE	39																																						
Inverloch																																							
COMMERCIAL 1 ZONE	26																																						
FARMING ZONE	385			1				0.3%				1				0.3%				1			0.3%				7				1.8%								
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	4559																			1			0.0%				31					0.7%							
INDUSTRIAL 3 ZONE	56																																						
LOW DENSITY RESIDENTIAL ZONE	4																																						
MIXED USE ZONE	24																																						
PUBLIC CONSERVATION AND RESOURCE ZONE	3																																						
PUBLIC PARK AND RECREATION ZONE	16																			1			6.3%				1				6.3%								
PUBLIC USE ZONE - CEMETERY/CREMATORIUM	1																																						
PUBLIC USE ZONE - EDUCATION	9																																						
PUBLIC USE ZONE - HEALTH AND COMMUNITY	1																																						
PUBLIC USE ZONE - LOCAL GOVERNMENT	6																																						
PUBLIC USE ZONE - SERVICE AND UTILITY	9																																						
RURAL ACTIVITY ZONE	44																																						
RURAL LIVING ZONE	62																																						
SPECIAL USE ZONE - SCHEDULE 5	57																																						
South Gippsland																																							
UNKNOWN	1																																						
COMMERCIAL 1 ZONE	2																																						
FARMING ZONE	1059			1				0.1%				2				0.2%				9			0.8%				13				1.2%								
LOW DENSITY RESIDENTIAL ZONE	65																										1					1.5%							
PUBLIC CONSERVATION AND RESOURCE ZONE	4																																						
PUBLIC PARK AND RECREATION ZONE	8																																						
PUBLIC USE ZONE - SERVICE AND UTILITY	1																																						
ROAD ZONE - CATEGORY 1	1																																						
RURAL CONSERVATION ZONE	57																										1				1.8%								
RURAL LIVING ZONE	1																																						
SPECIAL USE ZONE - SCHEDULE 7	49																																						
TOWNSHIP ZONE	2012																																						
Grand Total	8113			2				0.0%				3				0.0%				11		1			0.1%	0.0%		22		32		0.3%	0.4%						

- Notes:
- Only limited information was available about the type and tenure of building footprints, so these were categorised utilising the planning scheme zone in which they were placed.
 - The Inverloch Surf Life Saving Club building has been considered as part of the coastal facilities analysis (Table 32)
 - The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
 - Hazard extents and exposure results assume there are no adaptation measures

Table 23. Risk results (temporary inundation - combined storm tide and catchment flooding) for buildings by planning scheme zones – total area at risk, and % at risk relative to total number in reporting region

Risk rating:	Low	Medium	Significant	High
	Low	Med	Sign	High

Buildings (by planning scheme zone)	Total number	Storm tide inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		No.				%				No.				%				No.				%				No.				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Bass																																	
UNKNOWN	2																																
COMMERCIAL 1 ZONE	3																																
COMMERCIAL 2 ZONE	10																																
FARMING ZONE	214																																
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	1146																																
INDUSTRIAL 1 ZONE	63																																
PUBLIC CONSERVATION AND RESOURCE ZONE	94																																
PUBLIC PARK AND RECREATION ZONE	7																																
PUBLIC USE ZONE - SERVICE AND UTILITY	2																																
RURAL ACTIVITY ZONE	23																																
RURAL LIVING ZONE	39																																
Inverloch																																	
COMMERCIAL 1 ZONE	26																																
FARMING ZONE	385		1				0.3%				1				0.3%				1				0.3%				7					1.8%	
GENERAL RESIDENTIAL ZONE - SCHEDULE 1	4559		3	38			0.1%	0.8%			81	38			1.8%	0.8%			146	40			3.2%	0.9%			73	113				1.6%	2.5%
INDUSTRIAL 3 ZONE	56																																
LOW DENSITY RESIDENTIAL ZONE	4																																
MIXED USE ZONE	24																																
PUBLIC CONSERVATION AND RESOURCE ZONE	3																																
PUBLIC PARK AND RECREATION ZONE	16		1				6.3%				1	1			6.3%	6.3%			4	1			25.0%	6.3%			3	2			18.8%	12.5%	
PUBLIC USE ZONE - CEMETERY/CREMATORIUM	1																																
PUBLIC USE ZONE - EDUCATION	9																																
PUBLIC USE ZONE - HEALTH AND COMMUNITY	1																																
PUBLIC USE ZONE - LOCAL GOVERNMENT	6																																
PUBLIC USE ZONE - SERVICE AND UTILITY	9																																
RURAL ACTIVITY ZONE	44																																
RURAL LIVING ZONE	62																																
SPECIAL USE ZONE - SCHEDULE 5	57																																
South Gippsland																																	
UNKNOWN	1																																
COMMERCIAL 1 ZONE	2																																
FARMING ZONE	1059		1				0.1%				2				0.0%	0.2%			9				0.8%				13					1.2%	
LOW DENSITY RESIDENTIAL ZONE	65																																
PUBLIC CONSERVATION AND RESOURCE ZONE	4																																
PUBLIC PARK AND RECREATION ZONE	8																																

Notes:

- Only limited information was available about the type and tenure of building footprints, so these were categorised utilising the planning scheme zone in which they were placed.
- The Inverloch Surf Life Saving Club building has been considered as part of the coastal facilities analysis (Table 33)
- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Case study: Development Plan Overlay (DPO) areas – including Broadbeach

Higher level, regional vulnerability assessments by hazard type highlighted that some of the more recent and proposed developments may be located in areas potentially vulnerable to hazards in the future. This is particularly apparent for some areas on the eastern side of Inverloch, adjacent to Screw Creek. Catchment inundation dominates the exposure and risk results for some of these development areas. Much of these areas are already covered by land subject to inundation overlays (LSIO) under present day catchment conditions.

Given the more recent changes occurring in these DPO areas, it was recognised that there were and are some limitations to the broader exposure and risk analyses for these areas. Modelling and estimation of hazard extents used best available region-wide ground surface elevation data (LiDAR dated 2009). However, ground surface elevation and landforms may have changed as part of these developments' broader site landform changes (site cut-and-fill). Additionally, some of the more recent constructed buildings are not fully captured in the spatial asset database and are hence missing from the exposure and risk assessment.

Some additional exposure and risk analysis was considered as a case study for this area, to account for some of the data and knowledge gaps and to further quantify some of the potential exposure and risks to these areas.

Approach

Using spatial data from recent planning overlays, the analysis looked at the following DPO areas, located in the near vicinity of estimated hazard extents:

- DPO08 - Development Plan Overlay 8 Parklands Inverloch and Prom Island Park
- DPO25 – Development Plan Overlay 25 Broadbeach and Cuttriss Street
 - Combined total area = 766,408 m²



Figure 11. Development Plan Overlay area to the east of Inverloch township

Exposure analysis was undertaken for these DPO areas using similar methods to those used for planning scheme and land use analysis, intersecting these areas with each coastal hazard scenario. These exposure results were then used to assess risk. Results from the coastal hazard risk assessment for the DPO areas (including Broadbeach), for erosion, permanent inundation and temporary inundation are provided (Table 24).

Table 24. Risk results (all hazard types) for DPO areas - total area at risk and % at risk relative to total DPO areas.

Development Plan Overlay area	Total area (m ²)	2021 - 0.0 m SLR							
		m ²				%			
		Low	Med	Sign	High	Low	Med	Sign	High
Erosion	766,408.4					0.0%	0.0%		
Permanent inundation	766,408.4		15,492.8			0.0%	2.0%		
Temporary inundation	766,408.4	47,507.6	274,638.8			6.2%	35.8%		
Development Plan Overlay area	Total area (m ²)	2040 - 0.2 m SLR							
		m ²				%			
		Low	Med	Sign	High	Low	Med	Sign	High
Erosion	766,408.4					0.0%	0.0%		
Permanent inundation	766,408.4		27,790.5			0.0%	3.6%		
Temporary inundation	766,408.4	76,845.5	286,141.8			10.0%	37.3%		
Development Plan Overlay area	Total area (m ²)	2070 - 0.5 m SLR							
		m ²				%			
		Low	Med	Sign	High	Low	Med	Sign	High
Erosion	766,408.4	1,052.5				0.1%	0.0%		
Permanent inundation	766,408.4			73,618.4		0.0%	0.0%	9.6%	
Temporary inundation	766,408.4	62,288.9	322,146.4			8.1%	42.0%		
Development Plan Overlay area	Total area (m ²)	2100 - 0.8 m SLR							
		m ²				%			
		Low	Med	Sign	High	Low	Med	Sign	High
Erosion	766,408.4	9,293.1				1.2%	0.0%		
Permanent inundation	766,408.4		111,668.9			0.0%	14.6%		
Temporary inundation	766,408.4	21,448.0	362,987.3			2.8%	47.4%		

In addition to the development overlays, the exposure was assessed for the land parcels in these development areas (as a proxy for current and future buildings in these areas).

Looking at temporary inundation and permanent inundation, this assessment:

- Estimated the number of blocks/parcels (excluding reserves/large properties not subdivided)
- Intersected hazard layers to identify blocks/parcels potentially impacted
- In/out type of overlay, flagged as impacted if any part of parcel intersects hazard layer

Exposure of these parcels to permanent inundation and temporary inundation is presented (Table 25). This exposure analysis has been presented as total number of parcels exposure and % exposed relative to total number of parcels in DPO areas (of 386 parcels).

Table 25. Exposure results for DPO parcels - total number exposure and % exposed relative to total parcels in DPO areas.

Parcels exposed	Permanent inundation		Temporary inundation			
			10% AEP + 1% AEP catchment		1% AEP + 10% AEP catchment	
Sea level rise	No.	%	No.	%	No.	%
0.0 m	0	0.0%	262	67.9%	95	24.6%
0.2 m	0	0.0%	264	68.4%	103	26.7%
0.5 m	7	1.8%	283	73.3%	159	41.2%
0.8 m	21	5.4%	289	74.9%	185	47.9%
1.1 m	23	6.0%	291	75.4%	193	50.0%
1.4 m	88	22.8%				
Total	386					

Linear infrastructure and assets

Table 26. Key observations of risk results for linear infrastructure and assets (coastal protection structures, transport and utilities)

	Erosion	Permanent Inundation (frequent flooding by tides)	Temporary inundation (combined storm tide and catchment flooding)
Region-wide	<ul style="list-style-type: none">• A large proportion of coastal protection structures are at high risk of erosion, with risk increasing to 2100.• Coastal protection structures in Inverloch see a significant increase in risk from around 10% of structure length in present day to 75% by 2100.• Other asset types currently at risk in the present day include roads, trails, waterways, drainage pipes, sewerage pipes and telecommunications infrastructure.	<ul style="list-style-type: none">• As with erosion, many of the region’s coastal protection structures are already at risk of permanent inundation, with exposed and at risk structure lengths continuing to increase out to 2100.• Utilities and roads are increasing at risk of temporary inundation. This includes key access routes, and utility supply lines key to the region’s networks.	<ul style="list-style-type: none">• A large proportion of coastal protection structures are at high risk of temporary inundation impacts, with risk increasing to 2100.• Utilities and roads are increasing at risk of temporary inundation. This includes key access routes, and utility supply lines key to the region’s networks.
Inverloch	<ul style="list-style-type: none">• Utility assets (drainage, drinking water, electricity, sewerage and telecoms) become increasingly exposed by 2040, with ~30 km of these assets at medium risk or higher (4% of total length in Inverloch) and over 75 km by 2070 (10% of total length in Inverloch).• Small sections (< 1 %) of the Inverloch gas supply pipeline are currently at medium to significant risk of erosion. This proportion increases dramatically to over 62 % of the pipeline by 2040, 74 % by 2070 and 76% by 2100. Of this, 36 % is considered at significant risk by 2070, increasing to 50 % by 2100.• Roads exposed also increase significantly by 2040, with 400 m at medium risk or higher in present day, increasing to 5 km by 2040 and 10 km by 2070.	<ul style="list-style-type: none">• Utility assets (drainage, electricity, sewerage and telecoms) have minimal exposure now and become increasingly exposed to permanent inundation, with a notable increase in utility types and network extents exposure by 2070 onwards. Almost ~1 km of linear infrastructure at high risk in 2070 and almost 4 km by 2100, accounting for less than 1% of the network each utilities type.• Exposed roads also increase by 2070, with 500 m at significant risk, increasing to just under 2 km by 2100	<ul style="list-style-type: none">• In Inverloch, almost 59 km of the utility infrastructure is currently at medium to high risk, increasing 81 km by 2100. All utility networks have some level of temporary inundation exposure under present day conditions.• Of this, almost 13% of the sewerage network and almost 10% for the drinking water network is currently at medium to high risk, increasing to 17% and 12% respectively by 2100. Similarly, electricity and telecommunications networks are at medium risk at present (7% and 6 %), with each increasing to ~10 % by 2100.• Sections of the Inverloch gas supply pipeline are currently exposed to temporary inundation. Over 23% is currently at medium risk, increasing notably by 2070 to 37%, and then 43% by 2100.• Over 6 % of the road network is currently at medium risk, steadily increasing to almost 9% by 2070 and 11% of the network by 2100 (almost 20 km of roads). This includes lower-lying eastern sections of Bunurong Road.
South Gippsland	<ul style="list-style-type: none">• Small portions of roads, trails and water courses are exposed to erosion• Some utility assets (sewerage, telecommunication) are increasingly at risk out to 2100.	<ul style="list-style-type: none">• Utility assets (drainage, electricity, sewerage and telecoms) become increasingly exposed. Around 13 km telecommunications is at significant risk by 2070 (3% of that South Gippsland locality) increasing to 20 km by 2100 and 8 km of electricity linear infrastructure is also at risk in the locality region, from present day to 2100.• Levees, like the other coastal protection structures in the South Gippsland locality area, are increasingly at risk, with 10% (almost 4 km) of total levees currently at high risk, increasing to 57% (>20 km) by 2100.• Small portions of the road are exposed currently, increasing to over 3 km regularly inundated by tides by 2100. Notably, sections of the access road to Venus Bay are increasingly impacted by sea level rise from 2040 onwards, potentially cutting access to the township.	<ul style="list-style-type: none">• Around ~15 % (3.3 km) of the sewerage network is currently impacted, with this remaining at this extent out to 2100• Electricity and telecommunications networks are at medium risk at present (4% and 5 %), with each increasing to (7% and 10 %) by 2100.• Almost 8 km (~2%) of roads are currently at medium risk, increasing two-fold by 2100 (over 16 km, ~ 4%). This includes sections of the access road to Venus Bay which are at currently and increasingly impacted during temporary inundation events, cutting access to the township.
Bass Coast	<ul style="list-style-type: none">• Small portions of roads, trails and water courses are exposed to erosion• Sections of Bunurong Road, are currently at and remain at significant risk to erosion out until 2100.	<ul style="list-style-type: none">• At risk infrastructure is predominantly located areas of the Bass reporting locality within Anderson Inlet. This includes small portions of utilities networks (drainage and electricity), water courses are currently at significant risk to permanent inundation. Some sections of road are also at risk from 2070 onwards.	<ul style="list-style-type: none">• Small portions of utility assets (drainage, electricity, and telecoms) as well as roads and water courses are exposed to temporary inundation

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 27. Risk results (erosion) for linear infrastructure and assets – total length at risk, and % at risk relative to all assets in the reporting region

Table 27. Risk results (erosion) for linear infrastructure and assets – total length at risk, and % at risk relative to all assets in the reporting region																				Risk rating:				Low		Medium		Significant		High			
		Low				Med				Sign				High																			
Linear assets	Total length (m)	Erosion																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m				%				m				%				m				%				m				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High				
Bass																																	
Coastal protection structures																																	
Sea Wall	396.9				26.1				6.6%				26.3				6.6%				36.7				9.2%			39.2			9.9%		
Levee	2,208.4																																
Retaining Wall	36.3				8.6				23.6%				8.6				23.6%				8.6				23.6%			8.6			23.6%		
Revetment	635.3				14.1				2.2%		121.3		103.4		19.1%		16.3%		48.6		176.1		7.7%		27.7%		19.7	205.0		3.1%	32.3%		
Seawall	77.5				28.6				37.0%				28.6				37.0%				28.7				37.0%			28.7			37.0%		
Wharf	58.0			49.6				85.5%			49.6					85.5%			0.0	49.7		0.0%	85.6%				49.6			85.5%			
Waterways and drainage																																	
Connector channel drain	69.0																																
Connector drain	34.0																																
Connector stream	541.0			6.5				1.2%			6.5					1.2%			6.5				1.2%			6.5				1.2%			
Watercourse channel drain	3,604.7																																
Watercourse drain	7,469.7																																
Watercourse stream	3,465.6		2.8	44.9			0.1%	1.3%			76.0					2.2%			76.0				2.2%			76.0				2.2%			
Transport																																	
Road	69,263.2			105.0				0.2%			105.0					0.2%			12.4	105.0		0.0%	0.2%			38.8	105.0		0.1%	0.2%			
Trail	2,498.9		0.9	38.3			0.0%	1.5%			0.7	51.3			0.0%	2.1%			55.5				2.2%			0.5	57.0		0.0%	2.3%			
Utilities																																	
Drainage network - pipes	27,529.2																																
Drinking Water	36,620.4																																
Electricity - other	70,690.4																																
Sewerage - pipes	35,201.1																																
Telecommunications	106,655.5																																
Inverloch																																	
Coastal protection structures																																	
Sea Wall	531.7				99.2				18.7%		244.7		266.2		46.0%		50.1%		10.0		500.9		1.9%		94.2%			518.1			97.4%		
Levee	1,415.7												252.7				17.8%				531.6				37.6%			661.9			46.8%		
Breakwater	75.6				10.2				13.4%				65.9				87.1%				75.6				100.0%			75.6			100.0%		
Retaining Wall	51.8				51.8				100.0%				51.8				100.0%				51.8				100.0%			51.8			100.0%		
Revetment	1,054.3		0.0	31.5	158.0		0.0%	3.0%	15.0%		223.6	0.0	663.5		21.2%	0.0%	62.9%		37.2		938.8		3.5%		89.0%		18.2	1,006.7		1.7%	95.5%		
Seawall	287.0				21.6				7.5%		140.6		146.4		49.0%		51.0%		24.2		262.9		8.4%		91.6%		24.2	262.9		8.4%	91.6%		
Waterways and drainage																																	
Connector stream	9,641.0			90.7				0.9%			103.9					1.1%			81.5	103.9		0.8%	1.1%			81.5	103.9		0.8%	1.1%			
Watercourse channel drain	10,697.6										71.2					0.7%				197.6				1.8%			480.4			4.5%			
Watercourse stream	52,139.1		36.9	679.7			0.1%	1.3%			530.2	847.8			1.0%	1.6%			938.1	1,260.4		1.8%	2.4%			1,189.6	1,543.9		2.3%	3.0%			
Transport																																	
Bridge	134.4																																
Connector	102.5																																
Foot bridge	42.9																																
Ford	26.6																																
Road	178,132.8		48.5	424.7			0.0%	0.2%			5,540.7	1,366.6			3.1%	0.8%			10,528.8	3,451.7		5.9%	1.9%			11,072.6	4,750.1		6.2%	2.7%			
Trail	4,680.7		1.8	278.1			0.0%	5.9%			103.9	311.4			2.2%	6.7%			363.3	338.9		7.8%	7.2%			401.3	345.0		8.6%	7.4%			
Utilities																																	
Drainage network - pipes	90,845.0		1.5	26.4			0.0%	0.0%			2,074.9	176.0			2.3%	0.2%			5,260.4	559.6		5.8%	0.6%			7,295.7	1,058.7		8.0%	1.2%			
Drinking Water	82,489.5										5,869.6	15.5	319.2		7.1%	0.0%	0.4%		10,816.6	225.2	1,776.8		13.1%	0.3%	2.2%	11,093.8	119.6	3,308.6	13.4%	0.1%	4.0%		
Electricity - other	188,003.9										6,190.3	188.8			3.3%	0.1%			14,858.4	1,446.4		7.9%	0.8%			16,559.5	2,424.4		8.8%	1.3%			
Sewerage - pipes	89,862.0			132.2				0.1%			6,632.3	584.0			7.4%	0.6%			14,634.0	2,274.7		16.3%	2.5%			15,931.8	3,831.5		17.7%	4.3%			
Telecommunications	301,453.6			3.7				0.0%			8,378.6	7.4			2.8%	0.0%			22,872.6	1,588.2		7.6%	0.5%			26,149.0	2,910.1		8.7%	1.0%			
South Gippsland																																	
Coastal protection structures																																	
Levee	38,374.5												278.1				0.7%				828.2				2.2%			1,361.6			3.5%		
Revetment	43.3												5.6				12.9%				30.9				71.4%			40.7			94.1%		
Seawall	40.5																																
Waterways and drainage																																	
Connector channel drain	506.3																																
Connector river	33,410.9			601.9				1.8%			601.9					1.8%				601.9				1.8%			601.9			1.8%			
Connector stream	17,267.4																									1.1	7.0		0.0%	0.0%			
Watercourse channel drain	108,633.2			26.0				0.0%			65.3					0.1%				138.3				0.1%			667.7			0.6%			
Watercourse stream	363,570.0		5.4	443.8			0.0%	0.1%			6.4	496.2			0.0%	0.1%			6.4	590.4		0.0%	0.2%			7.7	936.6		0.0%	0.3%			
Transport																																	
Bridge	476.3																																
Road	363,935.5																		8.4	1.1		0.0%	0.0%			2.1	36.7		0.0%	0.0%			
Trail	7,825.1			84.0				1.1%			1.1	737.1			0.0%	9.4%			1.1	984.0		0.0%	12.6%			1.1	1,388.0		0.0%	17.7%			
Utilities																																	
Electricity - other	319,092.8																										1.1	2.1		0.0%	0.0%		
Sewerage - pipes	22,304.5		2.0	75.9			0.0%	0.3%			2.0	88.1			0.0%	0.4%			2.0	110.7		0.0%	0.5%			2.0	131.8		0.0%	0.6%			
Telecommunications	449,133.1																		1.0	66.8		0.0%	0.0%			1.0	78.1		0.0%	0.0%			
Grand Total	3,103,336.0		99.6	3,142.9	418.3		0.0%	0.1%	0.0%		36,060.8	5,949.6	2,216.2		1.2%	0.2%	0.1%		80,505.0	14,232.5	5,247.6		2.6%	0.5%	0.2%		89,892.3	21,711.8	7,569.4		2.9%	0.7%	0.2%

Table 28. Risk results (permanent inundation) for linear infrastructure and assets – total length at risk, and % at risk relative to all assets in the region

Table 28. Risk results (permanent inundation) for linear infrastructure and assets – total length at risk, and % at risk relative to all assets in the region																												Risk rating:				Low	Medium	Significant	High																				
																												Low	Med	Sign	High																								
Linear assets	Total length (m)	Permanent Inundation																																																					
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR																													
		m				%				m				%				m				%				m				%																									
																												Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Bass																																																							
Coastal protection structures																																																							
	396.9				157.1				39.6%					177.4				44.7%					192.7				48.6%				223.1			56.2%																					
Levee	2,208.4				30.7				1.4%					138.7				6.3%					367.7				16.6%				669.9			30.3%																					
Retaining Wall	36.3				8.6				23.6%					8.6				23.6%					8.6				23.6%				8.6			23.6%																					
Revetment	635.3				58.3				9.2%					79.9				12.6%					94.8				14.9%				127.1			20.0%																					
Seawall	77.5				35.1				45.3%					35.1				45.3%					41.7				53.8%				41.7			53.8%																					
Wharf	58.0			58.0				100.0%				58.0					100.0%					58.0				100.0%				58.0			100.0%																						
Waterways and drainage																																																							
Connector channel drain	69.0			69.0				100.0%				69.0					100.0%					69.0				100.0%				69.0			100.0%																						
Connector drain	34.0																																																						
Connector stream	541.0			6.5				1.2%				6.5					1.2%					6.5				1.2%				6.5			1.2%																						
Watercourse channel drain	3,604.7			678.0				18.8%				951.5					26.4%					1,814.4				50.3%				2,006.9			55.7%																						
Watercourse drain	7,469.7																																																						
Watercourse stream	3,465.6			184.6				5.3%				260.9					7.5%					316.4				9.1%				386.6			11.2%																						
Transport																																																							
Road	69,263.2																					38.3				0.1%				47.7			0.1%																						
Trail	2,498.9																																																						
Utilities																																																							
Drainage network - pipes	27,529.2			26.7				0.1%				26.7					0.1%					33.0				0.1%				33.0			0.1%																						
Drinking Water	36,620.4																																																						
Electricity - other	70,690.4			6.0				0.0%				6.0					0.0%					6.0				0.0%				6.0			0.0%																						
Sewerage - pipes	35,201.1																																																						
Telecommunications	106,655.5																																																						
Inverloch																																																							
Coastal protection structures																																																							
Sea Wall	531.7								0.0%					2.0				0.4%					16.8				3.2%				45.5			8.6%																					
Levee	1,415.7				1.6				0.1%					12.3				0.9%					69.3				4.9%				177.8			12.6%																					
Breakwater	75.6				15.9				21.1%					15.9				21.1%					23.2				30.7%				23.2			30.7%																					
Retaining Wall	51.8				24.0				46.4%					24.0				46.4%					35.3				68.1%				35.3			68.1%																					
Revetment	1,054.3				167.8				15.9%					205.5				19.5%					278.2				26.4%				452.2			42.9%																					
Seawall	287.0																					5.2				1.8%				19.9			6.9%																						
Waterways and drainage																																																							
Connector stream	9,641.0			1,785.8				18.5%				1,881.9					19.5%					1,926.6				20.0%				1,992.5			20.7%																						
Watercourse channel drain	10,697.6			709.8				6.6%				1,853.3					17.3%					2,839.1				26.5%				3,073.8			28.7%																						
Watercourse stream	52,139.1			574.2				1.1%				813.0					1.6%					1,505.3				2.9%				2,153.2			4.1%																						
Transport																																																							
Bridge	134.4			0.6				0.4%				0.6					0.4%					0.6				0.4%				10.4			7.8%																						
Connector	102.5																																																						
Foot_bridge	42.9			39.4				92.0%				39.4					92.0%					39.4				92.0%				39.4			92.0%																						
Ford	26.6																																																						
Road	178,132.8											11.1					0.0%					502.0				0.3%				1,774.4			1.0%																						
Trail	4,680.7			10.8				0.2%				10.8					0.2%					76.7				1.6%				129.6			2.8%																						
Utilities																																																							
Drainage network - pipes	90,845.0																					21.6				0.0%				80.6			0.1%																						
Drinking Water	82,489.5																																																						
Electricity - other	188,003.9			20.6				0.0%				176.2					0.1%					980.8				0.5%				1,627.0			0.9%																						
Sewerage - pipes	89,862.0																					536.7				0.6%				679.9			0.8%																						
Telecommunications	301,453.6			15.5				0.0%				162.3					0.1%					362.7				0.1%				1,255.9			0.4%																						
South Gippsland																																																							
Coastal protection structures																																																							
Levee	38,374.5				3,713.6				9.7%					6,850.1				17.9%					13,925.6				36.3%				20,358.5			53.1%																					
Revetment	43.3				1.5				3.6%					8.7				20.2%					8.7				20.2%				29.6			68.4%																					
Seawall	40.5				22.0				54.3%					22.0				54.3%					32.0				79.0%				40.5			100.0%																					
Waterways and drainage																																																							
Connector channel drain	506.3			142.7				28.2%				151.1					29.8%					183.8				36.3%				288.9			57.1%																						
Connector river	33,410.9			16,201.2				48.5%				17,767.5					53.2%					18,353.7				54.9%				18,655.6			55.8%																						
Connector stream	17,267.4			1,708.6				9.9%				1,986.8					11.5%					2,496.2				14.5%				2,622.1			15.2%																						
Watercourse channel drain	108,633.2			20,122.3				18.5%				27,995.9					25.8%					43,122.7				39.7%				51,711.5			47.6%																						
Watercourse stream	363,570.0			6,037.4				1.7%				8,199.9					2.3%					11,238.7				3.1%				13,670.1			3.8%																						
Transport																																																							
Bridge	476.3			56.9				11.9%				56.9					11.9%					72.5				15.2%				87.8			18.4%																						
Road	363,935.5			195.4				0.1%				584.5					0.2%					1,515.0				0.4%				3,298.2			0.9%																						
Trail	7,825.1			16.1				0.2%				23.0					0.3%					49.8				0.6%				180.6			2.3%																						
Utilities																																																							
Electricity - other	319,092.8			1,241.8				0.4%				2,541.1					0.8%					6,262.3				2.0%				9,808.6			3.1%																						
Sewerage - pipes	22,304.5			82.0				0.4%				197.5					0.9%					931.4				4.2%				1,921.0			8.6%																						
Telecommunications	449,133.1			1,012.0				0.2%				3,197.4					0.7%					13,984.9				3.1%				20,395.2			4.5%																						
Grand Total	3,103,336.0				51,001.8			4,236.3				69,028.7				7,580.2					2.2%	0.2%			109,344.1			15,099.9			3.5%	0.5%			138,070.0			22,252.9			4.4%	0.7%													
Gas Pipeline	Total length (m)	Permanent Inundation																																																					
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR																													
		m				%				m				%				m				%				m				%																									
																												Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
GasPipeline	6,832.7																																																						
Grand Total	6,832.7																																																						

Table 29. Risk results (temporary inundation - combined storm tide and catchment flooding) for linear infrastructure and assets – total length at risk, and % at risk relative to all assets in the region

Table 29. Risk results (temporary inundation - combined storm tide and catchment flooding) for linear infrastructure and assets – total length at risk, and % at risk relative to all assets in the region		Risk rating:												Low		Medium		Significant		High														
														Low		Med		Sign		High														
Linear assets	Total length (m)	Storm tide inundation																																
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR								
		m				%				m				%				m				%				m				%				
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	
Bass																																		
Coastal protection structures																																		
Sea Wall	396.9			157.1				39.6%				177.4				44.7%				192.7				48.6%				223.1				56.2%		
Levee	2,208.4			30.7				1.4%				138.7				6.3%				367.7				16.6%				669.9				30.3%		
Retaining Wall	36.3			8.6				23.6%				8.6				23.6%				8.6				23.6%				8.6				23.6%		
Revetment	635.3				58.3				9.2%				79.9			12.6%					94.8			14.9%					127.1				20.0%	
Seawall	77.5			35.1				45.3%				35.1				45.3%				41.7				53.8%				41.7				53.8%		
Wharf	58.0			58.0				100.0%				58.0				100.0%				58.0				100.0%				58.0				100.0%		
Waterways and drainage																																		
Connector channel drain	69.0		69.0				100.0%				69.0				100.0%				69.0				100.0%				69.0				100.0%			
Connector drain	34.0																																	
Connector stream	541.0		6.5				1.2%				6.5				1.2%				6.5				1.2%				6.5				1.2%			
Watercourse channel drain	3,604.7		678.0				18.8%				951.5				26.4%				1,814.4				50.3%				2,006.9				55.7%			
Watercourse drain	7,469.7																																	
Watercourse stream	3,465.6		184.6				5.3%				260.9				7.5%				316.4				9.1%				386.6				11.2%			
Transport																																		
Road	69,263.2	62.1	368.8			0.1%	0.5%			89.7	378.7			0.1%	0.5%			145.8	430.9			0.2%	0.6%			108.2	468.5			0.2%	0.7%			
Trail	2,498.9																																	
Utilities																																		
Drainage network - pipes	27,529.2		26.7				0.1%				26.7				0.1%			15.1	33.0			0.1%	0.1%			15.1	33.0			0.1%	0.1%			
Drinking Water	36,620.4																																	
Electricity - other	70,690.4	0.1	360.3			0.0%	0.5%			474.7	360.4			0.7%	0.5%			633.3	360.4			0.9%	0.5%			158.6	835.1			0.2%	1.2%			
Sewerage - pipes	35,201.1																		0.6				0.0%				0.6				0.0%			
Telecommunications	106,655.5		4.9				0.0%			0.9	4.9			0.0%	0.0%			3.3	4.9			0.0%	0.0%			2.4	5.9			0.0%	0.0%			
Inverloch																																		
Coastal protection structures																																		
Sea Wall	531.7											2.0			0.4%				16.8				3.2%				45.5				8.6%			
Levee	1,415.7			1.6			0.1%				12.3				0.9%				69.3				4.9%				177.8				12.6%			
Breakwater	75.6				15.9				21.1%				15.9			21.1%				23.2				30.7%				23.2				30.7%		
Retaining Wall	51.8			24.0			46.4%				24.0				46.4%				35.3				68.1%				35.3				68.1%			
Revetment	1,054.3				167.8				15.9%				205.5			19.5%				278.2				26.4%					452.2					
Seawall	287.0																		5.2				1.8%				19.9				6.9%			
Waterways and drainage																																		
Connector stream	9,641.0		1,785.8				18.5%				1,881.9				19.5%				1,926.6				20.0%				1,992.5				20.7%			
Watercourse channel drain	10,697.6		709.8				6.6%				1,853.3				17.3%				2,839.1				26.5%				3,073.8				28.7%			
Watercourse stream	52,139.1		574.2				1.1%				813.0				1.6%				1,505.3				2.9%				2,153.2				4.1%			
Transport																																		
Bridge	134.4		0.6				0.4%				0.6				0.4%				0.6				0.4%				10.4				7.8%			
Connector	102.5																													0.0%				
Foot bridge	42.9		39.4				92.0%				39.4				92.0%				39.4				92.0%				39.4				92.0%			
Ford	26.6																																	
Road	178,132.8	4,074.2	11,635.6			2.3%	6.5%			6,888.8	12,752.1			3.9%	7.2%			6,572.0	15,709.8			3.7%	8.8%			2,641.0	19,640.9			1.5%	11.0%			
Trail	4,680.7		10.8				0.2%				10.8				0.2%				76.7				1.6%				129.6				2.8%			
Utilities																																		
Drainage network - pipes	90,845.0	325.3	7,292.3			0.4%	8.0%			484.5	7,417.7			0.5%	8.2%			1,035.7	7,617.5			1.1%	8.4%			751.0	7,902.2			0.8%	8.7%			
Drinking Water	82,489.5		1,882.1	6,065.1			2.3%	7.4%			2,660.0	6,432.5			3.2%	7.8%			2,905.8	7,178.0			3.5%	8.7%			1,882.4	8,201.3			2.3%	9.9%		
Electricity - other	188,003.9	3,255.8	13,281.3			1.7%	7.1%			4,869.1	14,321.6			2.6%	7.6%			4,791.1	16,537.1			2.5%	8.8%			2,137.5	19,190.7			1.1%	10.2%			
Sewerage - pipes	89,862.0		3,238.0	8,987.4			3.6%	10.0%			4,163.0	9,535.2			4.6%	10.6%			4,860.3	10,808.4			5.4%	12.0%			3,381.4	12,287.3			3.8%	13.7%		
Telecommunications	301,453.6	4,136.4	17,978.3			1.4%	6.0%			9,167.1	19,633.9			3.0%	6.5%			9,868.7	22,114.7			3.3%	7.3%			3,182.4	28,801.0			1.1%	9.6%			
South Gippsland																																		
Coastal protection structures																																		
Levee	38,374.5			3,713.6				9.7%				6,850.1			17.9%				13,925.6				36.3%				20,358.5				53.1%			
Revetment	43.3				1.5				3.6%				8.7			20.2%				8.7				79.0%				40.5				100.0%		
Seawall	40.5			22.0				54.3%				22.0			54.3%				32.0															
Waterways and drainage																																		
Connector channel drain	506.3		142.7				28.2%				151.1				29.8%				183.8				36.3%				288.9				57.1%			
Connector river	33,410.9		16,201.2				48.5%				17,767.5				53.2%				18,353.7				54.9%				18,655.6				55.8%			
Connector stream	17,267.4		1,708.6				9.9%				1,986.8				11.5%				2,496.2				14.5%				2,622.1				15.2%			
Watercourse channel drain	108,633.2		20,122.3				18.5%				27,995.9				25.8%				43,122.7				39.7%				51,711.5				47.6%			
Watercourse stream	363,570.0		6,037.4				1.7%				8,199.9				2.3%				11,238.7				3.1%				13,670.1				3.8%			
Transport																																		
Bridge	476.3		56.9				11.9%				56.9				11.9%				72.5				15.2%				87.8				18.4%			
Road	363,935.5	4,734.4	7,865.3		1.3%		2.2%			6,571.8	9,495.6			1.8%	2.6%			6,979.8	12,599.8			1.9%	3.5%			3,512.1	16,067.5		1.0%	4.4%				
Trail	7,825.1		16.1				0.2%				23.0				0.3%				49.8				0.6%				180.6				2.3%			
Utilities																																		
Electricity - other	319,092.8	6,262.1	12,554.4			2.0%	3.9%			7,982.9	15,262.4			2.5%	4.8%			9,400.5	18,816.5			2.9%	5.9%			4,971.6	23,245.3			1.6%	7.3%			
Sewerage - pipes	22,304.5		54.0	3,320.3			0.2%	14.9%			62.7	3,352.9			0.3%	15.0%			198.9	3,374.3			0.9%	15.1%			157.7	3,415.6			0.7%	15.3%		
Telecommunications	449,133.1	13,106.6	20,934.7			2.9%	4.7%			15,772.2	26,734.0			3.5%	6.0%			13,807.6	34,041.3			3.1%	7.6%			5,342.8	42,506.1			1.2%	9.5%			
Grand Total	3,103,336.0	35,956.9	145,820.7	22,423.6	243.6	1.2%	4.7%	0.7%	0.0%	52,301.7	175,341.8	26,648.7	310.1	1.7%	5.7%	0.9%	0.0%	53,253.0	220,343.0	36,113.6	1.7%	404.9	1.7%	7.1%	1.2%	0.0%	22,822.8	261,202.7	45,583.0	632.1	0.7%	8.4%	1.5%	0.0%

Point features and assets

Table 30. Key observations of risk results for point features and assets

	Erosion	Permanent Inundation (frequent flooding by tides)	Temporary inundation (combined storm tide and catchment flooding)
Region-wide	<ul style="list-style-type: none">Assets at risk from erosion are predominant in electricity, sewerage and telecommunication networks.Point-based utility assets analysis closely aligns with risk analysis of the linear network.Some culturally significant sites are increasingly at risk of erosion. There are two locations currently at high risk, increasing to 5 locations at medium to high risk by 2040, 7 locations by 2070 and 8 locations by 2100.	<ul style="list-style-type: none">Assets at risk of permanent inundation are predominantly electricity, sewerage and telecommunication-related assets, typically aligned with the access roads to and through coastal settlements.Some culturally significant sites are currently at high risk to increasing exposure due to increasing sea levels, with two locations currently at high risk, out to 2100.	<ul style="list-style-type: none">Assets at risk from permanent inundation are similarly at risk of temporary inundation, and a greater number of assets are impacted by temporary events. However risk is lower in many cases (due to lower consequence of temporary inundation).Point-based utility assets align with risk analysis of the linear network. At risk features are predominantly electricity, sewerage and telecommunication related assets, typically aligned with the linear network and access roads to coastal settlements.Some culturally significant sites are currently at medium to significant risk of temporary inundation. Currently there are 6 at risk locations, increasing to 7 locations by 2040, out to 2100. By 2100, 6 of these 7 locations are at significant risk.
Inverloch	<ul style="list-style-type: none">A key facility for Inverloch, the Surf Life Saving Club, is at significant risk of erosion from 2040 onwards. Note that this assumes the current hazard protection geobag sand wall remains in place for the present day.For Inverloch, the point-based utility assets align with risk analysis of the linear network, and all utility types have with nodes and features currently exposed.Network nodes and features (especially electricity, sewerage and telecommunication) are increasingly at risk from erosion from 2040 onwards. Over 4% (~400) of telecommunication nodes are at medium to significant risk by 2040, increasing to 12% (~1200) by 2070 and 14% (~1400) by 2100. Over 12% Inverloch’s sewerage nodes are medium to significant risk to erosion by 2040, increasing to 34% by 2100. Drainage pits and outfalls as well as electricity network nodes and features (especially electricity, sewerage and telecoms) are increasingly at risk from erosion.The sewerage network is increasingly at risk from erosion, with 2 pump stations at medium risk by 2040, 6 pump stations medium to significant risk by 2070 and 9 pump stations by 2100.	<ul style="list-style-type: none">For Inverloch, the point-based utility assets align with risk analysis of the linear network with network nodes and features (drainage, electricity, sewerage and telecoms) are increasingly becoming exposed. There is a notable increase in at risk network nodes by 2070. At risk assets include power poles, telecommunications and drainage outfalls.Two sewerage pump stations are at significant risk by 2070 onwards.	<ul style="list-style-type: none">For Inverloch, and all utility types have with nodes and features currently exposed.Network nodes and features (especially electricity, sewerage and telecoms) are increasingly at risk to temporary inundation, with number of at-risk assets steadily increasing out to 2100, with over 1000 nodes/features at medium risk by 2100. Over 25% Inverloch’s sewerage nodes at medium risk by 2100.Inverloch’s sewerage network is increasingly at risk of temporary inundation, with almost 50% (8) sewerage pump stations currently at medium to significant risk. This increases to almost 60% (10) by 2070 onwards.
South Gippsland	<ul style="list-style-type: none">Erosion exposure and risk is limited to a small number of utility network nodes (electricity, sewerage and telecoms), with less than 10 assets with medium to significant risk by 2100.	<ul style="list-style-type: none">Network nodes and features (electricity, sewerage and telecoms) are increasingly becoming exposed. By 2100, almost 20% of sewerage node and 15% valves are at medium to significant risk.At risk assets include power poles, telecommunications and sewerage nodes.	<ul style="list-style-type: none">Network nodes and features (especially electricity, sewerage and telecoms) are increasingly at risk of temporary inundation, with number of at-risk assets steadily increasing out to 2100, with almost 600 nodes/features at medium risk by 2100.At risk assets include power poles, telecommunications and sewerage nodes. Almost 30 % of the South Gippsland reporting locality’s sewerage nodes are currently at and remain at medium risk out to 2100. Over 200 (3%) of the area’s telecommunications nodes are at medium risk, with 350 (5%) by 2070 and almost 500 (7%) by 2100
Bass Coast	<ul style="list-style-type: none">No point-based features assets have been identified as at risk from erosion hazards for the Bass locality area.	<ul style="list-style-type: none">Exposure and risk is limited to small number of utility network nodes, which are currently at risk.	<ul style="list-style-type: none">Some culturally significant sites are currently at significant to high risk from increasing exposure due to temporary flooding.Exposure and risk are limited small number of utility network nodes which are currently at risk.

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 31. Risk results (erosion) for point features and assets – number at risk, and % at risk relative to all assets in the region

		Risk rating:																										Low		Medium		Significant		High					
																												Low		Med		Sign		High					
Point assets	Total number	Erosion																																					
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR													
		No.				%				No.				%				No.				%				No.				%									
Low		Med		Sign		High		Low		Med		Sign		High		Low		Med		Sign		High		Low		Med		Sign		High		Low		Med		Sign		High	
Bass																																							
Facilities																																							
BBQ	1																																						
Community facilities	1																																						
Playgrounds	2																																						
Surf lifesaving clubs	2																																						
Utilities																																							
Drainage network - outfalls	186																																						
Drainage network - pits	880																																						
Electricity - poles	701																																						
Sewerage - node	170																																						
Sewerage - pipe valve	28																																						
Telecommunications	2505																																						
Inverloch																																							
Cultural																																							
Artefact Scatter	6										2				33.3%					1			2		16.7%		33.3%					3			50.0%				
Shell Midden	6				1			16.7%			1		1	16.7%		16.7%				1		2		16.7%		33.3%			2		33.3%			33.3%					
Stone Feature	1				1			100.0%					1			100.0%						1				100.0%				1					100.0%				
Facilities																																							
Community facilities	2																																						
Playgrounds	5																																						
Surf lifesaving clubs	1												1			100.0%							1				100.0%				1				100.0%				
Utilities																																							
Drainage network - outfalls	272		2				0.7%			9	10			3.3%	3.7%				18	17			6.6%	6.3%				22	19			8.1%	7.0%						
Drainage network - pits	2821									66	7			2.3%	0.2%				200	16			7.1%	0.6%				266	34			9.4%	1.2%						
Electricity - poles	1716									86	5			5.0%	0.3%				173	28			10.1%	1.6%				191	41			11.1%	2.4%						
Sewerage - node	201										23	2			11.4%	1.0%			48	8			23.9%	4.0%				54	13			26.9%	6.5%						
Sewerage - pipe valve	37									3	1			8.1%	2.7%				18	3			48.6%	8.1%				18	3			48.6%	8.1%						
Telecommunications	10026			1			0.0%				407	2			4.1%	0.0%			1121	67			11.2%	0.7%				1234	152			12.3%	1.5%						
South Gippsland																																							
Facilities																																							
Community facilities	3																																						
Playgrounds	2																																						
Surf lifesaving clubs	1																																						
Utilities																																							
Electricity - poles	2014																																		0.0%				
Sewerage - node	105		4				3.8%				5				4.8%					5				4.8%					1		5			4.8%					
Sewerage - pipe valve	46										1			2.2%					1				2.2%					1				2.2%							
Telecommunications	6665																			2				0.0%					2					0.0%					
Grand Total	28406		2	5			0.0%	0.0%		164	454	9	1	0.6%	1.6%	0.0%	0.0%		409	1234	82		1	1.4%	4.3%	0.3%	0.0%	497	1387	172		1	1.7%	4.9%	0.6%	0.0%			

Sewer Pumpstations	Total number	Erosion																																
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR								
		No.				%				No.				%				No.				%				No.				%				
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High					
Bass																																		
Sewerage - pump station	9																																	
Inverloch																																		
Sewerage - pump station	17										2				11.8%					4	2			23.5%	11.8%				7	2			41.2%	11.8%
Sewerage - WWTP	7																																	
Grand Total	33										2								4	2								7	2					

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 32. Risk results (permanent inundation) for point features and assets – total number at risk, and % at risk relative to all assets in the Shire

[illegible]

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 33 Risk results (temporary inundation - combined storm tide and catchment flooding) for point features and assets – total number at risk, and % at risk relative to all assets in the region

Risk rating:	Low	Medium	Significant	High
	Low	Med	Sign	High

Point assets	Total number	Storm tide inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		No.				%				No.				%				No.				%				No.				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High				
Bass																																	
Facilities																																	
BBQ	1																																
Community facilities	1																																
Playgrounds	2																																
Surf lifesaving clubs	2																																
Utilities																																	
Drainage network - outfalls	186			1					0.5%								0.5%											1			0.5%		
Drainage network - pits	880		1						0.1%								0.1%										1				0.1%		
Electricity - poles	701		3		1				0.4%					5		1			0.7%								6		1		0.9%		
Sewerage - node	170																										6		1		0.9%		
Sewerage - pipe valve	28																																
Telecommunications	2505																																
Inverloch																																	
Cultural																																	
Artefact Scatter	6			2					33.3%								33.3%												2			33.3%	
Shell Midden	6			2		1			33.3%					2		2			33.3%								1		3		50.0%		
Stone Feature	1			1					100.0%									100.0%											1			100.0%	
Facilities																																	
Community facilities	2																																
Playgrounds	5																																
Surf lifesaving clubs	1																																
Utilities																																	
Drainage network - outfalls	272		84						30.9%					93					34.2%									85		10		31.3%	
Drainage network - pits	2821		273						9.7%					280					9.9%									296		1		10.5%	
Electricity - poles	1716		164						9.6%					186		1			10.8%		0.1%							201		10		11.7%	
Sewerage - node	201		13		28				6.5%		13.9%			22		32			10.9%		15.9%							9		54		4.5%	
Sewerage - pipe valve	37		11						29.7%					12					32.4%									9		5		24.3%	
Telecommunications	10026		116		701				1.2%		7.0%			182		759			1.8%		7.6%							112		941		1.1%	
South Gippsland																																	
Facilities																																	
Community facilities	3																	1									1				33.3%		
Playgrounds	2		1						50.0%					1					50.0%									1				50.0%	
Surf lifesaving clubs	1																																
Utilities																																	
Electricity - poles	2014		99		5				4.9%		0.2%			128		12			6.4%		0.6%							117		55		5.8%	
Sewerage - node	105				31				29.5%							31				29.5%									31		29.5%		
Sewerage - pipe valve	46		12		1				26.1%		2.2%			12		1			26.1%		2.2%							6		7		13.0%	
Telecommunications	6665		134		218				2.0%		3.3%			227		259			3.4%		3.9%							71		486		1.1%	
Grand Total	32894		915		997				2.8%		3.0%			1155		1108			3.5%		3.4%							922		1605		2.8%	

Sewer Pumpstations	Total number	Storm tide inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		No.				%				No.				%				No.				%				No.				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High				
Bass																																	
Sewerage - pump station	9																																
Inverloch																																	
Sewerage - pump station	17		2	6		11.8%	35.3%				1	7		5.9%	41.2%			2	8		11.8%	47.1%			2	8		11.8%	47.1%				
Sewerage - WWTP	7																																
Grand Total	33		2	6							1	7						2	8							2	8						

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Natural (environmental) values and assets – native vegetation, wetlands, offshore environments and groundwater dependant ecosystems

Table 34. Key observations of risk results for natural values and assets

	Erosion	Permanent Inundation (frequent flooding by tides)	Temporary inundation (combined storm tide and catchment flooding)
Region-wide	<ul style="list-style-type: none">• Mangroves and saltmarsh communities are increasingly at risk of erosion, particularly within Anderson Inlet.• Coastal dune scrub and grasslands areas are increasingly at risk of erosion, with almost all these vegetation communities located within Inverloch being at risk of erosion by 2070.	<ul style="list-style-type: none">• Mangrove communities are increasingly at risk of permanent inundation, with almost all existing mangrove communities at risk by 2100.• Saltmarsh communities are increasingly at risk of permanent inundation, particularly within Anderson Inlet.• A wide range of native vegetation species (including scrub grassland, woodlands and heathlands) are increasingly at risk of permanent inundation, particularly within Anderson Inlet.	<ul style="list-style-type: none">• Mangroves and saltmarsh communities are increasingly at risk of temporary inundation particularly within Anderson Inlet.• A wide range of native vegetation species (including scrub grassland, woodlands and heathlands) are increasingly at risk of temporary inundation, particularly within Anderson Inlet.
Inverloch	<ul style="list-style-type: none">• Almost 32 Ha of native vegetation (including coastal and swamp scrub and grassland, woodlands and heathlands) is currently at medium to significant risk of erosion, increasing to 46 Ha by 2040, 52 Ha by 2070 and over 58 Ha by 2100.• Over 50% (21 Ha) of Inverloch’s coastal headland scrub is currently at medium to significant risk, increasing slightly by 2100 to 52% (~22 Ha)• Over 37% (~8 Ha) of Inverloch’s coastal dune scrub and grassland is currently at medium to significant risk, increasing to over 90% by (~20 Ha), almost 100% (~22 Ha) by 2070 and 2100.	<ul style="list-style-type: none">• Almost 21 Ha of native vegetation (including coastal and swamp scrub and grassland, woodlands and heathlands) is currently at medium to significant risk of permanent inundation, increasing to 24 Ha by 2040, 36 Ha by 2070 and over 45 Ha by 2100.• Over 29% (12 Ha) of Inverloch’s coastal headland scrub is currently at medium to significant risk of permanent inundation, increasing slightly by 2100 to 34% (~14 Ha)• Over 11% (~3 Ha) of Inverloch’s wet heathland is currently at medium to significant risk of permanent inundation, increasing to 53% (~135 Ha) by 2100.	<ul style="list-style-type: none">• Almost 62 Ha of native vegetation (including coastal and swamp scrub and grassland, woodlands and heathlands) is currently at medium to significant risk of temporary inundation, increasing to 70 Ha by 2040, 79 Ha by 2070 and over 90 Ha by 2100.• Over 39% (~16 Ha) of Inverloch’s coastal headland scrub is currently at medium risk of temporary inundation, increasing slightly by 2100 to 41% (~17 Ha)• Over 42% (~9 Ha) of Inverloch’s coastal dune scrub and grassland is currently at medium risk of temporary inundation, increasing slightly by 2100 to 70% (~15 Ha)• Over 55% (~14 Ha) of Inverloch’s wet heathland is currently at medium risk of temporary inundation, increasing to 79% (~20 Ha) by 2100.
South Gippsland	<ul style="list-style-type: none">• Almost 2% (~3 Ha) of coastal saltmarsh is presently at significant risk of erosion, increasing to 4% (~8 Ha) by 2040, 9% (~16 Ha) by 2070 and 14% (~26 Ha) by 2100• Over 51% (~35 Ha) of mangroves are presently at significant risk of erosion, increasing to 55% (~37 Ha) by 2040, 60% (~40 Ha) by 2070 and 66% (~45 Ha) by 2100• More than 60 Ha of native vegetation (including coastal and swamp scrub and grassland, woodlands and heathlands) is currently at medium to significant risk of erosion, increasing to 87 Ha by 2040, 126 Ha by 2070 and over 167 Ha by 2100.	<ul style="list-style-type: none">• Almost 15% (~28 Ha) of coastal saltmarsh is presently at significant risk of permanent inundation, increasing to 47% (~88 Ha) by 2040, 83% (~155 Ha) by 2070 and 85% (~160 Ha) by 2100.• Over 55% (~37 Ha) of mangroves are presently at significant risk of permanent inundation, increasing to 85% (~57 Ha) by 2040, 99% (~67 Ha) by 2070 and almost 100% (~68 Ha) by 2100. <p>More than 130 Ha of native vegetation (including coastal, estuary and swamp scrub and grasslands, woodlands and heathlands) is currently at medium to significant risk of permanent inundation, increasing to 185 Ha by 2040, 290 Ha by 2070 and over 324 Ha by 2100.</p>	<ul style="list-style-type: none">• Almost 15% (~28 Ha) of coastal saltmarsh is presently at medium risk of temporary inundation, increasing to 47% (~88 Ha) by 2040, 83% (~155 Ha) by 2070 and 85% (~160 Ha) by 2100.• Over 55% (~37 Ha) of mangroves are presently at medium risk of temporary inundation, increasing to 85% (~57 Ha) by 2040, 99% (~67 Ha) by 2070 and almost 100% (~68 Ha) by 2100. <p>More than 215 Ha of native vegetation (including coastal, estuary and swamp scrub and grasslands, woodlands and heathlands) is currently at medium to significant risk of temporary inundation, increasing to 265 Ha by 2040, 357 Ha by 2070 and over 385 Ha by 2100.</p>
Bass Coast	<ul style="list-style-type: none">• More than 23 Ha of native vegetation (including coastal dune scrub and grassland, headland scrub, wet heathland) is currently at medium to significant risk of erosion, increasing to over 25 Ha by 2100.	<ul style="list-style-type: none">• More than 14 Ha of native vegetation (including coastal dune scrub and grassland, headland scrub, wet heathland) is currently at medium to significant risk of permanent inundation, increasing to over 45 Ha by 2100.	<ul style="list-style-type: none">• More than 42 Ha of native vegetation (including coastal dune scrub and grassland, headland scrub, wet heathland) is currently at medium to significant risk of temporary inundation, increasing to almost 48 Ha by 2100.

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 35. Risk results (erosion) for natural values and assets – total area at risk, and % at risk relative to total area in the reporting region

Native vegetation	Total area (m²)	Erosion																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High		
Bass																																	
Coast Banksia Woodland/Coastal Dune Scrub Mosaic	312,565.0																																
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	302,864.3		128.6	154,076.7			0.0%	50.9%			663.7	155,125.7			0.2%	51.2%			168.6	155,620.8			0.1%	51.4%				155,789.4			51.4%		
Coastal Headland Scrub	373,122.7		1.4	73,553.7			0.0%	19.7%			1.3	73,559.2			0.0%	19.7%			20.1	73,567.8			0.0%	19.7%				21.2	73,571.1		0.0%	19.7%	
Damp Heathy Woodland/Lowland Forest Mosaic	2,733.8																																
Damp Sands Herb-rich Woodland	1,450,983.4																																
Damp Sands Herb-rich Woodland/Swamp Scrub Mosaic	493,109.9																																
Grassy Woodland/Swamp Scrub Mosaic	321,095.4																																
Sand Heathland/Wet Heathland Mosaic	217,637.4																																
Swamp Scrub	350,787.7																																
Wet Heathland	203,574.8		0.0	7,598.7			0.0%	3.7%			3,013.7	8,656.4			1.5%	4.3%			11,169.5	9,978.7			5.5%	4.9%				12,406.3	11,775.7		6.1%	5.8%	
Inverloch																																	
Coast Banksia Woodland	27,471.1		144.1	1,368.4			0.5%	5.0%			1,318.2	2,812.2			4.8%	10.2%			4,575.1	3,546.7			16.7%	12.9%				14,575.2	4,185.6		53.1%	15.2%	
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	213,903.2		5,051.7	79,552.8			2.4%	37.2%			78,049.6	117,574.0			36.5%	55.0%			64,181.3	149,036.2			30.0%	69.7%				35,564.6	177,652.9		16.6%	83.1%	
Coastal Headland Scrub	418,882.3		354.7	211,804.4			0.1%	50.6%			3,096.7	214,858.6			0.7%	51.3%			505.9	217,449.3			0.1%	51.9%				217,955.3			52.0%		
Damp Heathy Woodland/Lowland Forest Mosaic	93,342.4																																
Damp Sands Herb-rich Woodland	5,975,589.7																		5,381.7				0.1%					11,198.5			0.2%		
Estuarine Wetland/Estuarine Swamp Scrub Mosaic	304,759.0																																
Grassy Woodland/Swamp Scrub Mosaic	383,009.0																																
Sand Heathland/Wet Heathland Mosaic	25,241.6																																
Swamp Scrub	843,310.0																			3,400.2				0.4%				0.0	11,118.0		0.0%	1.3%	
Wet Heathland	254,415.8		37.4	19,202.2			0.0%	7.5%			21,266.8	22,968.2			8.4%	9.0%			34,873.8	40,379.2			13.7%	15.9%				50,592.7	57,013.3		19.9%	22.4%	
South Gippsland																																	
Coast Banksia Woodland	2,080,532.6		0.0	5,142.8			0.0%	0.2%				5,318.4				0.3%				5,525.4				0.3%					5,905.9			0.3%	
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	29,193,527.2		17,528.2	561,469.9			0.1%	1.9%			18,450.2	795,190.5			0.1%	2.7%			19,146.6	1,179,726.4			0.1%	4.0%				20,700.1	1,573,591.6		0.1%	5.4%	
Coastal Headland Scrub	4,326,259.1		101.0	8,331.6			0.0%	0.2%			116.4	9,297.2			0.0%	0.2%			145.0	11,037.2			0.0%	0.3%				264.9	13,713.3		0.0%	0.3%	
Coastal Saltmarsh	1,874,560.2			33,843.8				1.8%				77,185.3				4.1%			0.0	164,661.5			0.0%	8.8%				21.1	264,360.8		0.0%	14.1%	
Coastal Tussock Grassland	181,723.9																																
Damp Forest	298,084.8																																
Damp Heathy Woodland/Lowland Forest Mosaic	9,504,711.8																																
Damp Sands Herb-rich Woodland	4,029,316.5			442.5				0.0%			0.0	442.5			0.0%	0.0%			0.0	442.5			0.0%	0.0%				0.0	442.5		0.0%	0.0%	
Damp Sands Herb-rich Woodland/Swamp Scrub Complex	4,698,182.6																																
Estuarine Wetland/Estuarine Swamp Scrub Mosaic	851,635.7			23,117.4				2.7%			0.0	24,605.9			0.0%	2.9%			0.0	27,587.3			0.0%	3.2%				0.0	31,439.6		0.0%	3.7%	
Heathy Woodland	532,158.2																																
Lowland Forest	2,569.1																																
Mangrove Shrubland	675,583.5			348,045.0				51.5%				368,577.1				54.6%			0.0	405,051.9			0.0%	60.0%				0.0	448,187.3		0.0%	66.3%	
Riparian Scrub	1,674,302.5																																
Sandy Beach	1,461,955.6		0.0	18,910.5	297,119.8		0.0%	1.3%	20.3%			19,678.6	377,718.1			1.3%	25.8%		0.0	19,782.8	511,286.2			0.0%	1.4%	35.0%		18,097.9	629,532.2		1.2%	43.1%	
Swamp Scrub	4,149,871.0			14.0				0.0%				14.0				0.0%				14.0				0.0%					14.0			0.0%	
Swamp Scrub/Damp Sands Herb-rich Woodland/Wet Heathland Mosaic	39,344.2																																
Swamp Scrub/Wet Heathland Mosaic	1,743,385.5																																
Swampy Riparian Woodland	1,771,548.8			5,862.0				0.3%				6,048.3				0.3%				6,346.0				0.4%				0.0	6,651.7		0.0%	0.4%	
Wet Heathland	7,386,723.0			4,754.1				0.1%				9,519.4				0.1%			0.0	16,077.3			0.0%	0.2%				0.0	20,740.1		0.0%	0.3%	
Grand Total	89,044,374.4		23,347.1	1,557,090.5	297,119.8		0.0%	1.7%	0.3%		125,976.7	1,911,431.6	377,718.1		0.1%	2.1%	0.4%		140,167.7	2,489,231.4	511,286.2		0.2%	2.8%	0.6%		145,344.7	3,092,206.1	629,532.2		0.2%	3.5%	0.7%

Wetlands	Total area (m²)	Erosion																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Bass																																	
Coastal saltmarsh	191,838.0			2,692.4				1.4%				3,139.4				1.6%				3,936.4				2.1%				5,120.0				2.7%	
Estuary	6,464,660.6		6,348,163.5				98.2%				6,358,137.7				98.4%				6,362,927.4				98.4%				6,366,635.3			98.5%			
Permanent freshwater swamps	46,370.8																																
Temporary freshwater lakes	13,525.2																																
Temporary freshwater swamps	673,645.1																																
Unknown	112,071.1																																
Inverloch																																	
Coastal saltmarsh	75,436.9			1,766.1				2.3%				6,785.4				9.0%				18,579.6				24.6%				30,794.7			84.9%	40.8%	
Estuary	201,823.3		126,129.6				62.5%				149,437.5				74.0%				167,697.1				83.1%				171,400.5						
Permanent freshwater lakes	194,136.8																																
Temporary freshwater swamps	186,907.1																																
Unknown	86,566.2																																
South Gippsland																																	
Coastal saltmarsh	6,304,193.5			14,238.3				0.2%				29,259.7				0.5%				61,985.4				1.0%				109,182.3			86.9%	1.7%	
Estuary	17,933,984.9		15,327,031.1				85.5%				15,385,998.2				85.8%				15,478,254.1				86.3%				15,579,653.5						
Permanent freshwater lakes	39,285.2																																
Permanent freshwater swamps	93,249.7																																
Temporary freshwater lakes	18,393.5																																
Temporary freshwater swamps	583,894.9																																
Temporary saline swamps	167,848.6																																
Unknown	969,604.5																																
Grand Total	34,357,435.9		21,801,324.1	18,696.8			63.5%	0.1%			21,893,573.4	39,184.5		63.7%	0.1%			22,008,878.6	84,501.4			64.1%	0.2%			22,117,689.3	145,097.0		64.4%	0.4%			

Offshore environments (Seamap Australia)	Total area (m²)	Erosion																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Coarse Sediment	7,153,448.9																																
Hard Substrata	5,834,515.0																																
Mangroves	1,907,173.8			818,282.7				42.9%				854,775.8				44.8%				913,507.6				47.9%			0.0	984,254.2			0.0%	51.6%	
Mixed Biota	20,802,463.0		13,288,420.9				63.9%				13,288,420.9				63.9%				13,288,082.0				63.9%				13,288,420.9				63.9%		
Mixed Hard/Soft Substrata	750,474.6																																
Mixed Macrophytes	11,110,638.8		8,458,727.8				76.1%				8,458,727.8				76.1%				8,457,905.3				76.1%				8,458,727.8				76.1%		
Mixed Soft Substrata	12,680,880.1																																
Saltmarsh	6,707,988.7			898,798.1				13.4%			1,144.6	977,706.9			0.0%	14.6%			5,056.5	1,118,714.6			0.1%	16.7%			12,923.9	1,249,874.9			0.2%	18.6%	
Sand	213,111.1																																
Seagrass	4,428,787.0																																
Soft Substrata	38,852,974.7																																
Grand Total	110,442,455.7		21,747,148.7	1,717,080.8			19.7%	1.6%			21,748,293.3	1,832,482.6			19.7%	1.7%			21,751,043.9	2,032,222.2			19.7%	1.8%			21,760,072.6	2,234,129.1			19.7%	2.0%	

Groundwater Dependent Ecosystems	Total area (m²)	Erosion																																
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR								
		m²				%				m²				%				m²				%				m²				%				
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	
Bass																																		
Flood plains and morasses	3,879,388.3																																	
Hills and low hills	100,942.9																																	
Plains with dunes	179,807.5																																	
Plains without dunes	44,867.3																																	
Ranges	667,621.3		15.6	21,106.9			0.0%	3.2%			15.7	21,172.5			0.0%	3.2%			38.4	21,285.0			0.0%	3.2%			82.8	21,332.8			0.0%	3.2%		
Tidal	74,394.7																																	
Inverloch																																		
Coastal barriers	37,042.8		3.4				0.0%				21,456.3	331.1		57.9%	0.9%				23,684.4	6,792.3			63.9%	18.3%			13,444.5	18,173.0			36.3%	49.1%		
Flood plains and morasses	1,167,910.2																																	
Plains with dunes	935,330.5																																	
Plains without dunes	1,371,645.9		2,854.3	13,447.0			0.2%	1.0%			89,757.7	34,305.3		6.5%	2.5%				119,639.9	70,872.6			8.7%	5.2%			108,761.1	98,016.3			7.9%	7.1%		
Ranges	4,917,814.5			7,965.4			0.2%				680.7	8,035.1		0.0%	0.2%				18,474.8	15,292.1			0.4%	0.3%			37,835.0	33,139.9			0.8%	0.7%		
Tidal	24,531.0																		226.6				0.9%				0.0	2,029.8			0.0%	8.3%		
South Gippsland																																		
General groundwater dependant ecosystems	809.7																																	
Coastal barriers	8,392,379.3		200.7	85,850.3			0.0%	1.0%			289.8	210,963.2		0.0%	2.5%				516.1	423,049.4			0.0%	5.0%			1,152.1	665,086.3			0.0%	7.9%		
Dissected plains	2,389,823.3																																	
Flood plains and morasses	18,966,120.1		370.2	6,662.8			0.0%	0.0%			649.3	11,514.2		0.0%	0.1%				1,428.9	26,976.8			0.0%	0.1%			2,860.7	53,489.7			0.0%	0.3%		
Hills and low hills	8,607,373.2																																	
Plains with dunes	5,476,688.5																																	
Plains without dunes	1,065,948.8																																	
Prior stream plains	44,952.5																																	
Ranges	2,839,785.5																																	
Tidal	1,616,542.4		568.4				0.0%				587.3			0.0%					607.0				0.0%				629.7				0.0%			
Grand Total	62,801,720.3		4,012.8	135,032.4			0.0%	0.2%			113,436.8	286,321.4		0.2%	0.5%				164,616.1	564,268.2			0.3%	0.9%			0.0	166,795.8	889,237.9			0.0%	0.3%	1.4%

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 36. Risk results (permanent inundation) for natural values and assets – total area at risk, and % at risk relative to total area in the reporting region

Native vegetation	Total area (m²)	Permanent Inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR												2100 - 0.8 m SLR			
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Bass																																	
Coast Banksia Woodland/Coastal Dune Scrub Mosaic	312,565.0			1,708.1				0.5%				2,139.6				0.7%				3,166.8				1.0%				4,549.5				1.5%	
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	302,864.3			140,907.8				46.5%				142,545.9				47.1%				146,244.5				48.3%				171,443.8				56.6%	
Coastal Headland Scrub	373,122.7			29,600.3				7.9%				33,971.5				9.1%				44,004.5				11.8%				52,589.7				14.1%	
Damp Heathy Woodland/Lowland Forest Mosaic	2,733.8																																
Damp Sands Herb-rich Woodland	1,450,983.4																																
Damp Sands Herb-rich Woodland/Swamp Scrub Mosaic	493,109.9																																
Grassy Woodland/Swamp Scrub Mosaic	321,095.4																																
Sand Heathland/Wet Heathland Mosaic	217,637.4																																
Swamp Scrub	350,787.7			4,787.0				1.4%				9,677.6				2.8%				37,309.1				10.6%				44,961.4				12.8%	
Wet Heathland	203,574.8			28,709.9				14.1%				76,254.7				37.5%				161,722.6				79.4%				177,939.2				87.4%	
Inverloch																																	
Coast Banksia Woodland	27,471.1			620.4				2.3%				720.5				2.6%				720.5				2.6%				830.4				3.0%	
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	213,903.2			6,963.6				3.3%				8,536.1				4.0%				15,351.8				7.2%				26,578.4				12.4%	
Coastal Headland Scrub	418,882.3			123,725.7				29.5%				127,992.0				30.6%				135,984.5				32.5%				143,756.1				34.3%	
Damp Heathy Woodland/Lowland Forest Mosaic	93,342.4																																
Damp Sands Herb-rich Woodland	5,975,589.7			747.2				0.0%				814.5				0.0%				2,744.6				0.0%				4,488.7				0.1%	
Estuarine Wetland/Estuarine Swamp Scrub Mosaic	304,759.0			43,583.3				14.3%				54,861.4				18.0%				77,519.3				25.4%				100,897.5				33.1%	
Grassy Woodland/Swamp Scrub Mosaic	383,009.0																																
Sand Heathland/Wet Heathland Mosaic	25,241.6																																
Swamp Scrub	843,310.0			2,131.1				0.3%				7,312.4				0.9%				27,335.5				3.2%				42,928.7				5.1%	
Wet Heathland	254,415.8			28,802.6				11.3%				41,505.2				16.3%				103,647.6				40.7%				134,905.1				53.0%	
South Gippsland																																	
Coast Banksia Woodland	2,080,532.6			293,067.0				14.1%				362,579.6				17.4%				449,429.1				21.6%				466,232.2				22.4%	
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	29,193,527.2			106,744.3				0.4%				116,140.6				0.4%				143,785.1				0.5%				193,722.4				0.7%	
Coastal Headland Scrub	4,326,259.1			22,459.2				0.5%				28,311.6				0.7%				35,904.1				0.8%				42,242.3				1.0%	
Coastal Saltmarsh	1,874,560.2			278,935.3				14.9%				875,967.9				46.7%				1,547,290.6				82.5%				1,597,915.6				85.2%	
Coastal Tussock Grassland	181,723.9			7,366.9				4.1%				9,978.4				5.5%				15,154.3				8.3%				19,399.8				10.7%	
Damp Forest	298,084.8			980.1				0.3%				1,470.3				0.5%				2,362.7				0.8%				2,952.9				1.0%	
Damp Heathy Woodland/Lowland Forest Mosaic	9,504,711.8																																
Damp Sands Herb-rich Woodland	4,029,316.5			4,600.7				0.1%				6,706.8				0.2%				14,360.2				0.4%				26,815.2				0.7%	
Damp Sands Herb-rich Woodland/Swamp Scrub Complex	4,698,182.6			9,626.5				0.2%				17,599.7				0.4%				44,827.7				1.0%				61,268.0				1.3%	
Estuarine Wetland/Estuarine Swamp Scrub Mosaic	851,635.7			234,113.4				27.5%				481,541.7				56.5%				790,228.4				92.8%				819,227.6				96.2%	
Heathy Woodland	532,158.2																																
Lowland Forest	2,569.1																																
Mangrove Shrubland	675,583.5			367,861.2				54.5%				571,020.6				84.5%				671,120.5				99.3%				675,104.7				99.9%	
Riparian Scrub	1,674,302.5																																
Sandy Beach	1,461,955.6				9,861.5				0.7%				12,853.4				0.9%				18,917.3				1.3%				25,516.5				1.7%
Swamp Scrub	4,149,871.0			85,007.6				2.0%				132,822.0				3.2%				292,001.3				7.0%				371,537.6				9.0%	
Swamp Scrub/Damp Sands Herb-rich Woodland/Wet Heathland Mosaic	39,344.2																																
Swamp Scrub/Wet Heathland Mosaic	1,743,385.5																																
Swampy Riparian Woodland	1,771,548.8			485,162.4				27.4%				592,357.0				33.4%				961,376.1				54.3%				1,068,725.9				60.3%	
Wet Heathland	7,386,723.0			53,557.5				0.7%				102,114.6				1.4%				157,403.9				2.1%				170,205.9				2.3%	
Grand Total	89,044,374.4			2,361,769.2	9,861.5			2.7%	0.0%			3,804,942.4	12,853.4			4.3%	0.0%			5,880,995.2	18,917.3			6.6%	0.0%			6,421,218.8	25,516.5			7.2%	0.0%

Wetlands	Total area (m²)	Permanent Inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR												2100 - 0.8 m SLR			
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Bass																																	
Coastal saltmarsh	191,838.0			20,903.0				10.9%				58,409.0				30.4%				165,186.3				86.1%				187,009.8				97.5%	
Estuary	6,464,660.6		6,382,271.8					98.7%			6,408,951.5					99.1%			6,421,896.4				99.3%				6,429,950.3				99.5%		
Permanent freshwater swamps	46,370.8																																
Temporary freshwater lakes	13,525.2																																
Temporary freshwater swamps	673,645.1																																
Unknown	112,071.1																																
Inverloch																																	
Coastal saltmarsh	75,436.9			1,383.3				1.8%				3,271.9				4.3%				45,574.8				60.4%				58,306.6				77.3%	
Estuary	201,823.3		119,874.9					59.4%			131,385.4					65.1%			149,455.8				74.1%				165,743.5				82.1%		
Permanent freshwater lakes	194,136.8																		</														

Offshore environments (Seamap Australia)	Total area (m²)	Permanent Inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High				
Coarse Sediment	7,153,448.9		6,903,564.8				96.5%				6,921,931.4				96.8%				6,972,756.0				97.5%				7,032,772.6			98.3%			
Hard Substrata	5,834,515.0		5,833,622.9				100.0%				5,833,688.3				100.0%				5,833,688.3				100.0%				5,833,769.3			100.0%			
Mangroves	1,907,173.8			1,663,935.7				87.2%				1,876,745.1			98.4%					1,899,447.7			99.6%				1,901,580.1			99.7%			
Mixed Biota	20,802,463.0		20,691,111.2				99.5%				20,692,486.5				99.5%				20,694,678.4				99.5%				20,747,121.7			99.7%			
Mixed Hard/Soft Substrata	750,474.6		750,474.6				100.0%				750,474.6				100.0%				750,474.6				100.0%				750,474.6			100.0%			
Mixed Macrophytes	11,110,638.8		11,083,930.0				99.8%				11,084,243.4				99.8%				11,084,524.0				99.8%				11,098,609.1			99.9%			
Mixed Soft Substrata	12,680,880.1		11,753,225.9				92.7%				11,979,250.9				94.5%				12,051,359.5				95.0%				12,108,000.6			95.5%			
Saltmarsh	6,707,988.7			2,746,923.4				41.0%				4,393,545.8			65.5%				6,091,629.2				90.8%				6,357,911.7			94.8%			
Sand	213,111.1		213,111.1				100.0%				213,111.1				100.0%				213,111.1				100.0%				213,111.1			100.0%			
Seagrass	4,428,787.0		4,422,050.4				99.8%				4,422,255.1				99.9%				4,422,801.8				99.9%				4,425,539.5			99.9%			
Soft Substrata	38,852,974.7		38,847,519.3				100.0%				38,847,519.3				100.0%				38,847,519.3				100.0%				38,849,695.2			100.0%			
Grand Total	110,442,455.7		100,498,610.1	4,410,859.1			91.0%	4.0%			100,744,960.6	6,270,290.9			91.2%	5.7%			100,870,912.9	7,991,076.9			91.3%	7.2%			101,059,093.7	8,259,491.8		91.5%	7.5%		

Groundwater Dependent Ecosystems	Total area (m²)	Permanent Inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High		
Bass																																	
Flood plains and morasses	3,879,388.3																																
Hills and low hills	100,942.9																																
Plains with dunes	179,807.5																																
Plains without dunes	44,867.3																																
Ranges	667,621.3			212.8				0.0%				413.4			0.1%				541.6			0.1%						835.0			0.1%		
Tidal	74,394.7		11,133.9					15.0%				35,807.4			48.1%				71,881.8			96.6%					72,548.7			97.5%			
Inverloch																																	
Coastal barriers	37,042.8																		74.8			0.2%					864.8			2.3%			
Flood plains and morasses	1,167,910.2			5,001.3				0.4%				6,105.0			0.5%				9,135.7			0.8%					13,053.9			1.1%			
Plains with dunes	935,330.5																																
Plains without dunes	1,371,645.9																		165.6			0.0%					3,102.6			0.2%			
Ranges	4,917,814.5			28,236.0				0.6%				47,002.6			1.0%				108,729.0			2.2%					191,237.9			3.9%			
Tidal	24,531.0		6,777.6					27.6%				11,005.8			44.9%				18,521.2			75.5%					19,926.6			81.2%			
South Gippsland																																	
General groundwater dependant ecosystems	809.7																																
Coastal barriers	8,392,379.3			327,310.7				3.9%				797,875.2			9.5%				1,336,627.1			15.9%					1,406,172.9			16.8%			
Dissected plains	2,389,823.3			41.0				0.0%				41.0			0.0%				4,718.2			0.2%					7,340.5			0.3%			
Flood plains and morasses	18,966,120.1			136,182.1				0.7%				252,299.9			1.3%				649,354.8			3.4%					758,331.7			4.0%			
Hills and low hills	8,607,373.2																																
Plains with dunes	5,476,688.5																										199.8			0.0%			
Plains without dunes	1,065,948.8																										2,804.5			0.3%			
Prior stream plains	44,952.5																																
Ranges	2,839,785.5																																
Tidal	1,616,542.4		947,032.5					58.6%				1,272,021.7			78.7%				1,506,577.0			93.2%					1,555,645.7			96.2%			
Grand Total	62,801,720.3		964,943.9	496,983.9			1.5%	0.8%	2.1%			1,318,834.9	1,103,737.1		2.1%	1.8%			1,596,980.0	2,109,346.9		2.5%	3.4%	2.6%		1,648,121.1	2,383,943.6		2.6%	3.8%			

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 37. Risk results (temporary inundation - combined storm tide and catchment flooding) for natural values and assets – total area at risk, and % at risk relative to total area in the reporting region

Native vegetation	Total area (m²)	Storm tide inundation																																
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR								
		m²				%				m²				%				m²				%				m²				%				
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	
Bass																																		
Coast Banksia Woodland/Coastal Dune Scrub Mosaic	312,565.0		1,708.1				0.5%				2,139.6				0.7%				3,166.8				1.0%				4,549.5			1.5%				
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	302,864.3	348.3	157,852.5			0.1%	52.1%				158,470.0				52.3%			292.9	158,200.8			0.1%	52.2%				171,443.8			56.6%				
Coastal Headland Scrub	373,122.7	389.7	44,617.8			0.1%	12.0%			412.6	44,788.8			0.1%	12.0%			363.4	45,007.5			0.1%	12.1%				52,589.7			14.1%				
Damp Heathy Woodland/Lowland Forest Mosaic	2,733.8																																	
Damp Sands Herb-rich Woodland	1,450,983.4																																	
Damp Sands Herb-rich Woodland/Swamp Scrub Mosaic	493,109.9																																	
Grassy Woodland/Swamp Scrub Mosaic	321,095.4																																	
Sand Heathland/Wet Heathland Mosaic	217,637.4																																	
Swamp Scrub	350,787.7	3,004.7	54,440.4			0.9%	15.5%			4,702.0	54,563.9			1.3%	15.6%			1,825.9	57,445.1			0.5%	16.4%			5.0	59,266.0			0.0%	16.9%			
Wet Heathland	203,574.8	24,923.5	158,335.8			12.2%	77.8%			21,564.8	169,762.7			10.6%	83.4%			13,781.9	183,259.4			6.8%	90.0%			5,713.7	191,327.5			2.8%	94.0%			
Inverloch																																		
Coast Banksia Woodland	27,471.1	588.3	3,569.1			2.1%	13.0%			3,338.5	3,827.9			12.2%	13.9%			4,330.7	4,157.4			15.8%	15.1%			1,321.7	7,166.4			4.8%	26.1%			
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	213,903.2	36,968.7	90,488.4			17.3%	42.3%			33,082.4	115,658.9			15.5%	54.1%			30,139.2	127,457.1			14.1%	59.6%			8,855.0	148,741.2			4.1%	69.5%			
Coastal Headland Scrub	418,882.3	2,783.2	165,165.7			0.7%	39.4%			5,284.6	166,640.5			1.3%	39.8%			5,085.2	167,948.9			1.2%	40.1%			1,109.0	171,925.1			0.3%	41.0%			
Damp Heathy Woodland/Lowland Forest Mosaic	93,342.4																																	
Damp Sands Herb-rich Woodland	5,975,589.7		17,088.2	48,564.1			0.3%	0.8%			22,929.0	52,585.2			0.4%	0.9%			17,359.7	63,225.0			0.3%	1.1%			7,914.2	72,670.5			0.1%	1.2%		
Estuarine Wetland/Estuarine Swamp Scrub Mosaic	304,759.0	139,173.6	43,583.3			45.7%	14.3%			130,407.8	54,861.4			42.8%	18.0%			110,816.2	77,519.3			36.4%	25.4%			87,438.0	100,897.5			28.7%	33.1%			
Grassy Woodland/Swamp Scrub Mosaic	383,009.0																																	
Sand Heathland/Wet Heathland Mosaic	25,241.6																																	
Swamp Scrub	843,310.0	56,928.1	103,656.2			6.8%	12.3%			60,519.6	129,413.2			7.2%	15.3%			55,982.4	160,584.3			6.6%	19.0%			26,633.9	189,932.8			3.2%	22.5%			
Wet Heathland	254,415.8	32,222.6	141,847.2			12.7%	55.8%			48,558.6	151,044.3			19.1%	59.4%			41,639.2	174,069.8			16.4%	68.4%			16,106.1	199,602.9			6.3%	78.5%			
South Gippsland																																		
Coast Banksia Woodland	2,080,532.6	10,947.6	404,368.7			0.5%	19.4%			2,127.7	414,670.8			0.1%	19.9%				449,429.1				21.6%				466,232.2				22.4%			
Coastal Dune Scrub/Coastal Dune Grassland Mosaic	29,193,527.2	141,683.0	301,303.9			0.5%	1.0%			140,549.5	364,427.4			0.5%	1.2%			133,435.9	442,986.9			0.5%	1.5%			71,445.9	504,976.9			0.2%	1.7%			
Coastal Headland Scrub	4,326,259.1		22,459.2				0.5%				28,311.6				0.7%				35,904.1				0.8%				42,242.3				1.0%			
Coastal Saltmarsh	1,874,560.2	1,396,973.7	278,935.3			74.5%	14.9%			821,727.4	875,967.9			43.8%	46.7%			173,390.8	1,547,290.6			9.2%	82.5%			122,765.8	1,597,915.6			6.5%	85.2%			
Coastal Tussock Grassland	181,723.9		7,366.9				4.1%				9,978.4				5.5%				15,154.3				8.3%				19,399.8				10.7%			
Damp Forest	298,084.8			980.1				0.3%				1,470.3			0.5%					2,362.7			0.8%					2,952.9				1.0%		
Damp Heathy Woodland/Lowland Forest Mosaic	9,504,711.8																																	
Damp Sands Herb-rich Woodland	4,029,316.5		9,089.2	35,204.0			0.2%	0.9%			13,312.0	39,449.3			0.3%	1.0%			18,889.9	44,293.2			0.5%	1.1%			10,421.7	52,761.3			0.3%	1.3%		
Damp Sands Herb-rich Woodland/Swamp Scrub Complex	4,698,182.6		11,620.5	79,522.6			0.2%	1.7%			25,365.6	81,779.6			0.5%	1.7%			35,470.9	91,143.2			0.8%	1.9%			19,468.9	107,145.2			0.4%	2.3%		
Estuarine Wetland/Estuarine Swamp Scrub Mosaic	851,635.7	608,006.6	234,113.4			71.4%	27.5%			365,668.5	481,541.7			42.9%	56.5%			59,621.5	790,228.4			7.0%	92.8%			30,622.3	819,227.6			3.6%	96.2%			
Heathy Woodland	532,158.2																																	
Lowland Forest	2,569.1																																	
Mangrove Shrubland	675,583.5	307,722.3	367,861.2			45.5%	54.5%			104,562.9	571,020.6			15.5%	84.5%			4,463.0	671,120.5			0.7%	99.3%			478.8	675,104.7			0.1%	99.9%			
Riparian Scrub	1,674,302.5																																	
Sandy Beach	1,461,955.6	6,765.2	84,657.1			0.5%	5.8%			8,270.4	87,251.6			0.6%	6.0%			8,187.8	91,422.3			0.6%	6.3%			4,088.0	95,522.0			0.3%	6.5%			
Swamp Scrub	4,149,871.0	63,384.2	432,441.2			1.5%	10.4%			91,171.4	452,483.1			2.2%	10.9%			131,137.4	495,825.4			3.2%	11.9%			83,308.3	543,654.5			2.0%	13.1%			
Swamp Scrub/Damp Sands Herb-rich Woodland/Wet Heathland Mosaic	39,344.2																																	
Swamp Scrub/Wet Heathland Mosaic	1,743,385.5																																	
Swampy Riparian Woodland	1,771,548.8	718,571.4	485,162.4			40.6%	27.4%			618,319.8	592,357.0			34.9%	33.4%			260,105.9	961,376.1			14.7%	54.3%			152,756.1	1,068,725.9			8.6%	60.3%			
Wet Heathland	7,386,723.0	59,370.0	125,905.1			0.8%	1.7%			43,643.6	145,904.7			0.6%	2.0%			9,643.4	185,275.1			0.1%	2.5%			5,370.2	189,548.3			0.1%	2.6%			
Grand Total	89,044,374.4	3,610,754.9	3,747,636.8	164,270.9		4.1%	4.2%	0.2%		2,503,912.1	5,136,692.5	175,284.5		2.8%	5.8%	0.2%		1,044,242.6	6,916,549.5	201,024.1		1.2%	7.8%	0.2%		618,017.8	7,357,797.2	235,529.9		0.7%	8.3%	0.3%		

Wetlands	Total area (m²)	Storm tide inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Bass																																	
Coastal saltmarsh	191,838.0	170,757.1	20,903.0			89.0%	10.9%			133,257.5	58,409.0			69.5%	30.4%			26,651.8	165,186.3			13.9%	86.1%			4,828.2	187,009.8			2.5%	97.5%		
Estuary	6,464,660.6	66,432.4	6,382,271.8			1.0%	98.7%			43,311.2	6,408,951.5			0.7%	99.1%			36,937.8	6,421,896.4			0.6%	99.3%			28,884.0	6,429,950.3			0.4%	99.5%		
Permanent freshwater swamps	46,370.8																																
Temporary freshwater lakes	13,525.2																																
Temporary freshwater swamps	673,645.1																																
Unknown	112,071.1																																
Inverloch																																	
Coastal saltmarsh	75,436.9	69,464.4	1,383.3			92.1%	1.8%			70,493.8	3,271.9			93.4%	4.3%			29,267.5	45,574.8			38.8%	60.4%			16,535.6	58,306.6			21.9%	77.3%		
Estuary	201,823.3	73,552.2	119,874.9			36.4%	59.4%			64,610.9	131,385.4			32.0%	65.1%			49,120.3	149,455.8			24.3%	74.1%			32,832.6	165,743.5			16.3%	82.1%		
Permanent freshwater lakes	194,136.8																																
Temporary freshwater swamps	186,907.1																																
Unknown	86,566.2																																
South Gippsland																																	
Coastal saltmarsh	6,304,193.5	3,031,349.9	3,096,807.8			48.1%	49.1%			1,816,975.2	4,334,124.6			28.8%	68.7%			502,362.6	5,670,882.2			8.0%	90.0%			275,967.5	5,897,277.3			4.4%	93.5%		
Estuary	17,933,984.9	1,301,177.7	16,629,251.7			7.3%	92.7%			391,392.9	17,542,337.1			2.2%	97.8%			86,131.0	17,847,760.1			0.5%	99.5%			44,667.5	17,889,223.6			0.2%	99.8%		
Permanent freshwater lakes	39,285.2																																
Permanent freshwater swamps	93,249.7		26,242.5				28.1%				26,242.5				28.1%				26,242.5				28.1%				26,242.5					28.1%	
Temporary freshwater lakes	18,393.5																																
Temporary freshwater swamps	583,894.9		338.7	991.9			0.1%	0.2%		384.7	1,027.5				0.1%	0.2%		38.1	1,330.6				0.0%	0.2%			14,084.7					2.4%	
Temporary saline swamps	167,848.6	158,467.4	9,381.2			94.4%	5.6%			153,433.5	14,415.1			91.4%	8.6%			10,600.4	157,248.3			6.3%	93.7%			3,891.1	163,957.5			2.3%	97.7%		
Unknown	969,604.5		790,850.2				81.6%				790,850.2				81.6%				790,850.2				81.6%				790,850.2						
Grand Total	34,357,435.9	4,871,201.2	27,051,062.7	27,234.5		14.2%	78.7%	0.1%		2,673,474.9	29,284,129.3	27,270.1		7.8%	85.2%	0.1%		741,071.3	31,248,892.1	27,573.2		2.2%	91.0%	0.1%		407,606.5	31,582,318.9	40,327.2		1.2%	91.9%	0.1%	

Offshore environments (Seamap Australia)	Total area (m²)	Storm tide inundation																											
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR			
		m²				%				m²				%				m²				%				m²			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Coarse Sediment	7,153,448.9	214,174.4	6,903,564.8			3.0%	96.5%			204,078.0	6,921,931.4			2.9%	96.8%			155,133.2	6,972,756.0			2.2%	97.5%			95,116.6	7,032,772.6		
Hard Substrata	5,834,515.0		5,833,622.9				100.0%				5,833,688.3				100.0%				5,833,688.3				100.0%				5,833,769.3		
Mangroves	1,907,173.8	243,238.1	1,663,935.7			12.8%	87.2%			30,428.7	1,876,745.1			1.6%	98.4%			7,726.1	1,899,447.7			0.4%	99.6%			5,593.7	1,901,580.1		
Mixed Biota	20,802,463.0		20,691,111.2				99.5%				20,692,486.5				99.5%				20,694,678.4				99.5%				20,747,121.7		
Mixed Hard/Soft Substrata	750,474.6		750,474.6				100.0%				750,474.6				100.0%				750,474.6				100.0%				750,474.6		
Mixed Macrophytes	11,110,638.8		11,083,930.0				99.8%				11,084,243.4				99.8%				11,084,524.0				99.8%				11,098,609.1		
Mixed Soft Substrata	12,680,880.1	537,259.9	11,753,225.9			4.2%	92.7%			366,585.7	11,979,250.9			2.9%	94.5%			338,752.4	12,051,359.5			2.7%	95.0%			282,111.3	12,108,000.6		
Saltmarsh	6,707,988.7	3,776,995.1	2,746,923.4			56.3%	41.0%			2,186,317.1	4,393,545.8			32.6%	65.5%			512,878.1	6,091,629.2			7.6%	90.8%			246,595.6	6,357,911.7		
Sand	213,111.1		213,111.1				100.0%				213,111.1				100.0%				213,111.1				100.0%				213,111.1		
Seagrass	4,428,787.0		4,422,050.4				99.8%				4,422,255.1				99.9%				4,422,801.8				99.9%				4,425,539.5		
Soft Substrata	38,852,974.7		38,847,519.3				100.0%				38,847,519.3				100.0%				38,847,519.3				100.0%				38,849,695.2		
Grand Total	110,442,455.7	4,771,667.5	104,909,469.2			4.3%	95.0%			2,787,409.5	107,015,251.4			2.5%	96.9%			1,014,489.9	108,861,989.8			0.9%	98.6%			629,417.2	109,318,585.5		

Groundwater Dependent Ecosystems	Total area (m²)	Storm tide inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High		
Bass																																	
Flood plains and morasses	3,879,388.3																																
Hills and low hills	100,942.9																																
Plains with dunes	179,807.5																																
Plains without dunes	44,867.3																																
Ranges	667,621.3	119.3	2,118.9			0.0%	0.3%			137.7	2,168.6			0.0%	0.3%			137.3	2,238.2			0.0%	0.3%			69.1	2,306.4			0.0%	0.3%		
Tidal	74,394.7	63,260.8	11,133.9			85.0%	15.0%			38,587.3	35,807.4			51.9%	48.1%			2,512.8	71,881.8			3.4%	96.6%			1,845.9	72,548.7			2.5%	97.5%		
Inverloch																																	
Coastal barriers	37,042.8	13,909.3	4,866.1			37.5%	13.1%			13,606.5	14,794.0			36.7%	39.9%			12,571.8	18,775.4			33.9%	50.7%			2,946.8	28,400.4			8.0%	76.7%		
Flood plains and morasses	1,167,910.2	1,296.6	52,622.1			0.1%	4.5%			1,555.1	52,715.8			0.1%	4.5%			757.5	54,033.6			0.1%	4.6%			428.1	54,363.1			0.0%	4.7%		
Plains with dunes	935,330.5																																
Plains without dunes	1,371,645.9	22,677.6	100,291.7			1.7%	7.3%			19,050.9	111,517.8			1.4%	8.1%			12,237.7	122,969.3			0.9%	9.0%			4,638.3	130,568.8			0.3%	9.5%		
Ranges	4,917,814.5	207,725.9	275,819.4			4.2%	5.6%			267,320.6	331,881.0			5.4%	6.7%			153,634.8	483,545.3			3.1%	9.8%			37,978.6	599,201.6			0.8%	12.2%		
Tidal	24,531.0	17,165.4	6,777.6			70.0%	27.6%			13,111.8	11,005.8			53.5%	44.9%			5,929.4	18,521.2			24.2%	75.5%			4,524.0	19,926.6			18.4%	81.2%		
South Gippsland																																	
General groundwater dependent ecosystems	809.7																																
Coastal barriers	8,392,379.3	145,689.5	1,468,010.6			1.7%	17.5%			114,211.5	1,542,705.4			1.4%	18.4%			91,094.5	1,613,700.1			1.1%	19.2%			47,877.7	1,656,916.9			0.6%	19.7%		
Dissected plains	2,389,823.3	2,335.0	11,777.1			0.1%	0.5%			8,369.7	13,205.0			0.4%	0.6%			12,726.5	14,112.2			0.5%	0.6%			5,264.0	21,574.7			0.2%	0.9%		
Flood plains and morasses	18,966,120.1	167,116.2	987,241.6			0.9%	5.2%			275,398.2	1,008,179.4			1.5%	5.3%			197,878.1	1,154,357.8			1.0%	6.1%			68,658.3	1,283,577.6			0.4%	6.8%		
Hills and low hills	8,607,373.2																																
Plains with dunes	5,476,688.5	7,911.4	5,045.5			0.1%	0.1%			21,237.6	7,297.0			0.4%	0.1%			34,244.0	12,956.9			0.6%	0.2%			18,666.4	28,534.5			0.3%	0.5%		
Plains without dunes	1,065,948.8																										2,804.5			0.3%			
Prior stream plains	44,952.5																																
Ranges	2,839,785.5																																
Tidal	1,616,542.4	640,542.0	947,032.5			39.6%	58.6%			317,873.8	1,272,021.7			19.7%	78.7%			87,181.1	1,506,577.0			5.4%	93.2%			38,112.4	1,555,645.7			2.4%	96.2%		
Grand Total	62,801,720.3	1,289,749.1	3,872,737.0			2.1%	6.2%			1,090,460.8	4,403,298.9			1.7%	7.0%			610,905.8	5,073,668.8			1.0%	8.1%			231,009.5	5,456,369.6			0.4%	8.7%		

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Bass Coast Shire Council features – foreshore access and utilities

Table 38. Risk results (erosion) for BSC features – total area at risk, and % at risk relative to total area in the reporting region

Bass Coast Shire Council Polygons	Total area (m²)	Erosion																																
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR								
		m²				%				m²				%				m²				%				m²				%				
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	
Bass																																		
Foreshore access																																		
Boardwalk	117.1		64.6			55.1%			8.1	96.1			6.9%	82.1%				104.2				89.0%				104.2				89.0%				
Elevated Stairs	22.4		2.8			12.7%				2.8				12.7%				4.3				19.1%				4.9				21.9%				
In Ground Stairs	20.0								6.2				31.0%				17.1				85.4%				18.4				91.7%	8.3%				
Boat Ramps	261.4				140.8			53.9%							53.9%			0.2			142.3			0.1%	54.4%			140.8				53.9%		
Jetties	186.3			138.9			74.6%				138.9			74.6%			0.0	139.0				0.0%	74.6%				138.9				74.6%			
Pathways	1,193.2		0.2	303.2			0.0%	25.4%			32.3	350.3			2.7%	29.4%			156.4	367.2			13.1%	30.8%			133.8	406.6			11.2%	34.1%		
Utilities																																		
Drainage network - culverts	5,966.5																																	
Drainage network - detention basins	968.6											1.3				0.1%				1.3					0.1%				1.3				0.1%	
Drainage network - WSUD	1,735.9																																	
Inverloch																																		
Foreshore access																																		
Boardwalk	1,015.4		7.1			0.7%			87.0	23.1			8.6%	2.3%			48.1	65.3				4.7%	6.4%			44.6	68.8			4.4%	6.8%			
Elevated Stairs	160.3		36.2			22.6%			38.9	89.8			24.3%	56.0%			55.1	99.1				34.3%	61.8%			25.5	128.7			15.9%	80.2%			
In Ground Stairs	18.1								13.8	1.3			76.5%	7.2%			11.7	3.4				65.0%	18.6%			11.7	3.4			65.0%	18.6%			
Other	63.6																																	
Ramp	97.6		30.7			31.5%				97.6				100.0%				97.6					100.0%				97.6				100.0%			
Solid Stairs	20.4								3.3	8.4			16.1%	41.3%				11.7					57.5%				11.7				57.5%			
Viewing Platform	47.0									47.0				100.0%				47.0					100.0%				47.0				100.0%			
Boat Ramps	175.0				170.5			97.4%				175.0			100.0%						175.0			100.0%				175.0				100.0%		
Pathways	75,271.9		46.4	579.8		0.1%	0.8%			6,832.4	2,378.0			9.1%	3.2%			10,565.6	4,224.5				14.0%	5.6%			9,768.2	6,681.5			13.0%	8.9%		
Utilities																																		
Drainage network - culverts	1,431.5								169.4	60.3			11.8%	4.2%			488.5	172.3				34.1%	12.0%			688.0	186.2			48.1%	13.0%			
Drainage network - detention basins	39,128.5									368.5	42.2			0.9%	0.1%			15,757.6	416.1				40.3%	1.1%			18,010.3	416.1			46.0%	1.1%		
Drainage network - WSUD	6,639.4								15.8				0.2%				2.2	13.6				0.0%	0.2%				15.8				0.2%			
South Gippsland																																		
Utilities																																		
Drainage network - culverts	151.7																																	
Grand Total	134,691.8		188.1	1,021.8	311.3	0.1%	0.8%	0.2%	342.5	7,659.7	2,910.7	315.8	0.3%	5.7%	2.2%	0.2%	622.8	27,098.3	5,148.0	317.3	0.5%	20.1%	3.8%	0.2%	788.2	28,582.3	7,644.5	315.8	0.6%	21.2%	5.7%	0.2%		

Table 39. Risk results (permanent inundation) for BSC features – total area at risk, and % at risk relative to total area in the reporting region

Bass Coast Shire Council Polygons	Total area (m²)	Permanent Inundation																																
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR								
		m²				%				m²				%				m²				%				m²				%				
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High			
Bass																																		
Foreshore access																																		
Boardwalk	117.1		22.0				18.8%				22.0				18.8%			52.1			44.5%				54.3				46.4%					
Elevated Stairs	22.4		6.6				29.3%				6.6				29.3%			6.6			29.3%				10.4				46.3%					
In Ground Stairs	20.0																								7.7				38.5%					
Boat Ramps	261.4				154.7				59.2%					154.7			59.2%				196.2				75.1%				196.2			75.1%		
Jetties	186.3				186.3			100.0%					186.3			100.0%			186.3			100.0%						186.3			100.0%			
Pathways	1,193.2				241.1			20.2%					247.3			20.7%			290.1			24.3%						297.7			24.9%			
Utilities																																		
Drainage network - culverts	5,966.5																																	
Drainage network - detention basins	968.6																										1.3				0.1%			
Drainage network - WSUD	1,735.9																																	
Inverloch																																		
Foreshore access																																		
Boardwalk	1,015.4		12.3				1.2%				56.9				5.6%			365.1			36.0%				606.4				59.7%					
Elevated Stairs	160.3										0.0				0.0%			0.0			0.0%				15.0				9.3%					
In Ground Stairs	18.1																																	
Other	63.6																																	
Ramp	97.6																																	
Solid Stairs	20.4																																	
Viewing Platform	47.0																																	
Boat Ramps	175.0				164.4				93.9%				164.4			93.9%			164.4			93.9%			93.9%				175.0			100.0%		
Pathways	75,271.9				75.9			0.1%					123.9			0.2%			691.9			0.9%			93.9%				1,069.5			1.4%		
Utilities																																		
Drainage network - culverts	1,431.5		7.8				0.5%				35.5				2.5%			35.5			2.5%				36.5				2.6%					
Drainage network - detention basins	39,128.5											161.4			0.4%			331.2			0.8%					368.9				0.9%				
Drainage network - WSUD	6,639.4																																	
South Gippsland																																		
Utilities																																		
Drainage network - culverts	151.7																																	
Grand Total	59,419.9		48.6	427.3	319.2	0.1%	0.7%	0.5%			121.0	595.0	319.2	0.2%	1.0%	0.5%		459.4	807.5	360.6		0.8%	1.4%	0.6%		730.3	854.2	371.2	1.2%	1.4%	0.6%			

Table 40. Risk results (temporary inundation - combined storm tide and catchment flooding) for BSC features – total area at risk, and % at risk relative to total area in the reporting region

Bass Coast Shire Council Polygons	Total area (m²)	Storm tide inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High				
Bass																																	
Foreshore access																																	
Boardwalk	117.1	77.0	22.0		65.7%	18.8%			82.2	22.0			70.2%	18.8%			52.1	52.1			44.5%	44.5%			49.9	54.3			42.6%	46.4%			
Elevated Stairs	22.4	13.5	6.6		60.4%	29.3%			13.5	6.6			60.4%	29.3%			13.5	6.6			60.4%	29.3%			9.7	10.4			43.4%	46.3%			
In Ground Stairs	20.0	3.3			16.3%				15.2				75.7%				18.9				94.0%				11.1	7.7			55.6%	38.5%			
Boat Ramps	261.4		187.5			71.7%				187.5				71.7%				196.2				75.1%				196.2				75.1%			
Jetties	186.3		186.3			100.0%				186.3				100.0%				186.3				100.0%				186.3				100.0%			
Pathways	1,193.2	26.9	342.9		2.3%	28.7%			42.3	356.6			3.5%	29.9%			170.0	369.8			14.2%	31.0%			141.0	398.8			11.8%	33.4%			
Utilities																																	
Drainage network - culverts	5,966.5																																
Drainage network - detention basins	968.6	1.3			0.1%				0.3	1.0			0.0%	0.1%			1.3				0.1%				1.3				0.1%				
Drainage network - WSUD	1,735.9																																
Inverloch																																	
Foreshore access																																	
Boardwalk	1,015.4	829.9	12.3		81.7%	1.2%			814.2	56.9			80.2%	5.6%			513.1	365.1			50.5%	36.0%			271.8	606.4			26.8%	59.7%			
Elevated Stairs	160.3	56.9			35.5%				83.9	0.04			52.3%	0.02%			73.6	0.04			45.9%	0.02%			58.7	15.0			36.6%	9.3%			
In Ground Stairs	18.1	3.8			21.1%				6.3				34.9%				6.5				36.0%				6.5				36.0%				
Other	63.6																																
Ramp	97.6	65.4			67.0%				64.3				65.9%				64.3				65.9%				64.3				65.9%				
Solid Stairs	20.4	3.1			15.4%				3.2				15.7%				3.2				15.7%				3.2				15.7%				
Viewing Platform	47.0	0.5			1.0%				9.2				19.6%				0.3				0.7%				0.3				0.7%				
Boat Ramps	175.0		175.0			100.0%				175.0				100.0%				175.0				100.0%				175.0				100.0%			
Pathways	75,271.9	619.4	9,869.7		0.8%	13.1%			896.2	10,384.8			1.2%	13.8%			1,981.0	10,489.1			2.6%	13.9%			1,189.0	11,281.1			1.6%	15.0%			
Utilities																																	
Drainage network - culverts	1,431.5	1,037.2	7.8		72.5%	0.5%			1,046.2	35.5			73.1%	2.5%			1,026.5	35.5			71.7%	2.5%			1,045.2	36.5			73.0%	2.6%			
Drainage network - detention basins	39,128.5	299.6	23,342.3		0.8%	59.7%			520.7	23,412.5			1.3%	59.8%			345.7	23,642.0			0.9%	60.4%			37.1	23,950.5			0.1%	61.2%			
Drainage network - WSUD	6,639.4		3,479.9			52.4%			1.1	3,477.5			0.0%	52.4%				3,478.5				52.4%				3,478.6				52.4%			
South Gippsland																																	
Utilities																																	
Drainage network - culverts	151.7																																
Grand Total	57,888.7	2,391.6	27,233.3		4.1%	47.0%			2,660.5	27,374.5			4.6%	47.3%			2,117.7	27,952.3			3.7%	48.3%			1,557.9	28,532.0			2.7%	49.3%			

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Beach and foreshore assets

Table 41. Risk results (erosion) for beach and foreshore assets – total area at risk, and % at risk relative to total area in the reporting region

[illegible]

Table 42. Risk results (permanent inundation) for beach and foreshore assets – total area at risk, and % at risk relative to total area in the reporting region

[illegible]

Table 43. Risk results (temporary inundation - combined storm tide and catchment flooding) for beach and foreshore assets – total area at risk, and % at risk relative to total area in the reporting region

[illegible]

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Parks

Table 44. Risk results (erosion) for parks – total area at risk, and % at risk relative to total area in the reporting region

Parks	Total area (m²)	Erosion																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High		
Offland																																	
National Parks	20,470,527.4			4,248,595.0			20.8%				4,248,595.0			20.8%				4,248,595.0			20.8%				4,248,595.0			20.8%				20.8%	
Open space/parks	3,928,641.7		3,928,641.7			100.0%				3,928,641.7			100.0%					3,928,641.7			100.0%					3,928,641.7			100.0%				100.0%
Parks & Reserves	6,969,769.1		88.5	4,209,887.3			0.0%	60.4%			4,210,107.5			60.4%				4,210,107.5			60.4%					4,210,107.5			60.4%				60.4%
Bass																																	
Open space/parks	508,736.2																																
Parks & Reserves	2,348,940.7		3,186.5	870,448.1			0.1%	37.1%			25,048.1	901,461.1			1.1%	38.4%			24,970.4	933,616.7			1.1%	39.7%			19,289.2	953,989.2			0.8%	40.6%	
South Gippsland																																	
Open space/parks	25,662,774.1		1,859,060.6			7.2%				0.1	2,216,159.3			0.0%	8.6%			0.0	2,785,225.2			0.0%	10.9%				3,317,680.7				12.9%		
Parks & Reserves	3,003,723.1			54,676.8			1.8%					58,464.4			1.9%				0.0	60,248.5			0.0%	2.0%				60,962.9				2.0%	
Grand Total	62,893,112.4		5,790,977.3	9,383,607.2			9.2%	14.9%		0.1	6,169,849.1	9,418,628.0		0.0%	9.8%	15.0%		0.0	6,738,837.3	9,452,567.8		0.0%	10.7%	15.0%			7,265,611.7	9,473,654.6			11.6%	15.1%	

Table 45. Risk results (permanent inundation) for parks – total area at risk, and % at risk relative to total area in the reporting region

Parks	Total area (m²)	Permanent Inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High				
Offland																																	
National Parks	20,470,527.4			20,467,082.8			100.0%					20,467,580.1			100.0%					20,468,131.8			100.0%					20,468,683.7			100.0%		
Open space/parks	3,928,641.7		3,853,513.9			98.1%					3,871,467.9			98.5%					3,891,892.8			99.1%					3,905,160.9			99.4%			
Parks & Reserves	6,969,769.1			6,951,756.2			99.7%					6,956,607.4			99.8%					6,960,857.9			99.9%					6,963,384.3			99.9%		
Bass																																	
Open space/parks	508,736.2																																
Parks & Reserves	2,348,940.7																																
South Gippsland																																	
Open space/parks	25,662,774.1		1,102,260.3			4.3%					1,214,397.8			4.7%					1,351,623.3			5.3%					1,490,799.1			5.8%			
Parks & Reserves	3,003,723.1			188,119.4			6.3%					256,763.1			8.5%					336,897.9			11.2%					379,130.2			12.6%		
Grand Total	62,893,112.4		4,955,774.2	27,606,958.4			7.9%	43.9%			5,085,865.7	27,680,950.5		8.1%	44.0%			5,243,516.0	27,765,887.6		8.3%	44.1%				5,395,960.0	27,811,198.2			8.6%	44.2%		

Table 46. Risk results (temporary inundation - combined storm tide and catchment flooding) for parks – total area at risk, and % at risk relative to total area in the reporting region

Parks	Total area (m²)	Storm tide inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Offland																																	
National Parks	20,470,527.4		20,467,082.8				100.0%				20,467,580.1				100.0%				20,468,131.8				100.0%					20,468,683.7				100.0%	
Open space/parks	3,928,641.7		3,853,513.9				98.1%				3,871,467.9				98.5%				3,891,892.8				99.1%					3,905,160.9				99.4%	
Parks & Reserves	6,969,769.1		6,951,756.2				99.7%				6,956,607.4				99.8%				6,960,857.9				99.9%					6,963,384.3				99.9%	
Bass																																	
Open space/parks	508,736.2																																
Parks & Reserves	2,348,940.7	40,767.0	950,516.4			1.7%	40.5%			43,453.5	971,896.7			1.8%	41.4%			35,272.4	991,283.4			1.5%	42.2%			11,205.6	1,015,350.3			0.5%	43.2%		
South Gippsland																																	
Open space/parks	25,662,774.1	427,726.0	1,102,260.3			1.7%	4.3%			378,596.6	1,214,397.8			1.5%	4.7%			296,725.1	1,351,623.3			1.2%	5.3%			157,549.3	1,490,799.1			0.6%	5.8%		
Parks & Reserves	3,003,723.1	44,819.7	379,326.5			1.5%	12.6%			32,273.0	402,167.3			1.1%	13.4%			12,855.8	424,146.2			0.4%	14.1%			2,561.6	434,440.3			0.1%	14.5%		
Grand Total	62,893,112.4	513,312.8	33,704,456.1			0.8%	53.6%			454,323.2	33,884,117.2			0.7%	53.9%			344,853.3	34,087,935.3			0.5%	54.2%			171,316.5	34,277,818.6			0.3%	54.5%		

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Land use

Table 47. Risk results (erosion) for land use – total area at risk, and % at risk relative to total area in the reporting region

Landuse	Total area (m²)	Erosion																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High		
Bass																																	
Commercial services	23,074.5																																
Cropping	37,437.5																																
General purpose factory	10,359.7																																
Grazing modified pastures	27,753,538.9																																
Manufacturing and industrial	28,308.9																																
Natural feature protection	361,567.8																																
Navigation and communication	1,917.7																																
Other conserved area	86,156.8			6,511.9				7.6%				6,511.9				7.6%				6,511.9				7.6%				6,511.9			7.6%		
Protected landscape	8,126,160.5		13.8	364.6	6,590,844.6		0.0%	0.0%	81.1%		8,440.7	193.0	6,602,201.5		0.1%	0.0%	81.2%		17,615.7		6,608,662.6		0.2%		81.3%		16,139.8	180.2	6,613,885.8		0.2%	0.0%	81.4%
Public services	171,666.5																																
Recreation and culture	9,499.6																																
Roads	2,454,396.5		1,129.2	981,373.0			0.0%	40.0%			6,388.9	989,240.4			0.3%	40.3%			249.4	995,379.9			0.0%	40.6%			0.0	995,629.3		0.0%	40.6%		
Rural residential with agriculture	1,076,267.4																																
Rural residential without agriculture	452,221.9																																
Sewage/sewerage	94,595.3																																
Strict nature reserves	669,335.2																																
Urban residential	957,147.6																																
Utilities	568,499.3																																
Inverloch																																	
Commercial services	325,246.7										1,096.8				0.3%				33,409.8	13.1		10.3%	0.0%				67,649.5	1,921.1		20.8%	0.6%		
Grazing modified pastures	55,249,024.0			16,869.1			0.0%				18,650.0	26,433.1			0.0%	0.0%			104,072.8	49,342.3		0.2%	0.1%				124,441.0	85,213.7		0.2%	0.2%		
Other conserved area	208,265.0			91.2			0.0%					694.1				0.3%				1,684.8			0.8%					2,490.2			1.2%		
Production nurseries	164,172.7																																
Protected landscape	1,187,781.2		146.0	11,852.9	590,048.7		0.0%	1.0%	49.7%		58,466.2	11,762.2	620,164.4		4.9%	1.0%	52.2%		59,698.5	9,329.1	667,321.0		5.0%	0.8%	56.2%		50,756.0	9,531.4	691,822.1		4.3%	0.8%	58.2%
Recreation and culture	123,448.2																																
Roads	3,131,253.3		871.3	12,198.0			0.0%	0.4%			87,721.2	26,975.6			2.8%	0.9%			136,908.4	64,530.0			4.4%	2.1%			147,506.2	85,628.4		4.7%	2.7%		
Rural residential with agriculture	2,807,604.3				15,468.0				0.6%		9,209.8	109.1	26,194.9		0.3%	0.0%	0.9%		33,473.1	757.2	50,402.2		1.2%	0.0%	1.8%		52,454.5	1,234.5	90,651.0		1.9%	0.0%	3.2%
Rural residential without agriculture	1,587,161.9				23,572.1				1.5%			0.0	34,107.7			0.0%	2.1%		4,059.5	0.0	53,853.0		0.3%	0.0%	3.4%		4,059.5		76,608.8		0.3%	4.8%	
Strict nature reserves	168,785.5																																
Urban residential	4,298,848.9		0.0	6,802.4	121,598.6		0.0%	0.2%	2.8%		224,400.3	5,627.9	172,915.0		5.2%	0.1%	4.0%		548,498.0	6,860.2	224,298.8		12.8%	0.2%	5.2%		608,774.6	7,519.2	298,030.0		14.2%	0.2%	6.9%
Utilities	57,552.7																																
Water storage - intensive use/farm dams	155,213.4																																
South Gippsland																																	
Commercial services	7,759.0																																
Cropping	2,554,978.3																																
Grazing modified pastures	298,667,542.3			15,728.9			0.0%					33,333.8				0.0%				68,134.1			0.0%				0.0	106,951.4		0.0%	0.0%		
Other conserved area	26,867,646.9		23,864.1	1,024,565.4			0.1%	3.8%			25,305.0	1,342,230.2			0.1%	5.0%			27,327.4	1,870,273.3			0.1%	7.0%			28,563.1	2,373,449.0		0.1%	8.8%		
Plantation forests	1,172,335.4																																
Protected landscape	21,089,779.0			8,962.9	15,390,669.9		0.0%	73.0%			0.0	7,677.9	15,481,402.2		0.0%	0.0%	73.4%		0.0	4,351.4	15,603,204.4		0.0%	0.0%	74.0%		3,167.7	15,715,702.6		0.0%	74.5%		
Public services	90,943.2																																
Recreation and culture	45,105.6																																
Roads	7,273,606.1			423.8				0.0%				972.1				0.0%				5,381.7				0.1%				7,346.0			0.1%		
Rural residential with agriculture	4,289,581.0																				16,285.5				0.4%			0.0	72,095.6		0.0%	1.7%	
Rural residential without agriculture	1,133,756.6																																
Strict nature reserves	2,772,833.6			11,960.8			0.4%					12,251.1				0.4%			0.0	12,450.0			0.0%	0.4%			0.0	12,617.0		0.0%	0.5%		
Urban residential	2,354,915.7																																
Utilities	56,771.3																																
Grand Total	480,724,063.4		26,024.5	2,097,705.0	22,732,201.9		0.0%	0.4%	4.7%		439,679.0	2,464,012.3	22,936,985.6		0.1%	0.5%	4.8%		965,312.8	3,094,999.0	23,224,027.6		0.2%	0.6%	4.8%		1,100,344.3	3,699,391.0	23,558,795.9		0.2%	0.8%	4.9%

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 48. Risk results (permanent inundation) for land use – total area at risk, and % at risk relative to total area in the reporting region

Landuse	Total area (m²)	Permanent Inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High		
Bass																																	
Commercial services	23,074.5																																
Cropping	37,437.5																																
General purpose factory	10,359.7																																
Grazing modified pastures	27,753,538.9			43,169.9				0.2%				85,623.3				0.3%				317,874.1			1.1%				586,193.0				2.1%		
Manufacturing and industrial	28,308.9																																
Natural feature protection	361,567.8																																
Navigation and communication	1,917.7																																
Other conserved area	86,156.8			6,511.9				7.6%				6,511.9				7.6%				6,511.9			7.6%				6,511.9				7.6%		
Protected landscape	8,126,160.5				6,844,138.6				84.2%				6,915,582.3			85.1%				7,019,396.1			86.4%				7,066,412.1				87.0%		
Public services	171,666.5																																
Recreation and culture	9,499.6																																
Roads	2,454,396.5			732,123.2				29.8%				736,680.4				30.0%				742,758.8			30.3%				852,119.6				34.7%		
Rural residential with agriculture	1,076,267.4																																
Rural residential without agriculture	452,221.9																																
Sewage/sewerage	94,595.3																																
Strict nature reserves	669,335.2																																
Urban residential	957,147.6																																
Utilities	568,499.3																																
Inverloch																																	
Commercial services	325,246.7																																
Grazing modified pastures	55,249,024.0			71,014.8				0.1%				188,375.1				0.3%				354,574.1			0.6%				522,047.4				0.9%		
Other conserved area	208,265.0			6,657.0				3.2%				8,439.0				4.1%				10,444.8			5.0%				14,445.2				6.9%		
Production nurseries	164,172.7																																
Protected landscape	1,187,781.2				312,211.6				26.3%			341,468.0				28.7%				397,362.8			33.5%				453,797.8				38.2%		
Recreation and culture	123,448.2																																
Roads	3,131,253.3			4,115.8				0.1%				8,065.1				0.3%				16,006.8			0.5%				32,296.7				1.0%		
Rural residential with agriculture	2,807,604.3				22,842.5				0.8%			40,663.9				1.4%				125,253.1			4.5%				188,312.4				6.7%		
Rural residential without agriculture	1,587,161.9				20,921.7				1.3%			33,586.1				2.1%				62,072.8			3.9%				105,478.1				6.6%		
Strict nature reserves	168,785.5			15,619.8				9.3%				18,162.3				10.8%				23,756.1			14.1%				31,539.6				18.7%		
Urban residential	4,298,848.9				43,178.1				1.0%			54,620.3				1.3%				103,419.5			2.4%				160,126.5				3.7%		
Utilities	57,552.7			0.0				0.0%				0.0				0.0%				37.4			0.1%				205.1				0.4%		
Water storage - intensive use/farm dams	155,213.4																																
South Gippsland																																	
Commercial services	7,759.0																																
Cropping	2,554,978.3			48,770.4				1.9%				71,823.6				2.8%				115,419.0			4.5%				180,977.7				7.1%		
Grazing modified pastures	298,667,542.3			5,387,808.8				1.8%				8,798,431.9				2.9%				16,216,463.5			5.4%				21,673,704.1				7.3%		
Other conserved area	26,867,646.9			766,667.4				2.9%				836,313.4				3.1%				912,434.7			3.4%				984,070.8				3.7%		
Plantation forests	1,172,335.4																																
Protected landscape	21,089,779.0				17,020,319.6				80.7%			18,610,696.5				88.2%				19,905,957.9			94.4%				20,156,713.2				95.6%		
Public services	90,943.2																																
Recreation and culture	45,105.6																																
Roads	7,273,606.1			27,528.2				0.4%				64,860.4				0.9%				273.7			0.6%				397.4				0.9%		
Rural residential with agriculture	4,289,581.0				46,105.8				1.1%			116,474.3				2.7%				159,702.7			2.2%				245,968.2				3.4%		
Rural residential without agriculture	1,133,756.6				3,310.1				0.3%			19,747.8				1.7%				208,881.4			4.9%				252,821.0				5.9%		
Strict nature reserves	2,772,833.6			377,792.4				13.6%				454,059.7				16.4%				46,303.9			4.1%				56,251.9				5.0%		
Urban residential	2,354,915.7				31.3				0.0%			34.5				0.0%				658,660.4			23.8%				792,941.7				28.6%		
Utilities	2,354,915.7																			1,683.5							3,447.6				0.1%		
Utilities	56,771.3			7,734.3				13.6%				8,854.6				15.6%				9,539.4			16.8%				9,799.2				17.3%		
Grand Total	480,724,063.4			7,495,513.9	24,313,059.4			1.6%	5.1%			11,286,200.7	26,132,873.7			2.3%	5.4%			19,544,457.4	27,870,330.9			4.1%	5.8%		25,933,217.8	28,443,360.6			5.4%	5.9%	

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Table 49. Risk results (temporary inundation - combined storm tide and catchment flooding) for land use – total area at risk, and % at risk relative to total area in the reporting region

Landuse	Total area (m²)	Storm tide inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High		
Bass																																	
Commercial services	23,074.5																																
Cropping	37,437.5																																
General purpose factory	10,359.7																																
Grazing modified pastures	27,753,538.9	879,130.1	197,560.6			3.2%	0.7%			785,345.3	374,928.6			2.8%	1.4%			141,228.4	1,076,690.7			0.5%	3.9%			57,645.2	1,160,273.9		0.2%	4.2%			
Manufacturing and industrial	28,308.9																																
Natural feature protection	361,567.8																																
Navigation and communication	1,917.7																																
Other conserved area	86,156.8			6,511.9				7.6%				6,511.9				7.6%				6,511.9			7.6%				6,511.9			7.6%			
Protected landscape	8,126,160.5				6,844,138.6			84.2%				6,915,582.3			85.1%				7,019,396.1			86.4%					7,066,412.1				87.0%		
Public services	171,666.5			500.9				0.3%				500.9			0.3%				500.9			0.3%				111.0	389.8			0.1%	0.2%		
Recreation and culture	9,499.6																																
Roads	2,454,396.5	5,194.9	969,968.3			0.2%	39.5%				981,032.3			40.0%				7,922.2	975,163.3			0.3%	39.7%			3,310.4	979,775.1		0.1%	39.9%			
Rural residential with agriculture	1,076,267.4			7,632.4				0.7%			0.4	7,632.4			0.7%				411.7	7,632.0			0.0%	0.7%		275.5	7,768.2		0.0%	0.7%			
Rural residential without agriculture	452,221.9																																
Sewage/sewerage	94,595.3																																
Strict nature reserves	669,335.2																																
Urban residential	957,147.6																																
Utilities	568,499.3																																
Inverloch																																	
Commercial services	325,246.7	14,066.0	21,081.6			4.3%	6.5%			16,220.7	32,156.7			5.0%	9.9%			16,193.0	35,147.6			5.0%	10.8%			2,963.3	48,377.4		0.9%	14.9%			
Grazing modified pastures	55,249,024.0	866,907.9	323,180.8			1.6%	0.6%			1,247,645.0	342,147.0			2.3%	0.6%			502,150.2	1,190,088.7			0.9%	2.2%			102,446.8	1,589,792.0		0.2%	2.9%			
Other conserved area	208,265.0		2,416.4	59,088.7			1.2%	28.4%			1,907.6	60,401.6			0.9%	29.0%			2,129.6	61,355.0			1.0%	29.5%			1,417.6	62,067.0		0.7%	29.8%		
Production nurseries	164,172.7																																
Protected landscape	1,187,781.2		35,992.7	276,799.7	312,211.6		3.0%	23.3%	26.3%		32,514.6	275,561.7	341,468.0		2.7%	23.2%	28.7%		40,949.5	227,641.1	397,362.8		3.4%	19.2%	33.5%		16,409.2	195,746.4	453,797.8	1.4%	16.5%		
Recreation and culture	123,448.2		8,451.3				6.8%				8,411.7				6.8%			1.0	8,411.7			0.0%	6.8%			3.0	8,409.7		0.0%	6.8%			
Roads	3,131,253.3	91,121.3	157,186.9			2.9%	5.0%			134,914.5	186,226.0			4.3%	5.9%			125,728.3	248,308.2			4.0%	7.9%			52,895.9	321,140.6		1.7%	10.3%			
Rural residential with agriculture	2,807,604.3		164,303.0	189,463.0			5.9%	6.7%			194,055.7	275,658.9			6.9%	9.8%			171,293.8	347,915.7			6.1%	12.4%			49,494.9	469,714.5		1.8%	16.7%		
Rural residential without agriculture	1,587,161.9		180,215.7	104,999.8			11.4%	6.6%			150,382.2	168,756.7			9.5%	10.6%			64,579.6	263,992.4			4.1%	16.6%			12,336.0	316,236.0		0.8%	19.9%		
Strict nature reserves	168,785.5	302.1	55,669.8			0.2%	33.0%			425.8	55,808.9			0.3%	33.1%			574.8	55,971.8			0.3%	33.2%			312.0	56,234.7		0.2%	33.3%			
Urban residential	4,298,848.9		162,310.7	553,334.4			3.8%	12.9%			216,512.2	577,146.8			5.0%	13.4%			227,475.9	636,276.4			5.3%	14.8%			142,460.0	721,292.3		3.3%	16.8%		
Utilities	57,552.7		119.1	2,079.5			0.2%	3.6%			155.7	2,091.9			0.3%	3.6%			209.0	2,182.7			0.4%	3.8%			157.2	2,234.5		0.3%	3.9%		
Water storage - intensive use/farm dams	155,213.4																																
South Gippsland																																	
Commercial services	7,759.0	4,017.1	375.1			51.8%	4.8%			6,218.3	558.0			80.1%	7.2%			3,366.9	4,392.2			43.4%	56.6%			982.7	6,776.3		12.7%	87.3%			
Cropping	2,554,978.3	164,083.5	222,060.5			6.4%	8.7%			155,202.7	264,046.0			6.1%	10.3%			39,859.4	386,144.0			1.6%	15.1%			6,754.6	419,248.8		0.3%	16.4%			
Grazing modified pastures	298,667,542.3	8,314,340.8	24,133,775.9			2.8%	8.1%			8,267,992.6	27,215,470.7			2.8%	9.1%			4,909,067.3	32,448,116.7			1.6%	10.9%			1,873,720.7	35,483,463.3		0.6%	11.9%			
Other conserved area	26,867,646.9		127,607.2	795,645.6			0.5%	3.0%			128,307.8	849,757.6			0.5%	3.2%			101,682.7	923,252.9			0.4%	3.4%			40,864.8	984,070.8		0.2%	3.7%		
Plantation forests	1,172,335.4																																
Protected landscape	21,089,779.0		161,550.6	3,389,023.2	17,020,319.6		0.8%	16.1%	80.7%		123,680.9	1,887,265.3	18,610,696.5		0.6%	8.9%	88.2%		91,406.8	664,935.6	19,905,957.9		0.4%	3.2%	94.4%		40,657.6	464,929.5	20,156,713.2	0.2%	2.2%		
Public services	90,943.2																		253.1				0.3%				253.1			0.3%			
Recreation and culture	45,105.6	481.0	17.0			1.1%	0.0%			496.4	373.1			1.1%	0.8%			1,098.6	498.1			2.4%	1.1%			727.2	869.5		1.6%	1.9%			
Roads	7,273,606.1	159,540.2	263,918.8			2.2%	3.6%			181,390.3	307,346.2			2.5%	4.2%			157,341.5	423,459.0			2.2%	5.8%			92,064.0	488,736.5		1.3%	6.7%			
Rural residential with agriculture	4,289,581.0		55,192.9	251,484.5			1.3%	5.9%			79,447.6	276,572.3			1.9%	6.4%			107,245.6	306,677.4			2.5%	7.1%			57,903.1	356,019.9		1.3%	8.3%		
Rural residential without agriculture	1,133,756.6		74,803.5	48,415.6			6.6%	4.3%			166,544.0	59,545.1			14.7%	5.3%			124,393.6	123,219.1			11.0%	10.9%			21,523.6	226,089.1		1.9%	19.9%		
Strict nature reserves	2,772,833.6	29,121.5	939,343.4			1.1%	33.9%			43,255.4	947,738.9			1.6%	34.2%			52,877.0	968,464.9			1.9%	34.9%			30,347.6	990,994.3		1.1%	35.7%			
Urban residential	2,354,915.7		17,377.7	6,234.2			0.7%	0.3%			46,407.1	7,422.7			2.0%	0.3%			68,280.8	23,611.8			2.9%	1.0%			38,062.8	53,829.8		1.6%	2.3%		
Utilities	56,771.3		207.0	9,925.4			0.4%	17.5%			10,132.4				17.8%				10,132.4				17.8%				10,132.4			17.8%			
Grand Total	480,724,063.4	10,528,306.3	28,274,686.4	5,701,138.9	24,176,669.8	2.2%	5.9%	1.2%	5.0%	10,839,107.0	31,856,159.8	4,464,958.4	25,867,746.8	2.3%	6.6%	0.9%	5.4%	5,957,408.7	38,821,168.4	3,605,837.3	27,322,716.8	1.2%	8.1%	0.8%	5.7%	2,224,173.5	41,976,018.4	3,877,032.3	27,676,923.1	0.5%	8.7%	0.8%	

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures

Planning overlays

Table 50. Risk results (erosion) for planning overlays – total area at risk, and % at risk relative to total area in the reporting region

Planning scheme overlay	Total area (m²)	Erosion																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High		
Bass																																	
BUSHFIRE MANAGEMENT OVERLAY	4,688,815.4																																
DESIGN AND DEVELOPMENT OVERLAY	4,711.7																																
DEVELOPMENT PLAN OVERLAY	663,393.9																																
ENVIRONMENTAL SIGNIFICANCE OVERLAY	7,121,882.4			20,367.5				0.3%		34.2	21,829.0			0.0%	0.3%			21,949.6			0.3%				21,944.8					0.3%			
HERITAGE OVERLAY	51,367.2																																
LAND SUBJECT TO INUNDATION OVERLAY	2,486,384.4		830.5	838,206.2			0.0%	33.7%		9,222.7	854,381.9			0.4%	34.4%			17,654.6	860,790.6		0.7%	34.6%			16,078.6	865,819.5		0.6%	34.8%				
RESTRUCTURE OVERLAY	221,148.2																																
SIGNIFICANT LANDSCAPE OVERLAY	4,757,394.7																																
VEGETATION PROTECTION OVERLAY	105,137.8																																
Inverloch																																	
BUSHFIRE MANAGEMENT OVERLAY	6,559,028.7									152,834.0	419.1			8.5%	0.0%			313,661.8	10,407.7		17.5%	0.6%			330,579.8	50,994.0			18.4%	2.8%			
DESIGN AND DEVELOPMENT OVERLAY	1,792,234.3																	1,052.5	-		0.1%				9,293.1			0.5%					
DEVELOPMENT PLAN OVERLAY	1,973,724.0																																
ENVIRONMENTAL SIGNIFICANCE OVERLAY	4,289,585.4			66,322.4				1.5%		58,402.5	106,829.8			1.4%	2.5%			199,528.5	196,598.6		4.7%	4.6%				259,645.2	313,415.0		6.1%	7.3%			
HERITAGE OVERLAY	76,737.3									169.8	267.1			0.2%	0.3%			1,811.7	1,949.3		2.4%	2.5%				1,344.2	4,418.5		1.8%	5.8%			
LAND SUBJECT TO INUNDATION OVERLAY	3,373,694.1		1,169.6	361,893.1			0.0%	10.7%		42,864.2	427,722.9			1.3%	12.7%			60,235.9	543,597.4		1.8%	16.1%				72,720.9	655,896.6		2.2%	19.4%			
SIGNIFICANT LANDSCAPE OVERLAY	6,226,730.6			61,310.6				1.0%		48,023.0	99,942.1			0.8%	1.6%			164,458.5	183,924.5		2.6%	3.0%				193,274.1	295,894.5		3.1%	4.8%			
VEGETATION PROTECTION OVERLAY	5,052,972.4									155,381.1	419.1			3.1%	0.0%			445,866.8	7,765.9		8.8%	0.2%				520,422.1	47,837.9		10.3%	0.9%			
South Gippsland																																	
BUSHFIRE MANAGEMENT OVERLAY	106,169,685.2																																
DESIGN AND DEVELOPMENT OVERLAY	3,130,352.3																																
ENVIRONMENTAL SIGNIFICANCE OVERLAY	122,879,509.6		28,320.6	1,406,011.5			0.0%	1.1%		29,062.3	1,829,193.3			0.0%	1.5%			29,497.3	2,529,249.6		0.0%	2.1%				30,132.5	3,236,705.9		0.0%	2.6%			
HERITAGE OVERLAY	1,794.7																																
LAND SUBJECT TO INUNDATION OVERLAY	73,577,378.8			15,445,880.0				21.0%			15,573,814.3				21.2%				15,798,450.4			21.5%				0.0	16,046,230.9		0.0%	21.8%			
RESTRUCTURE OVERLAY	8,054.2																																
SIGNIFICANT LANDSCAPE OVERLAY	49,024,151.0		0.0	54,397.4			0.0%	0.1%			93,727.0				0.2%				176,774.8			0.4%				0.0	282,112.3		0.0%	0.6%			
Grand Total	404,235,868.3		30,320.7	18,254,388.7			0.0%	4.5%		152,834.0	343,578.7	19,008,126.5		0.0%	0.1%	4.7%		314,714.3	929,460.9	20,321,050.7		0.1%	0.2%	5.0%		339,872.8	1,144,611.6	21,770,275.9		0.1%	0.3%	5.4%	

- Notes:
- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
 - Hazard extents and exposure results assume there are no adaptation measures

Table 51. Risk results (permanent inundation) for planning overlays – total area at risk, and % at risk relative to total area in the reporting region

Planning scheme overlay	Total area (m²)	Permanent Inundation																															
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR								2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%				m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High
Bass																																	
BUSHFIRE MANAGEMENT OVERLAY	4,688,815.4		421,698.9			9.0%				440,140.7			9.4%					467,820.2			10.0%				493,229.2			10.5%					
DESIGN AND DEVELOPMENT OVERLAY	4,711.7																																
DEVELOPMENT PLAN OVERLAY	663,393.9																																
ENVIRONMENTAL SIGNIFICANCE OVERLAY	7,121,882.4		36,261.9			0.5%				57,438.2			0.8%					120,597.9			1.7%				152,148.3			2.1%					
HERITAGE OVERLAY	51,367.2																																
LAND SUBJECT TO INUNDATION OVERLAY	2,486,384.4			886,258.9			35.6%			997,637.0			40.1%					1,330,817.0			53.5%				1,673,927.0			67.3%					
RESTRUCTURE OVERLAY	221,148.2																																
SIGNIFICANT LANDSCAPE OVERLAY	4,757,394.7			43,169.9			0.9%			85,623.3			1.8%					317,874.0			6.7%				586,192.8			12.3%					
VEGETATION PROTECTION OVERLAY	105,137.8																																
Inverloch																																	
BUSHFIRE MANAGEMENT OVERLAY	6,559,028.7		267,157.8			4.1%				295,031.8			4.5%					358,689.6			5.5%				417,596.1			6.4%					
DESIGN AND DEVELOPMENT OVERLAY	1,792,234.3		7,536.7			0.4%				11,244.6			0.6%					30,647.1			1.7%				45,994.6			2.6%					
DEVELOPMENT PLAN OVERLAY	1,973,724.0		15,492.8			0.8%				27,790.5			1.4%					73,618.4			3.7%				111,668.9			5.7%					
ENVIRONMENTAL SIGNIFICANCE OVERLAY	4,289,585.4			101,980.7			2.4%				179,111.6			4.2%					290,780.3			6.8%				372,413.2			8.7%				
HERITAGE OVERLAY	76,737.3																								123.4			0.2%					
LAND SUBJECT TO INUNDATION OVERLAY	3,373,694.1			319,356.0			9.5%			511,370.6			15.2%					901,133.0			26.7%				1,306,619.4			38.7%					
SIGNIFICANT LANDSCAPE OVERLAY	6,226,730.6			116,585.1			1.9%			261,847.7			4.2%					524,877.4			8.4%				787,252.3			12.6%					
VEGETATION PROTECTION OVERLAY	5,052,972.4			15,481.9			0.3%			27,667.8			0.5%					73,415.5			1.5%				111,613.0			2.2%					
South Gippsland																																	
BUSHFIRE MANAGEMENT OVERLAY	106,169,685.2		1,321,381.5			1.2%				1,688,993.2			1.6%					2,068,094.4			1.9%				2,394,650.4			2.3%					
DESIGN AND DEVELOPMENT OVERLAY	3,130,352.3									202.9			0.0%					1,234.0			0.0%				5,178.6			0.2%					
ENVIRONMENTAL SIGNIFICANCE OVERLAY	122,879,509.6		5,999,289.6			4.9%					8,990,804.3			7.3%					12,547,109.1			10.2%				14,103,758.9			11.5%				
HERITAGE OVERLAY	1,794.7																																
LAND SUBJECT TO INUNDATION OVERLAY	73,577,378.8			23,295,477.0			31.7%				28,554,664.0			38.8%					37,760,115.9			51.3%				43,831,710.5			59.6%				
RESTRUCTURE OVERLAY	8,054.2																																
SIGNIFICANT LANDSCAPE OVERLAY	49,024,151.0			4,684,655.5			9.6%			6,882,707.8			14.0%					9,566,600.2			19.5%				10,935,801.2			22.3%					
Grand Total	404,235,868.3		2,033,267.8	35,498,516.3		0.5%	8.8%			2,463,403.7	46,548,872.2		0.6%	11.5%			3,000,103.7	63,433,320.3		0.7%	15.7%			3,468,317.8	73,861,559.9		0.9%	18.3%					

Table 52. Risk results (temporary inundation - combined storm tide and catchment flooding) for planning overlays – total area at risk, and % at risk relative to total area in the reporting region

Planning scheme overlay	Total area (m²)	Storm tide inundation																																			
		2021 - 0.0 m SLR								2040 - 0.2 m SLR								2070 - 0.5 m SLR												2100 - 0.8 m SLR							
		m²				%				m²				%				m²				%								m²				%			
		Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High	Low	Med	Sign	High				
Bass																																					
BUSHFIRE MANAGEMENT OVERLAY	4,688,815.4		421,698.9				9.0%				440,140.7				9.4%				467,820.2			10.0%				493,229.2			10.5%								
DESIGN AND DEVELOPMENT OVERLAY	4,711.7																																				
DEVELOPMENT PLAN OVERLAY	663,393.9																																				
ENVIRONMENTAL SIGNIFICANCE OVERLAY	7,121,882.4		119,284.9	36,261.9			1.7%	0.5%			93,613.0	67,962.2			1.3%	1.0%			10,206.7	155,546.9		0.1%	2.2%			4,178.3	161,575.2		0.1%	2.3%							
HERITAGE OVERLAY	51,367.2																																				
LAND SUBJECT TO INUNDATION OVERLAY	2,486,384.4	1,208,652.3	886,258.9			48.6%	35.6%			1,193,958.0	997,637.0			48.0%	40.1%			933,394.6	1,330,817.0			37.5%	53.5%			590,284.6	1,673,927.0			23.7%	67.3%						
RESTRUCTURE OVERLAY	221,148.2																																				
SIGNIFICANT LANDSCAPE OVERLAY	4,757,394.7	879,133.5	204,320.3			18.5%	4.3%			786,206.0	381,689.5			16.5%	8.0%			142,883.9	1,083,453.7			3.0%	22.8%			58,442.1	1,167,895.5			1.2%	24.5%						
VEGETATION PROTECTION OVERLAY	105,137.8						0.0%																														
Inverloch																																					
BUSHFIRE MANAGEMENT OVERLAY	6,559,028.7	427,300.1	267,157.8			6.5%	4.1%			430,075.6	295,031.8			6.6%	4.5%			386,985.9	358,689.6			5.9%	5.5%			328,079.4	417,596.1			5.0%	6.4%						
DESIGN AND DEVELOPMENT OVERLAY	1,792,234.3	45,351.4	194,332.5			2.5%	10.8%			73,429.8	205,220.1			4.1%	11.5%			66,652.9	239,683.9			3.7%	13.4%			27,686.8	278,649.9			1.5%	15.5%						
DEVELOPMENT PLAN OVERLAY	1,973,724.0	47,507.6	274,638.8			2.4%	13.9%			76,845.5	286,141.8			3.9%	14.5%			62,288.9	322,146.4			3.2%	16.3%			21,448.0	362,987.3			1.1%	18.4%						
ENVIRONMENTAL SIGNIFICANCE OVERLAY	4,289,585.4		495,538.4	316,932.1			11.6%	7.4%			563,278.9	427,170.9			13.1%	10.0%			248,804.1	812,470.5		5.8%	18.9%				83,566.4	977,708.2			1.9%	22.8%					
HERITAGE OVERLAY	76,737.3		1,583.3	732.3			2.1%	1.0%			3,606.5	1,682.0			4.7%	2.2%			4,902.7	2,166.1		6.4%	2.8%				1,780.3	5,288.5			2.3%	6.9%					
LAND SUBJECT TO INUNDATION OVERLAY	3,373,694.1	2,056,775.2	319,356.0			61.0%	9.5%			2,480,151.9	511,370.6			73.5%	15.2%			2,312,471.6	901,133.0			68.5%	26.7%			1,906,985.3	1,306,619.4			56.5%	38.7%						
SIGNIFICANT LANDSCAPE OVERLAY	6,226,730.6	1,384,347.1	299,483.3			22.2%	4.8%			1,484,218.1	533,967.0			23.8%	8.6%			427,564.1	1,683,830.5			6.9%	27.0%				93,209.4	2,018,185.2			1.5%	32.4%					
VEGETATION PROTECTION OVERLAY	5,052,972.4	69,080.4	517,252.3			1.4%	10.2%			98,894.4	539,061.0			2.0%	10.7%			109,295.8	586,332.7			2.2%	11.6%			57,673.2	637,955.4			1.1%	12.6%						
South Gippsland																																					
BUSHFIRE MANAGEMENT OVERLAY	106,169,685.2	1,629,268.0	1,321,381.5			1.5%	1.2%			1,570,682.7	1,688,993.2			1.5%	1.6%			1,498,286.9	2,068,094.4			1.4%	1.9%			1,171,731.0	2,394,650.4			1.1%	2.3%						
DESIGN AND DEVELOPMENT OVERLAY	3,130,352.3	72,106.5	6,133.8			2.3%	0.2%			202,790.4	10,328.8			6.5%	0.3%			194,463.3	78,240.4			6.2%	2.5%			59,584.4	213,119.2			1.9%	6.8%						
ENVIRONMENTAL SIGNIFICANCE OVERLAY	122,879,509.6		5,278,951.1	11,378,063.6			4.3%	9.3%			5,832,757.9	12,641,478.8			4.7%	10.3%			2,476,879.1	16,657,014.7		2.0%	13.6%			659,657.1	18,474,236.7			0.5%	15.0%						
HERITAGE OVERLAY	1,794.7		136.2	92.8			7.6%	5.2%			605.2	213.8			33.7%	11.9%			1,565.7	229.0		87.2%	12.8%				975.8	819.0			54.4%	45.6%					
LAND SUBJECT TO INUNDATION OVERLAY	73,577,378.8	32,359,161.4	23,295,477.0			44.0%	31.7%			30,301,960.0	28,554,664.0			41.2%	38.8%			22,446,157.7	37,760,115.9			30.5%	51.3%			16,374,563.1	43,831,710.5			22.3%	59.6%						
RESTRUCTURE OVERLAY	8,054.2																																				
SIGNIFICANT LANDSCAPE OVERLAY	49,024,151.0	5,006,947.3	8,315,316.0			10.2%	17.0%			5,329,332.1	9,487,407.8			10.9%	19.4%			1,988,013.1	13,322,263.3			4.1%	27.2%			493,536.6	14,816,739.9			1.0%	30.2%						
Grand Total	404,235,868.3	45,185,631.0	42,218,301.1	11,732,082.7		11.2%	10.4%	2.9%		44,028,544.6	50,425,514.8	13,138,507.8		10.9%	12.5%	3.3%		30,568,458.8	62,944,979.3	17,627,427.2		7.6%	15.6%	4.4%		21,183,223.8	70,363,422.9	19,619,627.6		5.2%	17.4%	4.9%					

Notes:

- The assessment was undertaken on a sub-set of values and assets for the Cape to Cape region (see Figure 8). Reported totals and percentages are based on this sub-set of data, and do not account for entire LGA areas.
- Hazard extents and exposure results assume there are no adaptation measures