Acronyms and Abbreviations

BVSC	Bega Valley Shire Council
BMP	Batemans Marine Park
CBD	Central Business District
CEA	Coastal Environmental Area
CM Act	Coastal Management Act 2016
CMA	Coastal Management Area
CMP	Coastal Management Program
CPHDS	Coastal Processes and Hazard Definition Study
CSP	Community Strategic Plan
CUA	Coastal Use Area
CVA	Coastal Vulnerability Area
CWLRA	Coastal Wetlands and Littoral Rainforest Area
DCP	Development Control Plan
ESC	Eurobodalla Shire Council
EMP	Estuary Management Plan
IP&R	Integrated Planning and Reporting Framework
LEP	Local Environment Plan
LGA	Local Government Area
MEMA	Marine Estate Management Authority
SEPP	State Environmental Planning Policy

1 Introduction

1.1 Background and Introduction to the CMP

1.1.1 Developing the Wallaga Lake Coastal Management Program

Through the preparation of formalised Coastal Management Programs, councils in NSW set the long term strategy for management of the coast, consistent with the objectives of the *Coastal Management Act 2016* (CM Act) and the *Resilience and Hazards State Environmental Planning Policy* (Resilience and Hazards SEPP). The *Wallaga Lake Coastal Management Program* sets out a framework for management of threats and pressures impacting on the values of the lake, and to realise opportunities that enhance the lake. The *Wallaga Lake CMP* provides a pathway for sustainable management of the coastal zone around the estuary over the coming decade.

Under the previous estuary management framework in NSW, the *Wallaga Lake Estuary Management Plan* (BVSC and ESC, 2000) provided an aspirational set of objectives for management of the lake and its catchment areas, as well as strategies and actions to achieve the objectives. This was updated by the *Wallaga Lake Coastal Zone (Estuary) Management Plan* (BVSC and ESC, 2006). In developing this CMP for the estuary, we have undertaken a review of the previous action plans to assess which actions have been completed, if the intent of the management objectives has been achieved, and to understand which objectives remain relevant for the new Coastal Management Program. The previous management objectives have been re-considered in view of updated coastal management legislation in NSW and the present threats, pressures and opportunities for the lake, to now provide the backbone of the *Wallaga Lake CMP*.

The *Bega Valley Shire Coastal Management Program Stage 1: Scoping Study* (BVSC, 2022b) identified Wallaga Lake as a high priority estuary for the establishment of a CMP, to update the understanding of threats and pressures acting on the estuary, and to identify targeted management strategies. While much work has been undertaken around Wallaga Lake over the past 20 years, the scoping study found that the intent of many of the management objectives has not yet been met, and that the lake has a range of high risk management challenges.

The *Wallaga Lake Coastal Management Program* builds on the objectives of the previous estuary management plan, extends the understanding of the current issues affecting the estuary as set out in the Scoping Study (BVSC, 2022b), and establishes a tangible series of management interventions to reduce the risks for the estuary. The process followed to identify threats to the estuary, and to subsequently plan and evaluate management responses is shown in Figure 1.1.

Figure 1.1: Estuary Threat Identification, Evaluation and Management Process

The process followed for developing the CMP was based on the five stages outlined in the *Coastal Management Manual (2018)*, and is shown in Figure 1.2.

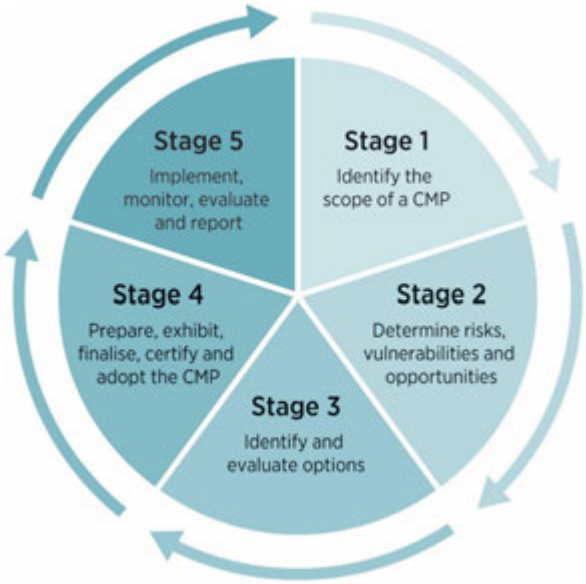


Figure 1.2: Five Stages of Developing a Coastal Management Program

Developing the CMP was a phased process spanning a number of years and included a range of activities completed within each of the five CMP development stages:

- CMP Stage 1:
    - Scoping and identifying the needs for the CMP within the context of the broader coastal zone of the Bega Valley Shire Local Government Area (see CMP Scoping Study, (BVSC, 2022b);
- CMP Stage 2:
    - Collating and reviewing existing information and management plans (see CMP Scoping Study (BVSC, 2022b), Synthesis of Information (BVSC, 2024a), CMP Estuary Threats and Pressures Assessment (BVSC, 2024b);

- Combining existing information with new field observations to build a contemporary understanding of threats and issues to the estuary (see CMP Estuary Threats and Pressures Assessment (BVSC, 2024b);
- Evaluating and prioritising the threats in a risk assessment framework (see CMP Estuary Threats and Pressures Assessment (BVSC, 2024b);

- CMP Stage 3:
  - Developing a range of achievable management responses to further inform, and where possible reduce, the risks posed by threats (presented in this report);
  - Evaluating and prioritising these management responses on the basis of their feasibility, viability and acceptability (presented in this report);
- CMP Stage 4:
  - Preparation of the CMP report (this document)
  - Collating feedback from stakeholders and community through formal review and exhibition processes.

Consistent with the *Coastal Management Manual*, there are a range of documents that provide background information and/or are support documents to the *Wallaga Lake CMP,* and should be consulted for background information on the preparation of this program:

- Wallaga Lake Estuary Processes Study (PBP, 1996);
- Wallaga Lake Estuary Management Plan (BVSC and ESC, 2000);
- Wallaga Lake Entrance Management Policy (BVSC, 2017)
- Bega Valley Shire Coastal Processes and Hazards Definition Study (BMT, 2015)
- Coastal Management Program Scoping Study (BVSC, 2022b)
- Wallaga Lake CMP – Synthesis of Information Report (BVSC, 2024a);
- Wallaga Lake CMP – Estuary Threats and Pressures Report (BVSC, 2024b); and
- Stakeholder and Community Engagement Plan – Wallaga Lake, Merimbula and Back Lake, and Lake Curalo CMPs (UNSW, 2017).

1.1.2 Scope and Coverage of the CMP

Recognising that Councils along the NSW coast each have different experiences, issues, challenges and opportunities with regards to coastal management, the *Coastal Management Manual* permits the scope of CMPs to be tailored to suit the specific local circumstances, community and coastal environment. Consistent with this concept, BVSC has opted to manage the coastline through a series of individual Coastal Management Programs that each define the management aspirations for individual estuaries within the Shire. This approach was a recommendation from the CMP Scoping Study (BVSC, 2022b), which considered the overall management of the Bega Valley Shire Coastline, a first-pass assessment of coastal management risks, and identified a phased process for the development of CMPs to address the highest risks first. Several high priority CMPs were identified in the Scoping Study that each cover a specific estuary, including Wallaga Lake.

The Wallaga Lake CMP takes a holistic approach, considering management issues and providing management aspirations that align with the objectives of all Coastal Management

Areas including the Coastal Environment Areas, Coastal Use Areas, and Coastal Wetland and Littoral Rainforest Areas. While Coastal Vulnerability Areas are yet to be mapped for Bega Valley Shire under the *Resilience and Hazards SEPP*, the *Wallaga Lake CMP* has considered the best available mapping of coastal hazards, and provided a series of management actions to reduce the corresponding risks.

Wallaga Lake is located at the far northern end of the BVSC Local Government Area (LGA) on the Sapphire Coast of NSW (Figure 1.3), with the northern shoreline of the lake forming the boundary between Bega Valley Shire Council and Eurobodalla Shire Council. The local area immediately around the estuary is shown in Figure 1.4, along with the major tributaries that flow into Wallaga Lake being Dignams Creek and Narira Creek. Wallaga Lake is an Intermittently Closed and Open Lake and Lagoon (ICOLL), with the mouth of the lake opening across Wallaga Beach. Wallaga Beach is part of the Mount Dromedary sediment compartment.

The Wallaga Lake CMP has considered threats and issues that arise from all areas within the broader catchment of the estuary as shown in Map 01a. This is important, as many issues for the estuary stem from further afar than the estuary itself, coming from the lower and in some cases, the upper catchment of the estuary and its tributaries. Cross-council consultation occurred throughout the CMP development, to ensure that management issues are holistically identified and addressed within the management actions.

Under the *Coastal Management Act 2016*, management actions proposed within CMPs are restricted to the zones identified as Coastal Management Areas mapped within the *Resilience and Hazards SEPP*. The coverage area for management actions within the *Wallaga Lake CMP* has therefore been formed by the envelope of mapped Coastal Management Areas surrounding the estuary, as well as the southern end of Wallaga Beach and the Northern end of Camel Rock Beach. The inclusion of the beach areas adjacent the estuary was seen as a priority to enable holistic management of a range of issues that cannot be completed for the estuary or the beach in isolation, but instead are best managed with a holistic approach across the continuum of both estuarine and beach environments. Examples of specific management issues at Wallaga Lake that provide the rationale for inclusion of these beach areas in the CMP coverage area, are the conservation of nesting shorebirds (Wallaga Beach), and the management of weeds (holistic approach needed for weed management that includes the corridor from Murunna Point through to Camel Rock Beach).

Map 01a shows the coverage area for management actions under the *Wallaga Lake CMP*, while Map 01b shows the Coastal Management Areas surrounding Wallaga Lake as mapped within the *Resilience and Hazards SEPP*.

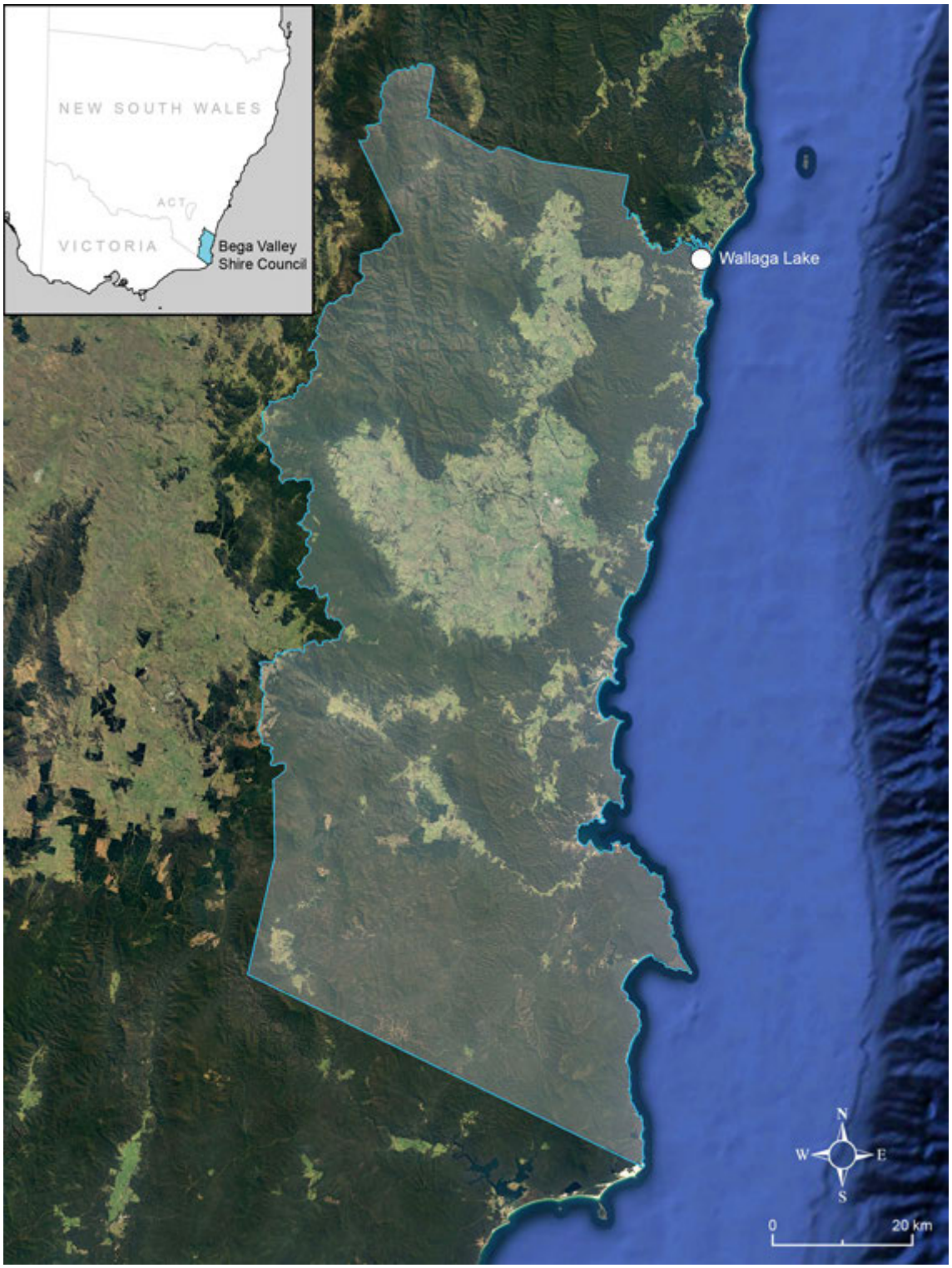
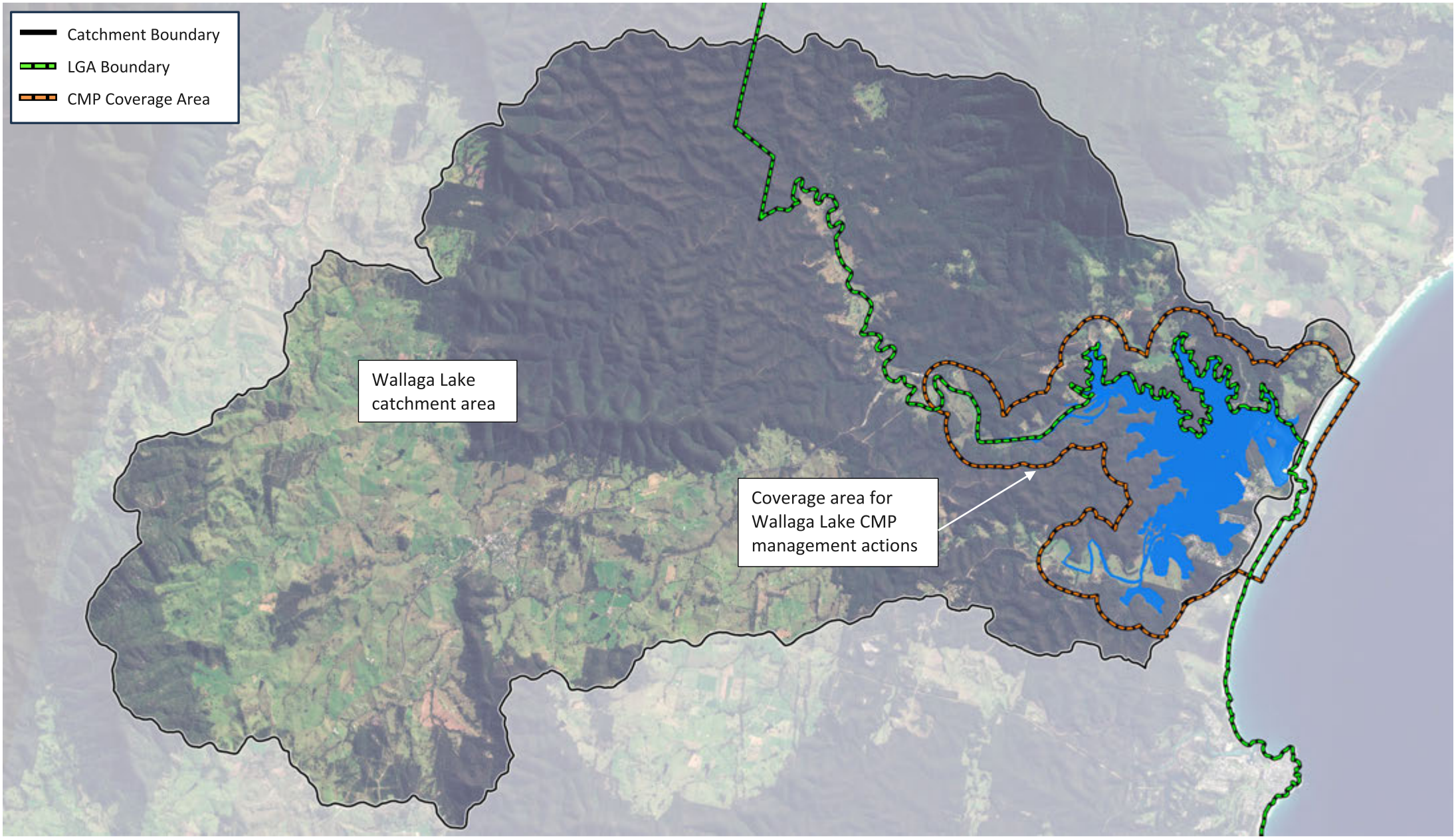


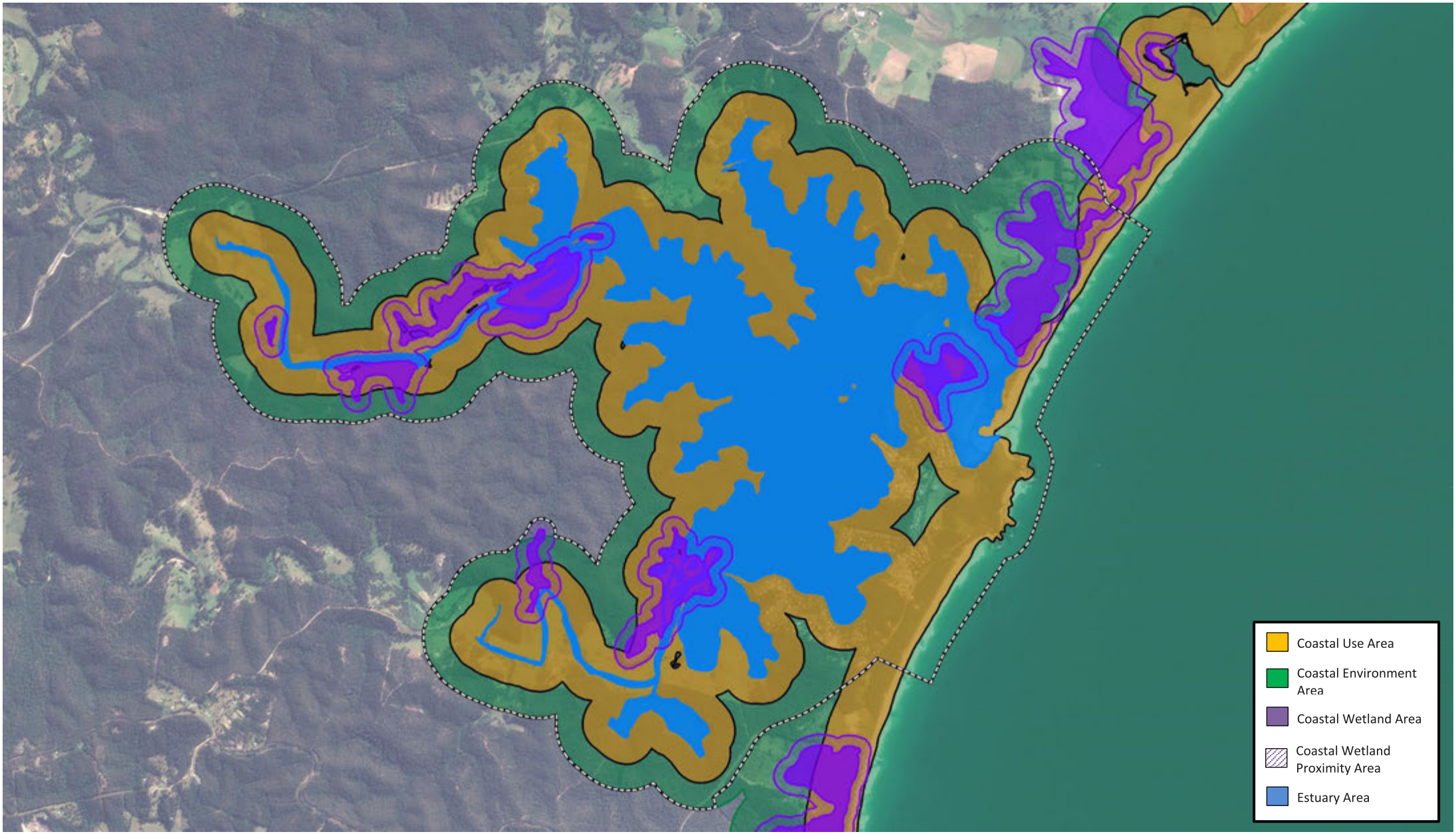
Figure 1.3: Location of Wallaga Lake and the Bega Valley Shire LGA

Figure 1.4: Location of Townships and Tributaries of Wallaga Lake



Wallaga Lake Coastal Management Program	Map Location: Wallaga Lake Catchment	
	Map Title: Wallaga Lake CMP Coverage Area	
	Map 01a	Date: 25/04/2024 Rev: 1

bega valley shire council



Wallaga Lake Coastal Management Program	Map Location: Wallaga Lake	
	Map Title: Wallaga Lake Coastal Management Areas	
	Map 01b	Date: 25/04/2024 Rev: 1

bega valley shire council

1.2 Legislative Framework for Coastal Management in NSW

Coastal management policy and guidelines in NSW have been developed over the last 50 years and the latest reforms of our coastal management legislation and regulatory framework were completed in 2018. This CMP has been completed under the *Coastal Management Act 2016* and supporting documents that include the *Coastal Management Manual (2018)* and the *State Environmental Planning Policy (Resilience and Hazards) 2021*.

1.2.1 State Government Acts, Policies and Guidelines

Coastal management policy is largely legislated by the State Government in NSW. The main instruments of relevance include:

- Environmental Planning and Assessment Act 1979;
- Coastal Management Act 2016 (replacing the Coastal Protection Act 1979);
- SEPP (Resilience and Hazards) 2021. This consolidated various other planning policies including the SEPP (Coastal Management) 2018, which incorporated former SEPP 14 (Coastal Wetlands), SEPP 26 (Littoral Rainforests) and SEPP 71 (Coastal Protection); and
- Coastal Management Manual (2018).

Figure 1.5 provides an overview of how the main State Government Acts, Policies and guidelines provide a legislative framework for the development of a Coastal Management Program. Further detail of the *Coastal Management Act 2016* and the *Coastal Management Manual (2018)* are provided below. In addition to these primary documents, several supporting Acts, Policies and guideline documents are also relevant to the development of a CMP, including:

- Marine Estate Management Act 2014 and Marine Estate Management Strategy;
- Local Government Act 1993;
- SEPP (Transport and Infrastructure) 2021;
- Fisheries Management Act 1994;
- National Parks and Wildlife Act 1974;
- Crown Land Management Act 2016;
- Biodiversity Conservation Act 2016;
- Environmental Protection and Biodiversity Act 1999;
- Local Land Services Act 2013;
- Water Management Act 2000;
- Aboriginal Land Rights Act 1983;
- Forestry Act 2012;
- Heritage Act 1977;
- Biosecurity Act 2015;
- Environment Protection and Biodiversity Conservation Act 1999; and
- Native Title Act 1993.

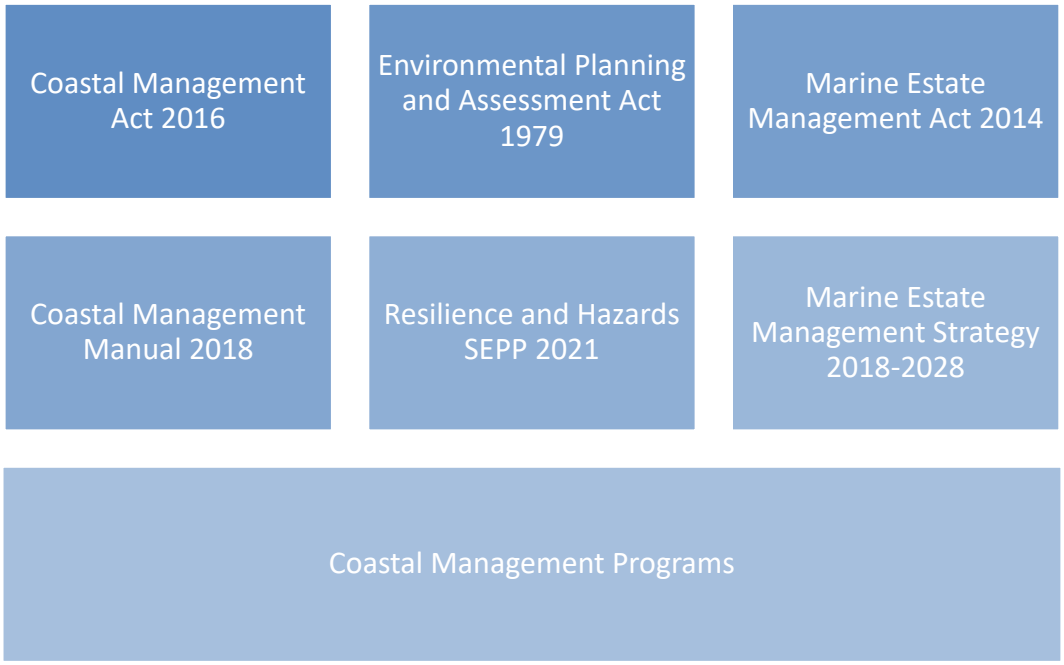


Figure 1.5: NSW Legislative Framework for Coastal Management

1.2.2 Overview of Primary Legislative Framework

As shown in Figure 1.5, the *Environmental and Planning Assessment Act 1979* underpins the planning framework in NSW. This Act ensures proactive management of environmental resources while balancing the needs of local communities. It underpins the standardised State Environmental Planning Policies (SEPP) and Local Environmental Plans (LEP) that provide input into the final development of the CMP.

The *Coastal Management Act 2016* promotes ecologically sustainable development of the coastal zone and identifies the importance of the natural, social, cultural and economic values of the coast. It provides a legislative framework for coordinated coastal planning across the state, and defines the requirements for a local CMP. The Act is aimed at providing improved decision making criteria for coastal management that will preserve natural coastal resources throughout the state without inhibiting social, cultural and economic values in the coastal region.

The *SEPP (Resilience and Hazards)*, referred to as the *Resilience and Hazards SEPP*, defines the coastal zone, including mapping of key Coastal Management Areas that require specific management approaches. It also provides management objectives and development controls for each area, and management approaches based on the mapping which are to be used across the state. This standardises coastal management between Councils, and ensures that a minimum level of environmental planning and policy is required in high-risk or high-value areas.

Finally, the *Coastal Management Manual* is the supporting document which provides guidance on how to develop a Coastal Management Program in accordance with the *Coastal Management Act 2016*. It is an important guideline document that sets out the 5-stage procedure for the development of a Coastal Management Program (Figure 1.2).

1.2.3 Regional and Local Planning Documents

Council has several strategic documents, plans and policies that guide planning and development within the coastal zone of the LGA, and the Wallaga Lake CMP gives consideration to these broader plans where necessary:

- Bega Valley Community Strategic Plan (2017)
- Bega Valley Local Environment Plan (2013)
- Bega Valley Development Control Plan (2013)
- Local Strategic Planning Statement 2040 (2020)
- Residential Land Strategy 2040 (2020)
- Rural Residential Strategy (2020)
- Commercial Land Strategy 2040 (2020)
- Bega Valley Climate Resilience Strategy (2020)
- Wallaga Lake Entrance Management Policy (BVSC, 2017)
- Various site specific blueprints, master plans, and plans of management.

NSW Government plans and strategies relevant to the CMP include:

- South East and Tablelands Regional Plan 2036 (NSW Government, 2017);
- NSW Marine Estate Strategy 2018-2028

1.3 Coastal Management Objectives

1.3.1 Objects of the Coastal Management Act 2016

The objectives for integrated management of the Bega Valley Shire coastal zone via our Coastal Management Programs are set out in the *Coastal Management Act 2016* and the Coastal Management Manual. As outlined in the Act, the overall objective is to manage the coastal environment in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the Shire. Table 1.1 outlines the ways in which the *Wallaga Lake CMP* considers and promotes each of the 13 Objects of the Coastal Management Act.

Table 1.1: How the Wallaga Lake CMP Considers and Promotes the Objects of the Coastal Management Act 2016

Object	CMP Sections that Consider and Promote the Object
a) To protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience.	The CMP includes a range of management actions that will reduce the risk of threats within CEAs and CUAs around the estuary. The methodology for evaluating risks and prioritising management actions was underpinned by the social, cultural and environmental values of these areas, including the scenic value, biological diversity and ecosystem integrity. Within the CMP specific actions have been identified to: • Protect and enhance natural coastal processes and coastal environmental values: R1.1, R1.2, R1.4, R2.1, R3.1, R3.2, R4.1, R5.1, R5.2, R6.1, R8.1, R8.2, R9.1. • Support the social and cultural values of the coastal zone and
b) To support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety;	

Table 1.1: How the Wallaga Lake CMP Considers and Promotes the Objects of the Coastal Management Act 2016	
Object	**CMP Sections that Consider and Promote the Object**
	maintain public access, amenity, use and safety: R1.2, R1.3, R3.2b, R5.1, R7.1, R7.2, R7.3, R7.4, R7.5, R7.6, R10.1, R10.2, R10.3.
c) To acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone;	The CMP acknowledges the importance of the traditional use and practices in managing catchment and estuarine areas and provides opportunity to raise awareness and share this knowledge as an integral part of CMP implementation (R10.2, R10.3). The CMP also aims to reduce the risk of threats to places and items of cultural significance, through management of issues identified in partnership with local Aboriginal people (R1.4).
d) To recognise the coastal zone as a vital economic zone and to support sustainable coastal economies;	The CMP acknowledges the role of tourism as a sustainable coastal economy and includes management actions to reduce the risks of climate change on tourism assets and operations (R3.2, R7.2). The CMP also acknowledges the importance of commercial fisheries, and the need to manage this industry sustainably through ongoing monitoring (R2.1).
e) To facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making;	Section 1.6 of the CMP considers the need for future development in the Wallaga Lake area and broader LGA, as identified in local and regional plans and strategies. This includes consideration of sustainable land use planning and opportunities for land development in line with land zoning. The assessment of threats and pressures completed in the CMP (BVSC, 2024b) includes a detailed risk assessment for coastal hazards on properties within the coastal zone (summarised in Section 2 of the CMP), and includes analysis of the evolving risk profile with climate change. Section 3 of the CMP presents a series of management actions (R7.1 to R7.6) that aim to address the identified risks through revised land use planning, asset management, revisions to planning controls and instruments, and building natural resilience of coastal buffer zones to coastal hazards.
f) To mitigate current and future risks from coastal hazards, taking into account the effects of climate change;	
g) To recognise that the local and regional scale effects of coastal processes, and the inherently ambulatory and dynamic nature of the shoreline may result in the loss of coastal land to the sea, (including estuaries and other arms of the sea), and to manage coastal use and development accordingly;	
h) To promote integrated and co-ordinated coastal planning, management and reporting;	The CMP has been aligned with Council's Integrated Planning and Reporting (IP&R) framework (CMP Section 1.3.2). The CMP Business Plan (Section 5) demonstrates integration of the CMP with the IPR framework, linking each management action to specific goals of Council's Community Strategic Plan.
i) To encourage and promote plans and strategies to improve the resilience of coastal assets to the impacts of an uncertain climate future including impacts of extreme storm events;	Coastal hazards present a threat to a number of key assets within the coastal zone around Wallaga Lake, with risks expected to increase due to climate change. Several actions are proposed in the CMP to understand, plan and manage adaptation of the assets (R1.2, R7.1, R7.2).
j) To ensure co-ordination of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities;	The CMP was developed via a consultative process including guidance from a stakeholder Focus Group that comprised representatives from all Government agencies and public authorities having a role in managing the coastal zone (Section 1.4). Implementation of the CMP will occur under the guidance of Council's Coast and Flood Management Committee as set out

Table 1.1: How the Wallaga Lake CMP Considers and Promotes the Objects of the Coastal Management Act 2016	
Object	**CMP Sections that Consider and Promote the Object**
	in the Monitoring, Evaluation and Reporting plan of the CMP (Section 7). This will ensure continued integration of coastal zone management across Government agencies as representatives to this committee.
k) To support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management;	The CMP includes a range of actions to promote public participation in management if the estuary. These actions include the support of active community environmental groups (R10.1), awareness, education and engagement activities (R10.2, R10.3).
l) To facilitate the identification of land in the coastal zone for acquisition by public or local authorities in order to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone;	Large sections of Wallaga Lake foreshore are owned and managed by public authorities and the CMP includes several actions to understand, protect, enhance and maintain the environment of the coastal zone within these buffer zones (R3.1, R3.2, R4.1, R6.1, R7.1, R7.2). The CMP also includes analysis of land areas (public and private) subject to current and future tidal inundation (BVSC, 2024b), and includes recommendations for analysis and management works to restore and enhance these areas for the protection and sustainability of the marine environment.
m) To support the objects of the Marine Estate Management Act 2014.	The CMP provides for the management of the marine estate consistent with the principals of ecologically sustainable development, including the promotion of a biodiverse, healthy and productive marine estate. This includes a range of actions that promote cultural, social and recreational use of the coastal zone, as well as scientific research and education (R1.1, R1.2, R1.4, R2.1, R3.1, R3.2, R4.1, R5.1, R5.2, R6.1, R8.1, R8.2, R9.1). The CMP also supports the effectiveness and management of the Batemans Marine Park through broader improvement of the coastal zone within the park, as well as through specific management actions (Section 3).

For management purposes, the coastal zone is comprised of four Coastal Management Areas, as defined and mapped in the *Resilience and Hazards SEPP,* with each management area having a different set of objectives (Table 1.2). Recognising that individual sections of land around Wallaga Lake are part of multiple Coastal Management Areas (Map 01b), there may be occurrences where the management objectives are inconsistent or even opposing. In these occurrences, the management objectives of the highest of the Coastal Management Areas as ordered in Table 1.2, will take priority.

Table 1.2: Management Objectives for Coastal Management Areas *(Coastal Management Act 2016)*	
Specific Management Objectives	**CMP Sections that Achieve Objectives**
Coastal Wetlands and Littoral Rainforest Areas	
n) To protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity. o) To promote the rehabilitation and restoration of degraded coastal wetlands	In developing the CMP, a detailed assessment of risks to mapped CWLR areas was completed (BVSC, 2024b). The CMP methodology for evaluating risks and prioritising management actions was underpinned by the social, cultural and environmental values of CWLR areas. Within the

Table 1.2: Management Objectives for Coastal Management Areas *(Coastal Management Act 2016)*	
Specific Management Objectives	**CMP Sections that Achieve Objectives**
and littoral rainforests. p) To improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration. q) To support the social and cultural values of coastal wetlands and littoral rainforests. r) To promote the objectives of State policies and programs for wetlands or littoral rainforest management.	CMP specific actions have been identified to: • Better understand the location, health and hydrology of wetland areas: R1.1, R2,1, R2.2, R7.4, R8.2. • Protect CWLR areas and reduce impacts from development and agriculture in catchment areas: R2.1, R4.1, R5.1, R5.2, R6.1. • Restore and rehabilitate CWLR areas: R3.2. R4.1, R5.1, R5.2, R6.1. • Understand and improve resilience of CWLR areas to climate change: R7.1. • Promote and support the cultural and social values: R1.3, R10.1, R10.2, R10.3

Coastal Vulnerability Areas	
a) To ensure public safety and prevent risks to human life. b) To mitigate current and future risk from coastal hazards by taking into account the effects of coastal processes and climate change. c) To maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place. d) To maintain public access, amenity and use of beaches and foreshores. e) To encourage land use that reduces exposure to risks from coastal hazards, including through siting, design, construction and operational decisions. f) To adopt coastal management strategies that reduce exposure to coastal hazards: i. in the first instance and wherever possible, by restoring or enhancing natural defences including coastal dunes, vegetation and wetlands; and ii. if that is not sufficient, by taking other action to reduce exposure to those coastal hazards. g) If taking that other action to reduce exposure to coastal hazards: i. to avoid significant degradation of biological diversity and ecosystem integrity; ii. to avoid significant degradation of, or disruption to, ecological, biophysical, geological and geomorphological coastal processes; iii. to avoid significant degradation of, or disruption to, beach and foreshore amenity and social and cultural values; iv. to avoid adverse impacts on adjoining land, resources or assets; and v. to provide for the restoration of a beach, or land adjacent to the beach, if any increased erosion of the beach or adjacent land is caused by actions to reduce exposure to coastal hazards. h) To prioritise actions that support the continued functionality of essential infrastructure during and immediately after a coastal hazard emergency. i) To improve the resilience of coastal development and communities by improving adaptive capacity and reducing reliance on emergency responses.	In developing the CMP, a detailed assessment of risks from coastal hazards was completed, and included risks around the estuary and adjacent areas of open coast (BVSC, 2024b). This assessment was underpinned by the best available information on local coastal processes, hazards and climate change projections through the *Coastal Processes and Hazard Definition Study* (BMT, 2015). Within the CMP specific actions have been identified to: • Enhance the natural protection of dunes through active dune management and effective entrance management: R1.1, R7.5. • Reduce impacts of coastal hazards on transport corridors and assets: R1.2, R7.1, R8.1 • Reduce exposure to coastal hazards through improved land use planning and planning of protection strategies: R7.1, R7.2, R7.3, R7.5, R7.6. • Plan and improve resilience of infrastructure and coastal development to cope with coastal hazards and climate change: R1.2, R7.1, R7.2, R7.3, R7.5 • Reduce impacts and degradation of ecosystems, and disruptions to ecological, biophysical, and geomorphological processes: R1.4, R2.1, R2.2, R3.1, R4.1, R6.1, R8.1, R8.2.
Coastal Environment Areas	
a) To protect and enhance the coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes and	In developing the CMP, a detailed assessment of risks to environmental values and natural processes of the estuary was completed (BVSC, 2024b). The

coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity. b) To reduce threats to and improve the resilience of coastal waters, estuaries, coastal lakes and coastal lagoons, including in response to climate change. c) To maintain and improve water quality and estuary health. d) To support the social and cultural values of coastal waters, estuaries, coastal lakes and coastal lagoons. e) To maintain the presence of beaches, dunes and the natural features of foreshores, taking into account the beach system operating at the relevant place. f) To maintain and, where practicable, improve public access.	CMP methodology for evaluating risks and prioritising management actions was underpinned by the social, cultural and environmental values of the estuary. Within the CMP specific actions have been identified to: • Protect and enhance the coastal environmental values of the estuary, improve biodiversity and integrity of terrestrial and aquatic ecosystems: R1.4, R2.1, R3.1, R3.2, R4.1, R5.1, R5.2, R6.1, R7.5, R8.2, R9.1. • Reduce the risk of threats to the environmental processes and natural ecosystems of the estuary and beach, including climate change: R1.1, R2.2, R7.1, R7.5, R8.2. • To understand threats, monitor and improve estuarine water quality: R2.1, R3.2, R4.1, R5.1, R5.2, R6.1, R8.2. • Enhance the natural protection of dunes through active dune management and effective entrance management: R1.1, R7.5
Coastal Use Areas	
a) To protect and enhance the scenic, social and cultural values of the coast by ensuring that: i. the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast; ii. adverse impacts of development on cultural and built environment heritage are avoided or mitigated; iii. urban design, including water sensitive urban design, is supported and incorporated into development activities; iv. adequate public open space is provided, including for recreational activities and associated infrastructure; and v. the use of the surf zone is considered. b) To accommodate both urbanised and natural stretches of coastline.	In consultation with the local community and stakeholders, a number of threats were identified that impinge on the scenic, social and cultural values of the Coastal Use Area around the estuary and beach. This includes the risk of climate and climate change impacts on the recreational and economic benefit of both built and natural assets. Within the CMP specific actions have been identified to: • Minimise the impacts of development and commercial activities within the lower catchment: R1.1, R3.2, R4.1, R5.1, R5.2, R6.1. • Enhance the climate resilience of recreational and essential transport infrastructure into future management of the estuary: R1.2, R7.1, R7.2, R7.5. • Balance the multi-use nature of the catchment across the needs of the agriculture sector, semi-urban villages and the natural ecosystem services and values provided by the estuary and coastline: R3.2, R4.1, R6.1, R8.1

1.3.2 Community Strategic Plan 2040 Objectives

The *Bega Valley Shire Community Strategic Plan 2042* (BVSC, 2022) is a long-term visionary plan, aligning Council's operations with the priorities and aspirations of the community. It is Council's overarching strategic planning document developed in partnership with the community and stakeholders, with its main purpose to help build a stronger and better Bega Valley Shire for the community. The *Community Strategic Plan* was prepared to complement key directions established in broader strategic documents such as the State Government's *Plan NSW 2021* (NSW Government, 2011), the *South East and Tablelands Regional Plan 2036* (NSW

Government, 2017) and the strategies and actions from Council's *Climate Resilience Strategy 2050* (BVSC, 2020) and *Community Engagement Strategy* (BVSC, 2019a).

The *Bega Valley Shire Community Strategic Plan 2042* is Council's overarching planning document within the Integrated Planning and Reporting (IP&R) framework (Figure 1.6), legislated under the *Local Government Act 1993* and informing Council's long term strategic, infrastructure and financial framework.

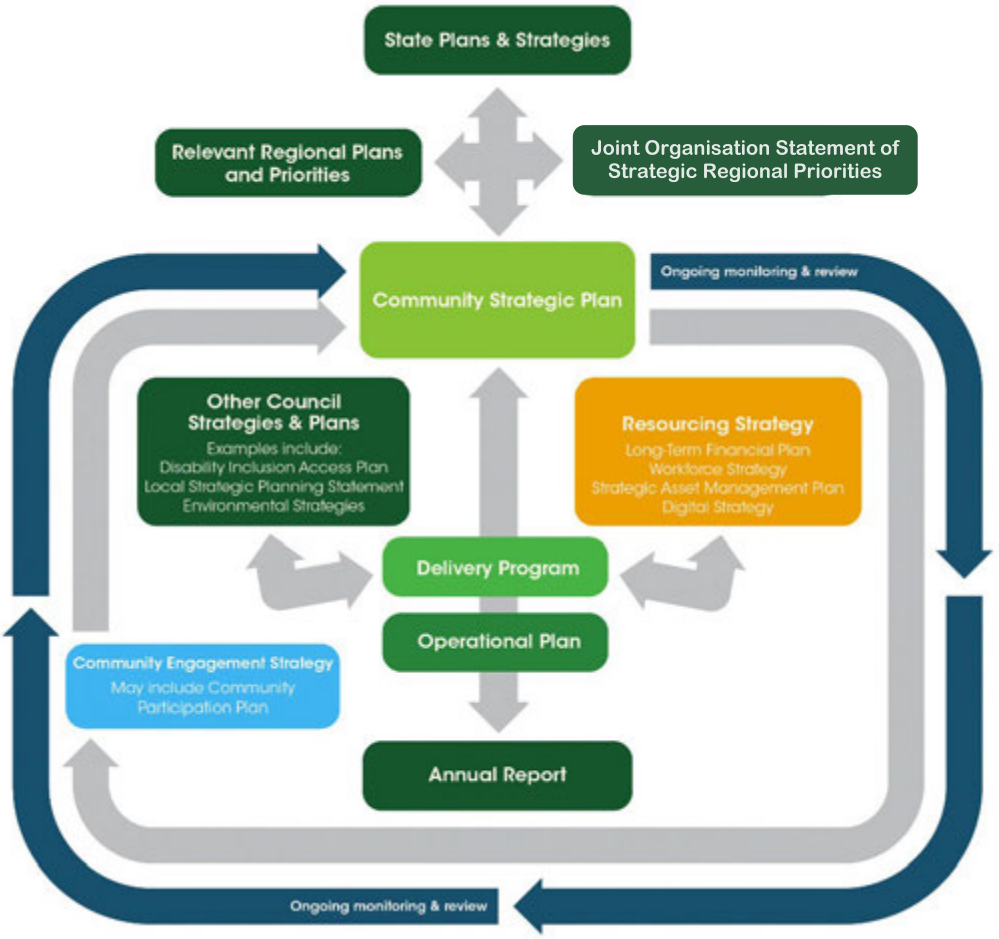


Figure 1.6: IP&R Framework within BVSC

The *Community Strategic Plan* is based around five priority themes:

a. Our community
b. Our economy
c. Our environment
d. Our infrastructure
e. Our civic leadership

A series of 16 Strategic Objectives and 39 actionable Strategies are identified in the Plan, reflecting the community's feedback across the five themes. The objectives and management responses of the Wallaga Lake CMP are consistent with several of the strategies from the *Community Strategic Plan*, as outlined in Table 1.3.

Table 1.3: Relevant Strategies of the Bega Valley Shire Community Strategic Plan 2042

Theme (a): Our Community: A connected and vibrant community where people are happy, safe and well.	
Strategic Objective: We are a vibrant, respectful, inclusive and connected community that enjoys a culturally rich community life.	**Strategy A.2:** Respect and promote our cultural heritage and diversity and partner with and acknowledge Traditional Owners and First Nations people.
Strategic Objective: We are a resilient and caring community that supports the health and wellbeing of our residents.	**Strategy A.5:** Provide and advocate for accessible services and initiatives that contribute to wellbeing across all stages of life.
Strategic Objective: We value the role of community in supporting and enhancing the life of all Bega Valley Shire residents.	**Strategy A.6:** Acknowledge and collaborate with local groups to advance local priorities – environmental impact, community infrastructure, housing and economic growth.
Strategic Objective: Our shire continues to be a safe and affordable place to live.	**Strategy A.8:** Ensure community safety is planned for and partner with other agencies to address issues related to community safety.
Theme (c): Our Environment We embrace sustainable living and value and conserve our natural environment.	
Strategic Objective: Our air and water are pristine, and our natural environment and rural landscapes are protected.	**Strategy C.1:** Deliver and support integrated water management. **Strategy C.2:** Ensure land use planning and resource use supports sustainable growth whilst protecting the quality of the natural environment and our rural landscapes.
Strategic Objective: We act to adapt to and mitigate the effects of climate change.	**Strategy C.5:** Lead climate change mitigation and adaptation through implementation of our Climate Resilience Strategy focusing on natural systems, preparing for natural hazards, liveable and connected places, safe, healthy and inclusive community, diverse and thriving economy, energy security and food security.
Theme (d): Our Infrastructure Our infrastructure complements our natural surroundings and character while enhancing the lives of our community.	
Strategic Objective: Our public and private infrastructure and community services meet community needs.	**Strategy D.1:** Plan for community infrastructure and services that will meet current and future needs.
Strategic Objective: Our community has access to good quality open space, recreation and sporting facilities that support health and wellbeing.	**Strategy D.5:** Collaborate with partners to provide open space, facilities, activities and services that encourage more people to have active and healthy lifestyles and improve accessibility to our natural environment.

Table 1.3: Relevant Strategies of the Bega Valley Shire Community Strategic Plan 2042	
Theme (e): Our Civic Leadership	
Strategic Objective: We are an informed and engaged community with a transparent, consultative and responsive Council.	**Strategy E.2:** Ensure the community has opportunities to actively engage and contribute in a timely manner to the things that affect their daily lives using relevant and varied communication channels. **Strategy E.3:** Councillors, council staff and the community work in partnership to identify and deliver community aspirations.
Strategic Objective: Council has strong organisational practices to ensure a viable organisation that delivers services and facilities to meet community needs.	**Strategy E.6:** Council decision making seeks to optimise environmental, social and economic outcomes for our community, while mitigating financial, legal, environmental, reputational and safety risks.

1.4 Community and Stakeholder Engagement During the Development of the CMP

Engagement of key stakeholders and the broader community during preparation of the *Wallaga Lake CMP* was essential to developing a program that was both evidence-based and tangible. The supporting document "*Stakeholder and Community Engagement Plan – Wallaga Lake, Merimbula and Back Lake, and Lake Curalo CMPs*", (UNSW, 2017), sets out the aspirational engagement activities that were largely followed during the development of the CMP. These activities include:

- Establishing a CMP focus group to oversee the CMP development process, consult on key aspects, and form a conduit to provide information to their respective agencies and constituencies. The focus group comprised key representatives from the community, BVSC (technical staff and elected councillors), Eurobodalla Shire Council, DCCEEW, DPI Fisheries, National Parks, Crown Lands, LLS, Batemans Marine Park, Merrimans LALC, Transport for NSW and NSW Forestry and UNSW;
- A dedicated website for the development of the suite of BVSC CMPs, including a section specifically for the *Wallaga Lake CMP*;
- Formal and social media releases;
- An email contact group used to distribute project updates and for community members to provide input;
- Information drop-in sessions;
- Formal exhibition of the draft CMP.

Cross-council consultation occurred throughout the CMP development, to ensure that management issues were holistically identified and addressed within the management actions. This was reflected through the inclusion of a Eurobodalla Shire Council representative within the Focus Group, and the opportunity for ESC to provide feedback on the CMP at regular stages during its development.

During the preparation of the CMP, there was a pause to evaluate the overall coastal management priorities across the full coastal zone of the LGA, documented through a revision to Council's CMP Scoping Study. This provided opportunity to update the scope of the Wallaga

Lake CMP and improve alignment with coastal management aspirations and legislation. Further to the engagement activities presented in the Stakeholder and Community Engagement Plan (UNSW, 2017), an additional meeting of the Wallaga Lake CMP Focus Group was held in May 2023 to discuss the updated CMP scope with key stakeholders, to present an extended analysis of threats and pressures, and to discuss revised management actions. This was followed by additional one-on-one consultation with key stakeholders to agree and finalise management actions. A one-on-one consultation was also held with Merrimans LALC in July 2023 to discuss management issues and actions relevant to local Aboriginal heritage, and how best to capture these within the CMP. These additional stakeholder engagement sessions helped to guide the final stages of the CMP.

The development of the *Wallaga Lake CMP* was undertaken in parallel with other CMPs for the Shire, with many synergistic opportunities to share and gather information from all CMPs with the community. An example of this was the results of the "*Community Uses and Values*" questionnaire (BVSC, 2017b, Draft) presented as a supporting document to the draft *CMP – Coastal Hazards* (BVSC, 2019b, Draft), which provided broad information on the community's values for the coastal zone, including the estuaries.

1.5 Overview of the Wallaga Lake Estuary

1.5.1 Catchment and Estuary Overview

Wallaga Lake has a catchment area of approximately 259 km^2 and the estuary occupies 9.3 km^2 (OEH, 2011). The lake is classified as an intermediate, wave dominated barrier estuary (Roy et al., 2001). National Park estate comprises 43% and State Forest 10% of the catchment. The primary tributaries into the lake are Dignams Creek and Narira Creek, and the lake is intermittently open to the ocean via Wallaga Lake beach.

The northern and central sections of the Wallaga Lake catchment are primarily comprised of Gulaga National Park and Kooraban National Park. Around 68% of the lake foreshore is classified as national park or a reserve (Spurway, 2004). The eastern section of the catchment is largely grazing and agricultural land either side of the Princes Highway. Small urban areas are scattered throughout the catchment, including development of the lake foreshore areas in the townships of Akolele, Regatta Point, Beauty Point and Fairhaven. Table 1.4 summarises the land use within the catchment and shows that the catchment is largely dominated by forested areas (approximately 60%) and agricultural areas used for grazing (approximately 36%).

Table 1.4: Land Uses within the Wallaga Lake Catchment

Land Use	Area (km^2)	% of Total Area
Cleared Land	0.1	0.04%
Forest	156.05	60.2%
Urban	8.18	3.2%
Crops	0	0.0%
Grazing	93.4	36.1%
Irrigated Pasture	0.04	0.02%
Dry Forbs	0.11	0.04%
Irrigated Forbs	0.48	0.2%
Other	0.66	0.3%

1.5.2 Estuary Entrance Dynamics

Wallaga Lake is an intermittently closed and open coastal lagoon (ICOLL), meaning that it is only periodically open to the ocean. At other times a coastal barrier dune builds up in the entrance to the lake adjacent to Murunna Point as a result of wave and wind driven sand movement, and separates the lake from tidal ocean flushing. Once closed, the lake entrance would naturally open and scour when water levels in the lake reached a suitably high level to overtop the entrance berm, however, the entrance is almost always mechanically opened at lower water levels to alleviate the impacts of flooding on low-lying development. The *Wallaga Lake Entrance Management Policy (2016)* has a trigger water level of 1.25 m AHD, at which point the entrance is mechanically opened by Council. Analysis of entrance data records shows that over the longer term, Wallaga Lake spends slightly more time open to the ocean than closed, with dynamics of the entrance summarised as:

- Entrance closed for 39% of the time, with closure durations ranging from as little as one week to as long as several years;
- Entrance open for 61% of the time, with open durations ranging from approximately one month to longer than three years.

Historically, prior to the development of the low-lying land around the foreshore, the dune accretion and erosion processes would have happened naturally. It is likely that the barrier dune would routinely have built to a height of 3 m AHD and breakthroughs would have only occurred after prolonged, large rainfall events which elevated water levels within the lake above the dune height. As a result it is postulated that breakthrough of the dune would have occurred less frequently in the past and under natural processes, but more energetic entrance breakouts would have provided better opportunity to scour built-up sediment from within the estuary.

1.5.3 Hydrodynamics

As an intermittently closed coastal lake, the hydrodynamics of Wallaga Lake are highly dependent on the entrance conditions. The hydrodynamics of the lake can therefore be split into two cases:

When the entrance is closed:

- The water budget is dependent on freshwater catchment runoff, direct rainfall, groundwater flow and evaporation losses;
- The largest water influx typically comes from catchment flows, with mean daily flows of 20 ML (PBP, 1996);
- During a large catchment rainfall event, the water level elevates prior to the scouring of the entrance. Breakout elevations between 0.86 m and 1.78 m AHD have been observed, although mechanically opening the entrance prevent estimates of natural breakout levels (BVSC, 2016); and
- A 2-year ARI catchment rainfall event will cause a freshwater flood event pushing approximately 27,000 ML through the lake, which is of similar order to the total lake volume itself.

When the entrance is open:

- Maximum spring tidal ranges of 0.5 m are observed in the lake, with water levels usually remaining above 0 m AHD (BVSC, 2016), and a tide lag time of 2.5 – 3 hours (PBP, 1996). Note both of these assume relatively well scoured entrance conditions;
- Due to its geometry, the tide extends relatively uniformly throughout the lake; and
- Mean tidal prism volumes of 1,800 ML were reported for one entrance condition, representing 7% of the lake's volume (PBP, 1996).

1.5.4 Sedimentation

The creeks that feed into Wallaga Lake are naturally low energy and therefore historically have caused little infill of the lake (PBP, 1996). However, urban and agricultural development in the catchment, and the associated land clearing, have increased the sedimentation rates as evidenced by a growth in the fluvial creek deltas where the creeks enter the lake. Sedimentation rates in the two creeks of 4,000 – 5,000 m^3/year were estimated by PBP (1996), around 10 times greater than times prior to land clearing in the area. No contemporary analysis of sediment accumulation within the fluvial deltas of the lake has been undertaken, however, the deltas have been anecdotally reported to be increasing in aerial extent.

Near the entrance of the lake (on the ocean side of the Wallaga Lake Road bridge), the sediments are generally marine beach sands, moved by tidal and wave forces through the entrance channel (BVSC, 2016). During storm events, this sediment gets pushed out of the entrance and deposited in the nearshore coastal region before being re-deposited later in calmer conditions. PBP (1996) noted little change in the flood tide delta from aerial images, though a long-term policy of mechanically opening the entrance may allow this to prograde (BVSC, 2016).

1.5.5 Ecosystem Health and Water Quality

Roper *et al.* (2011) presented the Monitoring, Evaluation and Reporting (MER) framework for assessing estuarine ecosystem health in NSW. A state-wide assessment of estuarine health using this framework was presented in the 'State of the Catchment' report series, with results for the Southern Rivers Region presented in Roper *et al.* (2010). This assessment evaluated available data on key health indicators in the MER framework, as well as pressures on estuary systems, to rate the condition of each estuary, including:

- eutrophication: chlorophyll a, macroalgae and turbidity;
- habitat distribution: change in seagrass, mangrove and saltmarsh (macrophytes) extent;
- fish assemblages: species diversity and composition, species abundance, nursery function; and
- trophic integrity (food web).

Table 1.5 summarises the results of the condition assessment for Wallaga Lake that is presented in the State of the Catchment reporting, noting that the overall condition score was 2.5, indicating that the estuary was in a 'Poor' condition compared to other estuaries in the state. In particular, the rating for Chlorophyll a was at the lowest possible end of the scale. This assessment was based on data available up until 2009.

Table 1.5: Condition Assessment for Wallaga Lake (adapted from Roper *et al*. 2011)		
Indicator	**Condition Score**	**Condition Index Rating**
Chlorophyll a (old data)	1	Very Poor
Macroalgae	No data	-
Turbidity	4	Good
Seagrass	3	Fair
Mangroves	N/A	-
Saltmarsh	2	Poor
Fish (old data)	No Data	-
Total	***2.5***	***Poor***

Based on data collected by OEH in 2017, the rating for turbidity was A (Very Good condition) and for chlorophyll-a was C (Fair condition). More recently water quality data collected over the 2021–22 summer when 3 sites were sampled on a monthly basis, yielded an overall estuary health rating of C (Fair condition). This was based on two water quality indicators being algae abundance graded D (poor), and water clarity graded C (Fair). While these records collected within the last 5 years show a slight improvement in water quality indicators, it remains difficult to directly link water quality improvements, estuary processes (such as entrance state and rainfall events) or management changes within the catchment. Updated mapping of estuarine vegetation condition has not been undertaken since the analysis of aerial photography from the late 1990's and field observations in 2002, which also limits the overall health rating of the estuary.

Mapping from DCCEEW (Figure 1.7, Figure 1.8, Figure 1.9) indicates that sources of catchment derived suspended solids are predominantly the steeper areas of catchment to the north-west of the lake as well as the urbanised areas along the eastern and northern foreshore. Catchment nutrients loads are predominantly from the agricultural areas of the lower western catchment, in particular along the flatter plans adjacent Dignams and Narira creeks.

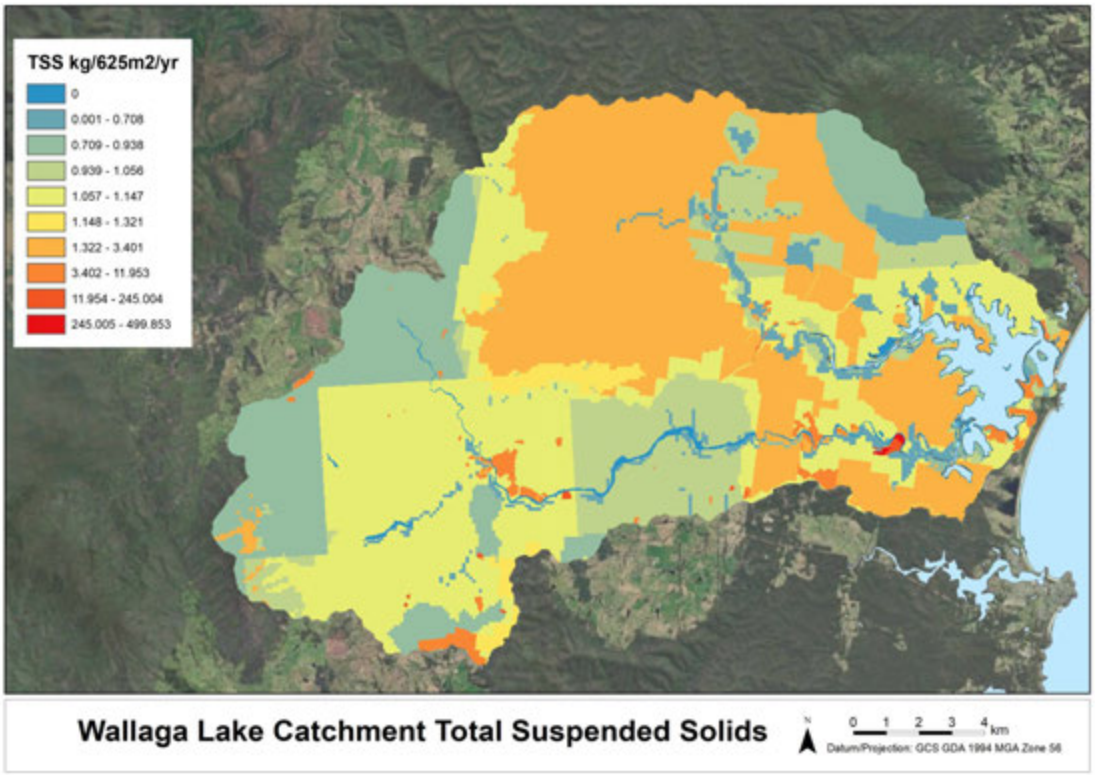


Figure 1.7: Catchment Derived Sources of TSS (DCCEEW, 2023)

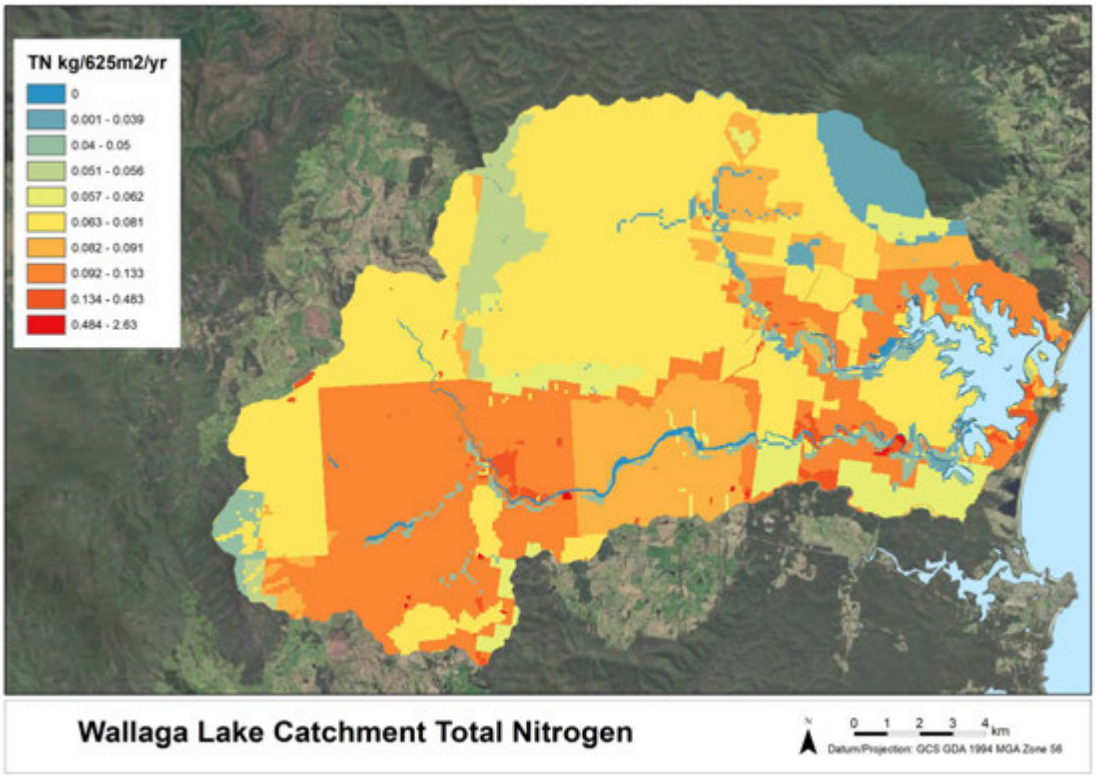


Figure 1.8: Catchment Total Nitrogen Loading (DCCEEW, 2023)

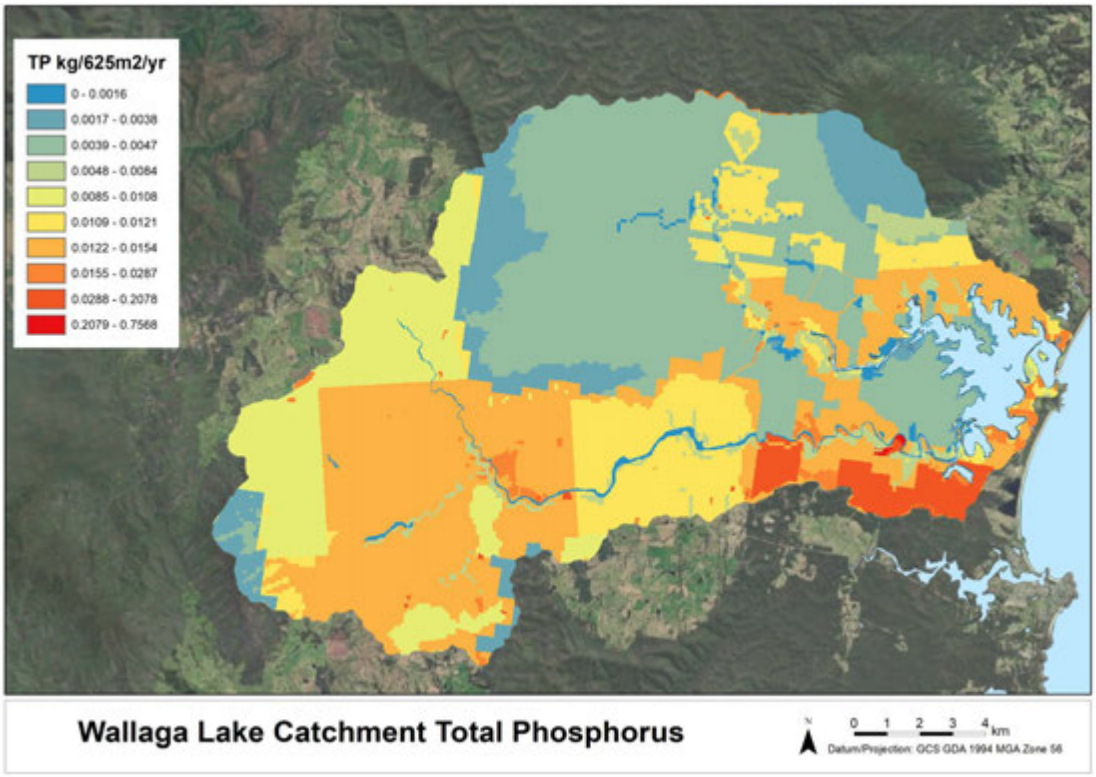


Figure 1.9: Catchment Total Phosphorus Loading (DCCEEW, 2023)

1.6 Estuary Uses and Values

1.6.1 Overview of Uses and Values for the Greater BVSC Coastal Zone

During the preparation of the Wallaga Lake CMP and CMPs for several other areas within BVSC, a shire-wide review of uses and values of the greater Bega Valley Shire coastal zone was conducted (BVSC, 2017b). Information gained during this process, along with other specific engagement activities (as outlined in UNSW, 2017), was used to inform our understanding of uses and values for the Wallaga Lake area.

Within the coastal townships of BVSC, the Coastal Use Area is a place for urban development of varying densities and socio-economic characteristics, and these townships represent the commercial centres of both Bega Valley and Eurobodalla Shires. In this broad sense, the coastal zone represents a place for residing, working and enjoying recreational activities for the majority of the Shires' population. The immediate Wallaga Lake area is home to the residential villages of Akolele in Eurobodalla Shire, and Wallaga Lake Heights, Beauty Point and Fairhaven in Bega Valley Shire.

The Bega Valley LGA has an estimated resident population of 36,279 as of June 2023 with five of the shire's six major settlements occurring in the coastal zone, including the township of Bermagui. Between 2019 and 2036, the population for Bega Valley Shire is forecast to increase by 3600 people (10.4% growth). The *South East and Tablelands Regional Plan 2036* identified that an additional 1,780 dwellings will be required in the Bega Valley to cope with population growth. The population of the Bermagui coast specifically is also expected to grow by 613 people, an increase of 25.5% between 2019 and 2036, as outlined in the *Residential Land Strategy2040* (BVSC, 2020c). The population is also ageing and the proportion of people over 60 is expected to increase from 20 per cent to 35 per cent in the next 20 years (id Consulting, 2023).

The majority of the Shire's population is situated in the major town centres, with a smaller percentage living in rural areas and smaller villages (Figure 1.10, BVSC, 2020b). Council currently has a critical housing shortage, following the impacts of bushfires and Covid-19 and the high proportion of housing in the short-term letting market, and is investigating ways to improve this through planning controls and partnerships with social and crisis housing providers.

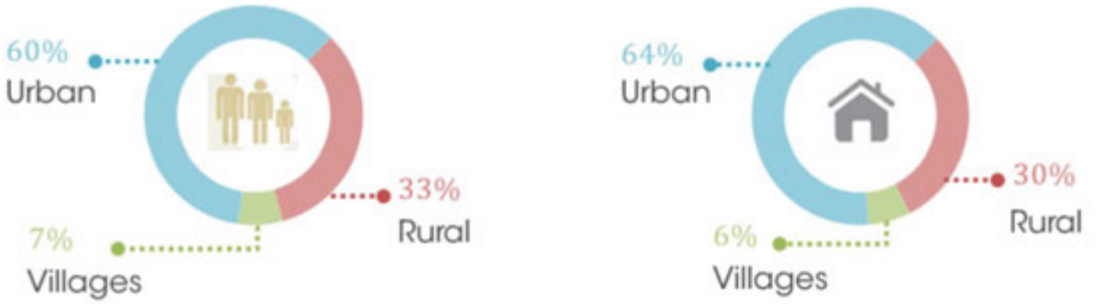


Figure 1.10: Distribution of population in BVSC

Within the Bermagui area, The *Residential Land Strategy* (BVSC, 2020c) identifies a need for a further 581 residential properties to be developed by 2036, and an estimated overall land available for 663 potential dwellings. This indicates that there is only a very slight excess of land within the area to meet the forecast residential property demand. Across the next decade only minor changes in development are expected within the Wallaga Lake catchment, due to the existing land ownership, zoning and existing development. More broadly across the catchment, large areas of land are State Forest or National Park, which further constrains future housing development within the catchment zone. The *Residential Land Strategy 2040* identifies potential areas for residential development within the Bermagui/Wallaga Lake area as shown in Figure 1.11. The only identified land parcel for residential land development in the Wallaga Lake area sits between Wallaga Lake Road and Camel Rock beach, to the east of Wallaga Lake.

Both in and outside of our urban coastal townships, Bega Valley Shire's coastal zone comprises a diverse range of natural features, highly valued by our local communities (BVSC, 2014). In terms of economic value, commercial fishing, aquaculture and tourism are significant areas of business for the Shire, and like other coastal areas of NSW, property within the coastal zone is of high economic value. Three holiday parks are situated on the immediate foreshore of Wallaga Lake, resulting in a boost to the population of the villages and lake usage in peak holiday times.

The coastal zone is also an important area for both Aboriginal and European cultural heritage values for the shire. The foreshores of the estuaries and rivers, dunes and coastal fringe areas are home to a large number of significant Aboriginal sites, and are important traditional areas for our Aboriginal people. Coastal settlements also provide the roots of European development of the Sapphire Coast region, with many industries historically relying on shipping and natural resources from our coastal settlements located on estuaries.

Across the Shire the coastal zone therefore has a broad range of values to our community and visitors alike, as well as being an important and unique part of the environment of the state and country. These values span social, economic, environmental and recreational groups, and protection of these values through our CMPs is highly important, and consistent with the Key Directions of our *Community Strategic Plan*.

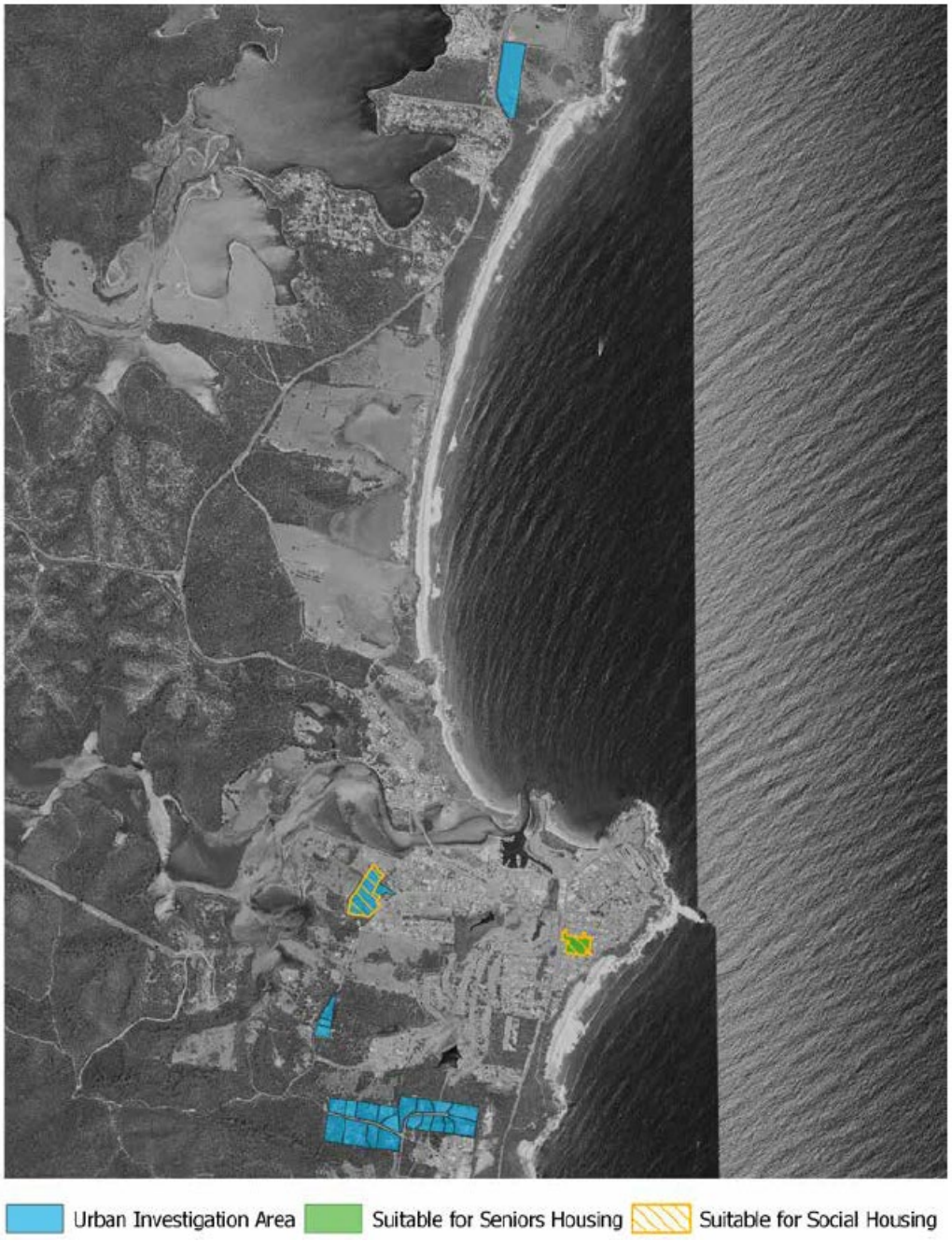


Figure 1.11: Bermagui and Wallaga Lake residential land investigation areas (BVSC, 2020c)

1.6.2 Community's Values for the Coastal Zone

Council has undertaken a number of broad community surveys in recent years, and from these surveys have been able to develop a good understanding of the values of our community with regards to coastal areas. Of particular relevance is the information obtained from the *Understanding Our Place* survey, completed for the previous *Community Strategic Plan*. This shire-wide research compiled feedback from 2,000 community members, obtaining almost 25,000 comments, and helped to provide an overall understanding of what our community loves about the Bega Valley Shire and what they find challenging; as well as the community's ambitions and the direction they would like the Shire to head. Overall, the three things our

community like best about the Bega Valley Shire, as reflected in the *Community Strategic Plan 2042* are the natural environment, peace and quiet and the sense of community.

Key results from the *Understanding our Place* survey related to management of our coastline include:

- When asked what sets the place we live in apart from others, 40% of respondents indicated it was the natural environment, while 6% said that it was the proximity to towns, services, coast and nature.
- When asked what they love most about the place we live, almost 9% of respondents said it was the coast, beach and sea, while 9% said it was the trees, forests, wildlife, waterways and mountains.

A theme coming through much of the survey was the community's love of the relaxed coastal country lifestyle, with 17% of respondents indicating this was currently the most important thing in their life.

Additional information specific to the coastal zone was collected in a "*Uses and Values of Your Coast*" questionnaire, distributed to the community as part of the development of the Shire's CMPs (BVSC, 2017b). This process assisted in understanding which parts of the coastline are most used by our community, what activities people enjoy at the beaches and estuaries, and why they value specific areas of the Bega Valley Shire coastal zone. The information collected has been captured within the Scoping Study for Stage 1 of the CMP (BVSC, 2022b). While this survey got a relatively small number of responses, they represented a broad spectrum of the community, and the main themes echoed the results of Council's wider community surveys.

Our residents and community members in the coastal areas of the Shire have expressed that the beaches and estuaries of the region are an extremely important factor that influences their enjoyment and value of their local area. With regards to community values of coastal areas, key feedback from the survey process indicated:

- The natural and pristine conditions, water quality and scenery are typically valued more highly than other aspects of our coastal areas;
- While people appreciate and use public infrastructure (e.g. recreational amenities and club houses), there appears to be little desire to expand the facilities to a greater number of areas. While the community recognise the importance of well-maintained facilities at urban coastal areas, they also indicate that it is important to maintain some locations which have no or few public facilities beyond the natural amenity;
- While the numbers of people visiting our remote coastal locations may be fewer than our urban beaches, the availability of locations that are uncrowded and undeveloped is viewed by our community as a characteristic that is relatively unique to the Bega Valley Shire area of NSW, and seen as an essential characteristic to preserve.

The local community has a unique view of threats to the coastal region within Bega Valley Shire Council. Many people expressed a view that climate change, including sea level rise, is one of the biggest threats to their region. Other threats highlighted by the community which they would like to see be addressed in BVSC's Coastal Management Programs include:

- Storm erosion and inundation;
- Over development or poorly managed development;
- Rubbish, litter and pollution; and
- Sedimentation of the lake entrances.

1.6.3 Coastal Zone Values of Wallaga Lake

The *Wallaga Lake Estuary Management Plan* (BVSC and ESC; 2000) and the *Wallaga Lake Coastal Zone (Estuary) Management Plan* (BVSC, ESC and DPNR; 2006) provided a specific summary of the values of the estuary based on previous investigations and consultation with the community and stakeholders. Both of these documents were compiled under guidance of the Wallaga Lake Estuary Management Committee. This summary has been reviewed and updated where necessary for the CMP. In general, the main values of Wallaga Lake are underpinned by the natural environment and the heritage. There were 12 key values identified in the *Wallaga Lake Estuary Management Plan* (BVSC and ESC; 2000), which generally remain relevant, with Table 1.6 showing the values and a description taken from the Estuary Management Plan.

Table 1.6: Key Values for Wallaga Lake (adjusted from BVSC and ESC; 2000)

Value	Description
Natural Beauty	• Wallaga Lake is considered an area of significant natural beauty. • The diverse features of the area, ie the lake, forests, and Gulaga/Mt Dromadery, within such close proximity to each other make Wallaga Lake a unique location in the region. • The visual beauty of the lake and its surrounds is a key value of the Wallaga Lake estuary.
Unspoiled Environment	• The unspoiled nature or relatively pristine condition of Wallaga Lake estuary is valued by residents and visitors. • The relatively pristine condition of the area is due to factors such as the low level of development on the foreshores and the presence of permanent forests on the north western shore resulting in an estuary with good habitat condition and relatively good water quality.
Tranquillity	• Wallaga Lake is considered a peaceful and relaxing area. • The tranquillity of the area is primarily due to the low level of development on the foreshores and the current low impact use of lake, ie very few speedboats or jet skis.
Recreation	• Wallaga Lake provides opportunities for recreational fishing, sailing, boating, swimming, kayaking and water skiing in protected waters. • There are numerous walking tracks and picnic areas around the lake foreshores.
Tourism	• Wallaga Lake is part of a wider cultural landscape including Baranguba - Montague Island, Najanuga - Little Dromedary, Gulaga – Mt Dromedary, Montreal Goldfields, Gulaga National Park, and Tilba Conservation Area. • Wallaga Lake is a popular tourist destination. • The primary tourist operators around the estuary are the holiday parks. • Tourist operators rely on visitors to the area for income, with visitors staying at Wallaga Lake are an important component of tourism for the wider Bermagui, Tilba and Narooma areas. • Tourism provides an injection of money into the wider community and employment opportunities.
Commercial Fishing	• Commercial fishers value the lake as it provides employment and income. • There are six regular, nine frequent and twenty-four seasonal fishers who fish commercially in Wallaga Lake and many more who hold licences enabling them to fish the lake. • The primary source of income for commercial fishers comes from finfish although prawn and oysters are also commercially harvested within the lake.

Table 1.6: Key Values for Wallaga Lake (adjusted from BVSC and ESC; 2000)	
Value	**Description**
Residential Area	• Wallaga Lake is valued as a residential area. • The community described the area as “a great place to live”, “safe place to raise a family”. • The residential centres on the Koori land and at Akolele, Wallaga Lake Heights, Beauty Point and Fairhaven are closely associated with the lake environment. • Residents value the lifestyle associated with living near the lake. • Wallaga Lake is a significant retirement area.
Cultural Heritage	• The most prominent cultural values and sites around Wallaga Lake stem from the Aboriginal history and deep significance of the lake and surrounding area to the Aboriginal people. • Merrimans Island Aboriginal Place was the first Aboriginal Place gazetted in NSW. • Extensive midden sites are located around the lake and suggest the local Aboriginal community have lived here for at least 6000 years. • Gulaga National Park forms a large part of the lake catchment. • Non-Aboriginal historic sites primarily relate to goldmining. • Montreal Goldfields are located behind the beach dunes and the site is currently zoned a public reserve.
Development Potential	• There is scope for development on the northern (limited) and eastern shores of Wallaga Lake • Development has the potential to provide income for landholders, developers and tradespeople. • An increase in development and employment around Wallaga Lake would also provide an injection of money into the local economy.
Flora and Fauna	• Over 60 lake dependent bird species rely on the Wallaga Lake ecosystem for breeding, shelter and food. • The lake is considered one of the most significant estuaries for birdlife in NSW and includes a range of foraging and nesting sites for several threatened shorebird species including Hooded Plovers, Pied Oystercatchers and Little Terns. The lake, including the intertidal sand flats and lake edges also provides important feeding habitats and roosting sites for migratory shorebirds such as the critically endangered Eastern Curlew and Great Knot • The fish stocks, prawn and fish nursery identified in Meads Bay, surrounding forests, seagrass beds, swamps, saltmarsh and delta wetlands are all valued components of the Wallaga Lake estuary. • The riparian vegetation provides significant habitat for many species some of which are endangered. • The bio-diversity of the lake and its surrounds is a key value of the Wallaga Lake estuary. • The catchment of Wallaga Lake has a range of areas mapped as threatened ecological communities and several species of threatened flora occur around the lake such as Square Raspwort. The area is known habitat for several species listed as vulnerable or endangered including the koala, long nosed potoroo and Greater Glider. There is also a notable Grey-headed Flying-fox camp at Wallaga Lake and Southern Myotis colony at Wallaga Lake bridge.
National Park and State Forest	• Gulaga National Park contains high value wilderness areas along with significant Aboriginal heritage sites. • The National Park and State Forest are valuable resources for day use activities such as hiking and picnicking. • They are also valued as a visual resource as they limit the scope for future

Table 1.6: Key Values for Wallaga Lake (adjusted from BVSC and ESC; 2000)	
Value	**Description**
	development around Wallaga Lake. • The National Park and State Forest are located in a unique position on the foreshores of the estuary. • Bermagui State Forest contributes sustainable timber resources under the Regional Forest Agreement
Batemans Marine Park	• Includes the entirety of tidal/brackish waters of Wallaga Lake. • Sanctuary Zones at Couria Bay, Meads Bay, Dignams Creek, Narira Creek and Merriwinga Creek provide full protection of marine biodiversity inclusive of fish and sea grass beds. • The Snake Island Special Purpose Zone provides exclusive use to Traditional Owners for collection of cultural food resources. • Multi-use zoning provides for a range of different economical uses including commercial fishing, aquaculture, and tourism. • Recreational fishing is supported within Habitat Protection and General Use Zones of the Lake. • Recreational activities of kayaking, swimming, and boating are permitted across all zones of the Marine Park.
Accessibility	• Visitors to Wallaga Lake and residents of the area value that the lake foreshore and waterway are accessible.

Several of these key values of Wallaga Lake embody the broader values of the Batemans Marine Park and Gulaga National Park of the which the lake and its catchment form a part, as outlined in the *Plan of Management for Yuin Bangguri (Mountain) Parks 2014* and *Batemans Marine Park Operational Plan 2010*. In particular, this includes values related to the environment, flora, fauna and Aboriginal cultural heritage. Reducing threats to these priority values through this CMP therefore also contributes positively to management of the broader National and Marine Park lands and waters.

2 Snapshot of Issues

2.1 Approach to Identifying Threats and Pressures

Our contemporary understanding of the threats and pressures acting on the Wallaga Lake estuary has been developed from a range of information including:

- Broader scale threats and pressures applicable to estuaries of the South Coast region, as identified in the *NSW Marine Estate Threat and Risk Assessment Report* (BMT, 2017);
- Review of the status of the management action plans from the *Wallaga Lake Estuary Management Plan* (2000), *Wallaga Lake Foreshore Vegetation Management Plan* (2004) and the *Wallaga Lake Coastal (Estuary) Zone Management Plan* (2006);
- The *State of the Catchments: Estuaries and Coastal Lakes, Southern Rivers Region report* (2010);
- Bega Valley Shire Coastal Processes and Hazard Definition Study (BMT WBM, 2015)
- NSW Estuary Health Risk Dataset (2019), comprising mapping of sub-catchment risks and catchment pollutant loading, updated in 2023;
- Contemporary water quality monitoring completed 2017 and 2021/22;
- Coastal Management Program Scoping Study (BVSC, 2022b);
- Various field inspections by the project team, Council, DPHI and DCCEEW; and
- Consultation with various stakeholders and community representatives.

Consistent with the requirements of the *Coastal Management Manual 2018,* the threats and the identified management issues through which they manifest at Wallaga Lake, have been evaluated using a qualitative risk assessment framework under Stage 2 of the preparation of this CMP. The results of the assessment are fully detailed in the supporting document titled *Wallaga Lake CMP – Estuary Threats and Pressures* (BVSC 2024b), including detailed mapping of identified threats and management issues. This section of the CMP provides a snapshot of the management issues around the estuary, and their relative risk level.

2.2 Regional Scale Threats to Our Estuaries

The NSW Marine Estate Management Authority (MEMA) has undertaken a state-wide Threat and Risk Assessment (TARA) for NSW, with the results published in the report *NSW Marine Estate Threat and Risk Assessment* (BMT, 2017). The TARA identified estuarine areas to be under greater threat than the adjacent coastal and marine areas. The top 10 priority environmental threats identified for estuaries in the Southern Region include:

1. Agricultural diffuse source runoff;
2. Estuary entrance modifications;
3. Urban stormwater discharge;
4. Modified freshwater flows;
5. Clearing riparian and adjacent habitat including wetland drainage;

6. Recreation and tourism – boating and boating infrastructure;
7. Foreshore development;
8. Navigation and entrance management /modification, harbour maintenance, dredging;
9. Stock grazing of riparian and marine vegetation; and
10. Sewage effluent and septic runoff.

Other lower priority estuarine environmental threats were related to recreational and commercial fisheries, oyster aquaculture, introduced pests (flora and fauna) and shipping.

2.3 Specific Threats, Pressures and Management Issues for Wallaga Lake

The summary of ecosystem pressures for Wallaga Lake, as evaluated in Roper et al. (2010) is presented in Table 2.1. Overall, the pressure rating at Wallaga Lake was considered 'moderate' compared to NSW estuaries in general, indicating that there is greater pressure on ecosystem health than is generally observed for other estuaries in the region. On the basis of these pressure ratings, the primary stressors originate from the clearing of land, population and sediment input. These stressors are closely linked to one another, and in combination can affect the health of the overall ecosystem.

Table 2.1: Pressure assessment for Wallaga Lake (adapted from Roper *et al.* 2010)

Indicator	Pressure Score	Pressure Index Rating
Cleared Land	3	Moderate
Population	4	Low
Sediment Input	2	High
Nutrient input	3	Moderate
Freshwater Flow	4	Low
Disturbed habitat	5	Very Low
Tidal Flow	1	Very High
Fishing	1	Very High
Total	**2.9**	***Moderate***

Consistent with the assessment of Roper et al. (2010), the primary and secondary effects of sedimentation, entrance management and fishing have also been identified by stakeholders as key pressures acting on the system.

The *Coastal Management Manual* requires Councils to follow a risk management process when evaluating threats and developing coastal management programs. In the estuarine management context a risk management approach involves identifying, evaluating, treating, communicating and monitoring risks to people, the environment, assets and infrastructure and to the general social, environmental, cultural and economic values of the estuary. The risk management approach aims to identify the likelihood and consequences of threats to

understand the risk level, as well as to also understand the vulnerability and tolerance of people, assets and the environment to the consequences of threats.

Nine broad threats were identified for Wallaga Lake during the development of the CMP, each containing one or more specific management issues:

1. Artificial Entrance Management;
2. Lack of Knowledge of Estuary Health and Condition;
3. Degradation of Vegetation Communities;
4. Degradation of Wetlands;
5. Catchment Runoff and Urban Pollutants;
6. Degradation of Foreshore and Tributary Banks;
7. Coastal Hazards and Climate Change;
8. Structure and Function of the Lake;
9. Biodiversity Loss.

Each coastal management threat/issue has been assessed for the relevant values that it impacts, and the highest risk posed by each threat has been determined. Appendix A includes the summary of the risk assessment scoring for all threats, with the exception of coastal hazard threats which are discussed further below.

Consistent with the Mandatory Requirements for CMPs (MR2), this analysis considered not only the risk level currently posed by each threat/issue, but also considered how the risk profile of each threat is likely to evolve with time across short (approximately 20 years), medium (approximately 50 years) and long (approximately 100 years) timeframes, if no intervention or risk management action is taken.

Future risk levels for most threats, except coastal hazards, for 20 years, 50 years and 100 years timeframes could only be established on the basis of the Current Risk Level and a qualitative evolution assessment, based on judgement and experience of the project team in order to comply with CMP requirements.

Table 2.2 to Table 2.10 provide the results of the threat risk assessment for Wallaga Lake, with full details of the assessment including mapping of issues provided in the supporting document *Wallaga Lake CMP – Estuary Threats and Pressures* (BVSC, 2024b).

The risk evolution for threats associated with coastal hazards in Table 2.8 was assessed during coastal hazard assessment (BMT, 2015).

Table 2.2: Risk Evaluation Results for Threat 1 - Artificial Entrance Management						
Detailed Description of Issues	**Current Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
Overview: The Wallaga Lake entrance has been artificially opened for several decades to alleviate flooding of low-lying foreshore land and to allow tidal flushing. BVSC manage this process under a formalised Entrance Management Policy (2016), which sees the lake mechanically opened once the water level reaches an elevation of ~1.25 m AHD. Once the lake is open to the sea, waves and tidal currents carry sediment from Wallaga Lake Beach into the lake entrance area, eventually building a sand barrier across the lake entrance that again closes the lake from the sea.						
T1.1 Long term sustainability of entrance opening trigger level To achieve reasonable scour during artificial entrance opening, it is desirable to open the lake with as much water volume in the lake as possible, and with as much hydraulic head between the lake and sea level as possible. With increasing sea levels, the long term sustainability and effectiveness of artificial entrance management is unknown. This issue is identified in the Entrance Management Policy, which identifies a goal to raise low-lying assets in the future. However, at Wallaga Lake there is limited opportunity for this to occur in some instances at present.	Extreme	Extreme	Extreme	Extreme	Unacceptable	High
T1.2 Community understanding of entrance management At present the broader community has limited understanding of the entrance management process, or the overall processes which would naturally take place with regards to entrance openings/closures and other indirect processes. At times this leads to community dissatisfaction in Council's management of the estuary. This was raised by the community with online feedback during the project.	High	High	High	High	Unacceptable	Medium
T1.3 Inundation of low-lying assets when closed lake entrance When the lake entrance is closed from the ocean, it remains closed until the lake water level reaches the trigger level of 1.25 m AHD or above, as defined in Council's Entrance Management Policy. Short term inundation up to or above the trigger level is likely in order to achieve successful scour of the entrance berm, as the entrance opening process requires a combination of conditions to be correct with regards to safety, tides, daylight and other site conditions. Several assets around the foreshore of the lake become inundated prior to the trigger level being reached.	Medium	Extreme	Extreme	Extreme	Tolerable	Medium
T1.4 Degradation of high-value heritage sites on Murunna Point There are a number of issues with the condition and management of Murunna Point, resulting in degradation of high value Aboriginal heritage sites (including a burial site of high local significance). Specific issues include uncontrolled access to sites, and the impacts on the burial site resulting from machine access for lake entrance opening works. Access to the lake entrance for the excavator to mechanically open the entrance can be difficult, and in the past the primary access has required the machine to pass over the burial site. This results in damage to the site if not carefully managed, and is difficult to mitigate with temporary ground protective measures.	High	High	High	High	Unacceptable	High
T1.5 Impacts to threatened beach-nesting birds from excavator access and opening of entrance	Medium	Medium	Medium	Medium	Tolerable	Medium

Table 2.2: Risk Evaluation Results for Threat 1 - Artificial Entrance Management						
Detailed Description of Issues	**Current Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
The Wallaga Lake entrance is a known site for threatened beach-nesting birds including Hooded Plovers, Pied Oystercatchers and Little Terns that have all been recorded as nesting on the spit. Artificial opening of the Wallaga Lake entrance may be required during the shorebird nesting season, and may impact the beach-nesting birds through both the excavator access and entrance opening/scour process.						

Table 2.3: Risk Evaluation Results for Threat 2 – Lack of Knowledge of Estuary Health and Condition						
Detailed Description of Issues/Opportunities	**Current Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
Overview: The 2000 Estuary Management Plan had an action to "Define a monitoring program that allows assessment of the effectiveness of individual plan strategies and provides information on the environmental status and trends of the lake i.e. ecosystem health.", along with a number of actions around monitoring of water quality and estuary health. This action has not specifically been completed, however, the lake water quality is monitored through ad-hoc MER data collection campaigns and other one-off investigations. Maintaining a contemporary understanding of overall estuary health remains a relevant threat and obstacle to informed decisions regarding management of the estuary.						
T2.1 Estuary health knowledge and evaluation Further and ongoing data collection is required to develop a holistic understanding of estuary health changes, in particular in the years following the 2020 bushfires that burnt extensive areas of the lake's catchment. Since the previous estuary management plan there have also been improvements that have been achieved through significant changes to lake management and catchment (such as sewering of urbanised communities in eastern area of catchment and establishment of marine park), and ongoing data collection is required to quantify the impacts of these improvements. This would include a wider range of data collection than basic water quality parameters that have been recorded within the MER program. Data sets for water quality and fish assemblages collected post 2016 are beginning to provide insights into estuary health improvements, and ongoing data collection will allow future changes to estuary health from previous and future management actions to be tracked and quantified.	Medium	Medium	High	High	Tolerable	Medium

Table 2.4: Risk Evaluation Results for Threat 3 – Degradation of Vegetation Communities						
Detailed Description of Issues/Opportunities	**Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
Overview: The 2000 Estuary Management Plan had an objective to "*Protect and Enhance Riparian and Foreshore Vegetation*", and included strategies to "*Improve the condition of existing riparian and wetland vegetation*" and to "*Maintain foreshore vegetation around the lake*". There were many management actions associated with these strategies, nevertheless many of the key issues previously noted remain highly relevant						
T3.1 Invasive/exotic vegetation Foreshore zones along the urbanised northern and eastern areas of the lake have a range of weed infestations that will require ongoing removal and maintenance. This includes species that have propagated organically and have spread from adjacent private garden areas.	High	High	Extreme	Extreme	Tolerable	Medium
T3.2 Vegetation clearing and maintenance Fringing and foreshore vegetation communities around the urbanised areas of the lake are being impacted by a number of anthropogenic processes, including within foreshore reserves established to act as a buffer zone. Clearing of foreshore vegetation for views and access including shrubs and trees, mowing areas of saltmarsh as part of property maintenance, and ad-hoc vehicle access to foreshore for boat launching, have all been identified as part of the field inspections. These issues are particularly relevant along the foreshores of Akolele, Regatta Point, Beauty Point and Fairhaven.	Extreme	Extreme	Extreme	Extreme	Unacceptable	High
T3.3 Cattle grazing to water's edge Grazing to the water's edge is an extensive issue, in particular for areas around Dignams Creek, Narira Creek and Meads Bay. This impacts on the establishment of strong native fringing vegetation communities, including both terrestrial species and intertidal/high stand wetland species.	Extreme	Extreme	Extreme	Extreme	Unacceptable	High

Table 2.5: Risk Evaluation Results for Threat 4 – Degradation of Wetlands						
Detailed Description of Issues/Opportunities	**Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
Overview: Wetlands around the fringes of the lake's upper reaches have been impacted, degraded or completely isolated at a number of locations. These areas form habitat and nursery zones for the lake, in particular during periods when the lake entrance is closed and the lake water level is high, and are considered highly important to the overall ecological function of the lake.						
T4.1 Wetlands accessible for cattle grazing Extensive areas of wetland are accessible and grazed by cattle. This is a significant issue around the areas where the Narira and Dignams creeks enter the lake, and moving further upstream in the rivers. At least one area has a Crown grazing lease that should be revised or terminated. Other areas require fencing and enforcement of land boundaries, while some areas are on private property and will require collaboration with land owners to implement improved management practices.	Extreme	Extreme	Extreme	Extreme	Unacceptable	High
T4.2 Hydraulic modification of wetland area A moderate area of wetland running into a natural gully has been isolated at Akolele by a vehicle track causeway that is used for powerline maintenance. The access track has hydraulically modified the system, and resulted in a shift to the vegetation community (now completely grown out with Phragmites). Originally the area may have been an intertidal backwater, or at least a submerged wetland during periods of high lake water level, and would have been available habitat for aquatic species. This area is mapped as a future intertidal zone and would naturally have provided an opportunity for migration of vegetations species, however, this will not occur with the current hydraulic barrier.	Medium	Medium	High	High	Tolerable	Medium

Table 2.6: Risk Evaluation Results for Threat 5 – Catchment Runoff and Urban Pollutants						
Detailed Description of Issues	**Current Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
Overview: The 2000 Estuary Management Plan had an objective to "*Improve the quality of run-off from rural, urban and forested areas* ". There were numerous actions around minimising the impacts of runoff on lake health in the previous management plan, and with a partially urbanised and partially agricultural catchment, runoff from the catchment continues to represent a threat to the health of the lake.						
T5.1 Unsealed foreshore roads and tracks There are numerous unsealed roads and foreshore access tracks that are immediately adjacent the lake edge and through the lower lake catchment, including locations at Akolele, Beauty Point, Fairhaven Point and Black Lagoon. At Fairhaven Point the foreshore access track is generating sediment to the lake as well as impacting a large shell midden. There is a log and roadbase bridge constructed across a tributary creek of Black Lagoon, and de-vegetated powerline easements at Akolele. These areas all provide a source of increased sediment load to the lake, contributing to catchment derived impacts on the estuary's water quality, ecology and overall health.	High	High	Extreme	Extreme	Unacceptable	High
T5.2 Sedimentation from development in catchment As well as impacting the physical processes of the lake through altered hydrodynamics, sediment washed from the catchment has the potential to have impacts on aquatic ecosystems. Sediment control measures for development in the urbanised areas of the catchment require ongoing improvement, including both residential development as well as other forms of development/earthmoving such as roadworks on the Princes Hwy in areas that are adjacent to lake tributaries. Sediment runoff from poorly managed stormwater is also an issue at several localised sites such as caravan parks.	Medium	Medium	Medium	Medium	Tolerable	Medium
T5.3 Water quality impacts from agriculture in catchment Agriculture, in particular in the Narira Creek catchment results in increased levels of catchment derived nutrient load to the system. Catchment use and load mapping for suspended solids and nutrients identifies the extensive agricultural areas west of the lake as contributing elevated nutrient loads to the estuary.	Medium	Medium	Medium	Medium	Tolerable	Medium
T5.4 Bushfire impacts The 2020 bushfires burnt extensive areas of the greater Wallaga Lake catchment. In the immediate period after the fires this resulted in large volumes of burnt debris entering the lake and tributaries during rainfall events that followed the fires. Due to the intensity and scale of the fires, large areas of previously forested catchment remain exposed, and are expected to contribute a significantly higher sediment load to the lake for years to come.	High	High	Extreme	Extreme	Unacceptable	High

Table 2.7: Risk Evaluation Results for Threat 6 – Degradation of Foreshore and Tributary Banks						
Detailed Description of Issues	**Current Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
T6.1 Degradation of foreshore areas - cattle grazing to water's edge Extensive areas of riparian foreshore are grazed to the water's edge by cattle, resulting in degraded banks and increased sediment loads to rivers/lake. This has been recorded during site inspections along banks of both Narira and Dignams Creeks, and the areas where these creeks join the main body of the lake. Stabilising and improving the condition of these banks to remove the sediment source will first require effective stock control and buffer zones to be implemented.	High	High	High	High	Unacceptable	High
T6.2 Erosion/recession of lake foreshore A moderate area of foreshore immediately east of the Wallaga Lake Bridge northern abutment has active erosion, presumably from wind waves during periods of high lake water level. A short section of the foreshore has existing rock armouring, however, erosion has propagated a notable distance further alongshore in unprotected areas. At present this area of foreshore erosion is contributing sediment to the lake, and is generally in a degraded condition. If not mitigated the bank erosion will become a threat to the shoulder of the road.	High	High	Extreme	Extreme	Unacceptable	High
T6.3 Localised erosion of Aboriginal midden near Beauty Point boat ramp There is a midden (registered Aboriginal site) located immediately north of the Beauty Point boat ramp which is experiencing erosion, reported to be at an increasing rate due to the recent upgrade works for the boat ramp.	High	High	High	High	Unacceptable	High

Table 2.8: Risk Evaluation Results for Threat 7 – Coastal Hazards						
Detailed Description of Issues	**Current Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
Overview: Coastal hazard mapping in the Coastal Process and Hazard Definition Study (BMT, 2015) and the NSW Estuary Tidal Inundation Exposure Assessment (OEH, 2018) identifies that there are areas that are vulnerable to various coastal hazards around Wallaga Lake. In the context of the Resilience and Hazards SEPP, these vulnerable areas include sections of land mapped as Coastal Wetland and Littoral Rainforest Areas, Coastal Environment Areas and Coastal Use Areas. This coastal hazard exposure is a threat to both natural and built assets around the lake.						
T7.1 Tidal inundation impacts on low-lying assets, habitat and areas With future sea levels tidal inundation will create a progressively increasing risk profile for both natural and built assets around the lake foreshore. Fringing vegetation communities, including important wetland species, will be forced to migrate due to higher sea levels, and a number of built assets will become exposed to regular tidal inundation when the lake is open to the sea. The majority of areas	High	High	High	High	Unacceptable	High

Table 2.8: Risk Evaluation Results for Threat 7 – Coastal Hazards						
Detailed Description of Issues	**Current Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
available to provide suitable buffers as sea levels rise are located within the Narira and Dignams creek arms of the estuary, and are on privately owned cleared land that is currently (or has been previously) used for agriculture.						
T7.2 Coastal inundation impacts on low-lying assets and areas During large or extreme coastal storm events the nearshore sea level on Wallaga Lake Beach increases temporarily due to processes such as storm surge and wave setup. If the entrance to Wallaga Lake is open to the sea at the time, then the water level in the lake is temporarily increased and can cause flooding of low-lying areas and assets.	High	High	High	High	Unacceptable	High
T7.3 Coastal erosion impacts on built assets During large or extreme coastal storm events, coastal erosion presents a significant threat to the foreshore of Camel Rock Beach. At present coastal erosion is a threat to the timber decked observation platform that overlooks Camel Rock Beach, as well as the adjacent vegetated sand dunes. With increasing sea levels, erosion will also pose a threat to the car parking area at the northern end of the beach and the unsealed road that provides access. While the consequences of a large erosion event are considered relatively low, this beach is popular with the local community and access into the future will be a requirement.	Medium	Medium	Medium	High	Tolerable	Medium
T7.4 Coastal entrance instability The ocean entrance to Wallaga Lake has generally maintained a stable position within a narrow area at the southern end of Wallaga Lake Beach for many decades. This stability is a result of the entrance being geologically constrained on the southern side by the rocky foreshore and Murunna Point, as well as the mechanical opening regime used by Council under the Entrance Management Policy. It is plausible that the entrance could wander to the north of its typical location, if the sand spit was breached by overtopping and wave-driven erosion as indicated by the location of the coastal erosion/recession hazard lines at the southern end of Wallaga Lake Beach. This envelope of potential entrance migration could be incorporated within the Coastal Vulnerability Area, and therefore requires mapping.	Medium	Medium	Medium	Medium	Tolerable	Medium

Table 2.9: Risk Evaluation Results for Threat 8 – Structure and Function of the Lake						
Detailed Description of Issues/Opportunities	**Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
T8.1 Wallaga Lake Road causeway The previous Wallaga Lake Estuary Management Plan identified the impacts of the causeway on the hydrodynamics of the estuary as a potential issue. The causeway results in a significant constriction of the lower estuary, and over the longer term has modified this section of the estuary. While this has previously been explored in a detailed study which found that impacts on overall lake flushing were minimal, the issue was again raised by stakeholders during preparation of this CMP. Options to minimise the impacts of the causeway on estuary function should be given further consideration in future road causeway upgrades/improvements.	Extreme	Extreme	Extreme	Extreme	Unacceptable	High
T8.2 Narira Creek delta sedimentation The Narira Creek fluvial delta at the entrance to Mead's Bay has anecdotally been accreting at an accelerated rate. This issue was previously identified in the Wallaga Lake Estuary Management Plan (2000), and remains a relevant concern, as raised by stakeholders. The growth of the delta has the potential to alter the hydraulic function and hydrodynamics of both Meads Bay and Black Lagoon.	High	High	Extreme	Extreme	Unacceptable	High

Table 2.10: Risk Evaluation Results for Threat 9 – Biodiversity Loss						
Detailed Description of Issues/Opportunities	**Risk Level**	**Risk Evolution**			**Current Acceptability**	**Priority**
		20 Years	**50 Years**	**100+ Years**		
T9.1 Decline of threatened migratory shorebirds and beach-nesting birds Wallaga Lake is a priority nesting site for threatened beach-nesting birds including Hooded Plovers, Pied Oystercatchers and Little Terns. Little Terns ceased nesting at Wallaga Lake from 2003 to 2020 due to human disturbance. Little Terns begun nesting at the Wallaga Lake spit again in 2021/22 and 2022/23 seasons, however nesting failed due to predation and disturbance and only one chick was fledged in the two years since Little Terns have returned to the site to breed. Wallaga Lake including the intertidal sand flats and lake edges also provides important feeding habitats and roosting sites for migratory shorebirds such as the critically endangered Eastern Curlew and Great Knot. Shorebirds are likely to be displaced from foraging and roosting sites by heavy human recreational use of beaches, shorelines, and estuaries. Hydrological changes to estuaries and similar waterbodies may modify or remove important areas of suitable habitat. Key issues include human disturbance, predation by native, introduced and domesticised animals, lake hydrology and water level.	Extreme	Extreme	Extreme	Extreme	Unacceptable	High