

MORUYA RIVER, MUMMUGA LAKE AND WAGONGA INLET ESTUARINE COASTAL MANAGEMENT PROGRAM

Prepared by Salients, Coastal Environment and the University of Newcastle for Eurobodalla Shire Council

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MORUYA RIVER, MUMMUGA LAKE AND WAGONGA INLET ESTUARINE COASTAL MANAGEMENT PROGRAM

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EXECUTIVE SUMMARY

Eurobodalla Shire Council recognises Aboriginal people as the original inhabitants and custodians of all land and water in the Eurobodalla and respects their enduring cultural and spiritual connection to it. Eurobodalla Shire Council acknowledges the Traditional Owners of the land in which we live. Council pays respect to Elders past, present and future.

The people of the Yuin Nation are the traditional custodians of the land we now know as Eurobodalla Shire. Yuin people have lived in the area for thousands of years and have an enduring custodianship and connection over the land and waterways of Eurobodalla.

The Moruya River, Mummuga Lake and Wagonga Inlet estuaries and catchments lie within the Eurobodalla Local Government Area. Eurobodalla Shire Council has adopted multiple Plans of Management for the estuaries of Eurobodalla, including Moruya River and Wagonga Inlet. While works have been completed in the catchments of Mummuga Lake but there is no formal estuary plan which considers current land use within the catchments.

Council is responsible for preparing Coastal Management Programs (CMPs) in accordance with the requirements of the *Coastal Management Act 2016* and the Coastal Management Manual. This is advantageous to Council as a gazetted CMP unlocks funding opportunities via the NSW Government's Coast and Estuary Grants funding stream. Further, a gazetted CMP will provide a degree of exemption from liability to local councils under Section 733 of The Local Government Act 1993. Through the CMP process Council has opportunities to engage with the community in decision making to ensure that a strategic and coordinated approach is taken to managing the coastal zone within the Local Government Area.

The location of the three estuaries, their catchments and the coastal zone of the Eurobodalla Shire is shown in Figure E1.

Council and the local community place a high value on the 'clean', 'beautiful' and 'healthy' coastal environment of the Eurobodalla Shire. There is an overriding desire to protect and sustainably manage the estuaries of the Eurobodalla Shire in a responsible manner for both current and future generations. Council wishes to promote coastal management actions that help local communities thrive socially, culturally, and economically. Balancing the environment with the community's aspirations can be complex given the threats and challenges facing the estuaries. These include sea level rise, population growth, pollution, the impacts of livestock grazing, uncontrolled public access to sensitive habitats, and the administrative and organisational barriers of multiple government agencies having a role in coastal management.



Sector Sector



The purpose of this Estuarine Coastal Management Program (ECMP) is to set the long-term strategy for coordinated management of the coastal zone surrounding the estuaries of the Eurobodalla Shire. The ECMP aims to provide strategic direction and specific management actions to address the priority risks to the ecological, social, and economic values associated with the estuaries. A Business Plan in Section 6 provides a program for the delivery of the management actions including funding sources, the formal commitment of public authorities responsible for delivery, and an implementation schedule.

The NSW government's Coastal Management Manual outlines a five-stage cyclical process for developing a CMP (see Figure E2). The steps followed in developing this ECMP are summarised herein, with a detailed account provided in the accompanying documents.



Figure E 2 Stages in Preparing and Implementing a CMP (Source: NSW Government, 2018a)

Stakeholder and community engagement is an important feature of the process. The community were engaged via drop-in sessions during the scoping study phase, and through direct face-to-face consultation and an online survey during subsequent preparation of the CMP in Stages 2 and 3. Stakeholders from public authorities participated in workshops and meetings, particularly during Stages 1 and 3 of the process to ensure agreement and commitment to actions relevant to their operational responsibilities.

The CMP outlines four sets of actions. The first set addresses those issues that are important across all three estuaries. The remaining three sets of actions relate to the specific issues associated with the three estuaries in turn. There are 33 management actions in total (Overarching: 7 actions, Moruya River: 7 actions, Mummuga Lake:



7 actions, Wagonga Inlet: 12 actions). Eurobodalla Shire Council is responsible for twenty-three of these actions, with responsibility for the remaining actions divided between South East Local Land Services, NSW National Parks and Wildlife Service, DPIE- Planning, Dol-Industry and Batemans Marine Park.

The estimated cost of program delivery over a four-year period is 2,859,500. Eurobodalla Shire Council and South East Local Land Services have committed to providing approximately 11% and 21% of the total funding respectively. Remaining funds are reliant on successful grant applications through the NSW State Government Coast and Estuary, Fisheries Habitat Management and Floodplain Management grants schemes, as well as funding from The Nature Conservancy. More detail on the actions and cost arrangements is provided in the Business Plan presented in Section 6 of the ECMP

The implementation and reporting of ECMP actions are to be enacted by Council through the Integrated Planning and Reporting (IPR) System. Under the IPR framework, actions from strategic plans such as the ECMP, are to be included in Council's Delivery and Operational Plan. Progress and outcomes of the ECMP will be reported to stakeholders and the community via Council's Annual Report. The ECMP includes the formation of a multi-agency advisory committee to assist in making sure that these requirements are met.

The Estuarine Management Advisory Committee will be established upon certification of the ECMP. The Committee will be chaired by Council and will include of staff from Council, South East Local Land Services, Department of Primary Industries (Fisheries), Department of Planning, Industry and Environment (EES), Batemans Marine Park, Transport for NSW and DPIE Crown Lands.

The ECMP will be formally reviewed in 2026, at the end of the four-year delivery period. That review must consider the extent to which actions proposed have been implemented, progress on actions that go beyond the four-year period and whether the strategic management approach requires review.



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1 INTRODUCTION

1.1 The Eurobodalla Estuarine CMP

The purpose of this Estuarine Coastal Management Program (ECMP) is to set the long-term strategy for co-ordinated land management within the coastal zone surrounding the estuaries of the Eurobodalla Shire.

Council intends to cover all the major estuaries of Eurobodalla within the scope of a comprehensive ECMP. This will be completed cumulatively, starting with Wagonga, Mummuga and Moruya. These 3 estuaries were chosen initially due to the age or lack of a current plan of management. In comparison, more recent studies and plans are available for other estuaries in Eurobodalla, such as Tomaga River, Tuross River/Coila Lake and the Clyde River.

Considering recent statewide coastal reforms, it is timely to examine estuary dependent economic activity and any shift in the social dynamic of the estuaries and their catchments in recent years. The development of the ECMP is helping Council understand changing views and expectations within the community regarding how Eurobodalla Shire's estuaries are managed.

Eurobodalla Shire Council has adopted multiple Plans of Management (POM) for the Estuaries of Eurobodalla in the past, including Moruya River and Wagonga Inlet. While works have been completed in and around Mummuga Lake, there is no formal estuary plan which considers current land use within its catchment.

The location of the three estuaries and their catchments within Eurobodalla Shire is shown in Figure 1. The *coastal zone* within Eurobodalla Shire, including areas associated with other estuaries and the open coast (not covered by this ECMP) is also shown. The area considered by this ECMP is entirely within the Eurobodalla Local Government Area.

Development of the ECMP began in 2018, with a draft of the supporting *Scoping Study* for the Moruya River, Mummuga Lake and Wagonga Inlet (included as Appendix A) prepared in early 2019. Preparation of the draft ECMP followed, during 2020, including ongoing consultation with the community and state government stakeholders. Following feedback from government stakeholders, the present Exhibition Draft was prepared in the second half of 2021.

The Estuaries CMP has been developed in accordance with the requirements of the *Coastal Management Act 2016* (the CM Act) and Coastal Management Manual (2018).





The coastal zone is defined by the CM Act and includes four coastal management areas:

- 1 Coastal wetlands and littoral rainforests area.
- 2 Coastal vulnerability area.
- 3 Coastal environment area.
- 4 Coastal use area.

The CM Act outlines management *objectives* for each of these areas. For the objectives to be addressed, the corresponding coastal management area should ideally be mapped in the State Environmental Planning Policy (Coastal Management) 2018 (CM SEPP). As of late October 2021, there are no maps available for the coastal vulnerability area around the subject estuaries.

This limitation was identified by the Scoping Study and would, ideally, have been addressed by completing studies to derive the maps before preparation of the ECMP. Council was unable to allocate additional funding to complete the underpinning studies and produce the required maps. The work required to address these data gaps has been identified as priority actions for completion during implementation of the ECMP.

Considering that the coastal vulnerability area is being addressed in this manner, the remaining focus for management around the estuaries, particularly considering the findings and identified risks from the Scoping Study are as follows:

- Primary focus: Coastal wetlands and coastal environment areas.
- Secondary focus: Coastal use and littoral rainforest areas².

The degree of focus applied to the different areas varies between estuaries. The way an estuary is used by the community, the amount of surrounding development, and nature of threatening processes makes the management of each estuary unique.

Given that the CM Act also addresses management of the open coast, there are several objectives within the CM Act that do not readily apply to estuaries. Where appropriate, these objectives have not been given weight when examining risks and deciding on management actions while developing this ECMP.

² There are, presently, no littoral rainforests mapped in the CM SEPP around the estuaries subject to this ECMP. Therefore the *"littoral rainforest area"* is not presently relevant. A potential area has been identified in Flying Fox Bay. The littoral rainforest area may become relevant in time and incorporated during review of the ECMP.



1.2 Why is this ECMP Required?

Estuaries are complex for a variety of reasons. We do not understand the physical, chemical and ecological behaviour of estuaries as well as we would like, and there are competing desires around the way they are used and managed, and the way that land surrounding them is developed.

A review of the Eurobodalla Community Strategic Plan (Eurobodalla Shire Council, 2017) indicates that Council and the local community place a high value on the 'clean', 'beautiful' and 'healthy' coastal environment of the Eurobodalla Shire. There is an overriding desire to protect and sustainably manage the estuaries of the Eurobodalla Shire in a responsible manner for both current and future generations. Council wishes to promote coastal management actions that help local communities thrive socially, culturally, and economically.

Eurobodalla residents have an innate connection to the water. Consultation has identified that good water quality, access for recreation and sporting activities, and maintenance of natural beauty are important to the local community. This ECMP incorporates input from the community and various government stakeholders responsible for estuary management in the Eurobodalla Local Government Area.

Considering its key focus on estuary management, the ECMP concentrates on achieving the following objects of the CM Act:

- To protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience.
- To support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety.
- To acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone.
- To recognise the coastal zone as a vital economic zone and to supports sustainable coastal economies.
- To facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making.
- To mitigate current and future risks from coastal hazards, taking into account the effects of climate change.
- To promote integrated and co-ordinated coastal planning, management, and reporting.

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• 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.



- To support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions.
- 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.
- To support the objects of the Marine Estate Management Act 2014.

Consistent with the Marine Estate Management Act, the following purposes are also supported:

- To promote the co-ordination of the exercise, by public authorities, of functions in relation to the marine estate.
- To provide for the management of the marine estate of New South Wales in a manner that:

(i) Promotes a biologically diverse, healthy and productive marine estate.

(ii) Facilitates:

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- economic opportunities for the people of New South Wales, including opportunities for regional communities, and
- the cultural, social and recreational use of the marine estate, and
- the maintenance of ecosystem integrity, and
- the use of the marine estate for scientific research and education.

While not a focus, the coastal vulnerability area (CVA) cannot be completely ignored. The ECMP has been prepared to be consistent with Council's current management of coastal hazards. Further coastal hazard studies are still required to determine the extent of the CVA (see actions Mo3, Mu1 and Wa2). Council intends to undertake the mapping of the CVA for Moruya River, Mummuga Lake and Wagonga Inlet following adoption and certification of this ECMP.

1.3 Roles and Responsibilities of Council and Public Authorities

Council is responsible for preparing CMPs for the coastal zone within the boundaries of Eurobodalla Shire in accordance with the requirements of the CM Act and the Coastal Management Manual (NSW Government, 2018a). Council must then implement those CMPs through their *Integrated Planning & Reporting* program and/or land use planning system according to New South Wales law. The CMP must



be monitored and reported on, with annual reporting required for planned actions and their outcomes over the period covered by the CMP. The land use planning controls adopted by Council within the coastal zone should give effect to the management objectives identified in the CMP.

Other public authorities must have agreed to any actions that are either identified as their responsibility in the CMP, or that affect their land or assets before a CMP can be certified. When preparing, developing or reviewing other plans of management, public authorities must have regard to the CMP, wherever it might be relevant and/or influence their operations.

1.4 Integration of Flood and Coastal Management Programs

The Narooma Floodplain Risk Management Study & Plan (FRMSP) is currently (Late 2021) being prepared and covers areas immediately adjacent to and including Wagonga Inlet and Mummuga Lake. The FRMSP will still be in draft form when this CMP is adopted. The FRMSP examines several areas around Wagonga Inlet and Mummuga Lake where there are low lying parcels of land and roads running parallel to the edge of the inlet that are subject to flooding. There are records of flooding at some of these locations during relatively frequent flood events (~10% AEP).

The outcomes of the FRMSP may result in changes to the management of the Wagonga and Mummuga estuaries within the lifespan of this CMP, and the actions in this CMP should be adjusted to be compatible with these wherever possible.

As part of the Narooma Flood Study and Narooma FRMSP process, tidal inundation extents will be provided to Council which will assist in completing actions WA2 and MU1 of this CMP.

1.5 How was the ECMP Developed?

The CM Act states that a coastal management program needs to be prepared in accordance with the Coastal Management Manual. The Coastal Management Manual (NSW Government, 2018a) outlines a 5-stage process as shown Figure 2.

1.5.1 Stage 1 Identify the Scope of the CMP

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Appendix A contains the Scoping Study, which is the outcome of Stage 1 of the process. The primary purpose of a scoping study was to identify the required focus for the CMP (as outlined above), and the steps required in preparing that CMP. The scoping study considered existing information to review any progress already made in managing issues in coastal areas. Key tasks completed as part of the scoping study process were:







- Gathering an understanding of the community and identifying stakeholders. Developing an engagement strategy for later stages and beginning development of a shared understanding of the existing coastal management situation. Identifying the organisations and communities that need to be involved in the CMP process and who holds responsibility for various issues that are likely to be involved.
- Determining the strategic context of coastal management for the area being considered and establishing the purpose, vision, and objectives of the CMP, identifying an appropriate scope, and expected key outcomes from the CMP.
- Determining the spatial extent of management areas (and which of the four management areas) need to be considered by the CMP.
- Considering where coastal management areas overlap and how the hierarchy of management objectives outlined in the CM Act would operate. For the present ECMP, objectives relating to coastal wetlands are more important than those relating to the coastal environment area (where those areas overlap). These in turn are more important than the objectives relating to the coastal use area.



- Reviewing the issues already identified, current coastal management arrangements and progress with existing actions. Determining where further or different action is required via a first-pass risk assessment.
- Identifying the knowledge gaps and preparing the business case for filling those gaps. The business
 case also included a forward program for preparing the coastal management program.

An important overarching concern for estuaries is how any population growth within the catchment is going to be managed alongside changes in demographics. Existing and projected population growth over the next 15 years is provided in Table 1, alongside recent aging trends which show a population which ages throughout the main townships surrounding the three subject estuaries. The population has tended to age one year for every calendar year that passes. The aging demographic needs to be considered in terms of actions to enable access to the estuary, associated facilities, and services.

Locality	Population 2020 (via Forecast)	Population 2036 (Forecast)	Change in Population	Median Age 2011	Median Age 2016
Urban Moruya / Moruya Heads	3687	4732	+28.32%	46	51
Dalmeny	2027	2197	+8.38%	53	59
Narooma/North Narooma	3586	4029	+12.33%	53	59

Table 1	Demographics and	Change
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Moruya is of particular interest, with relatively rapid growth expected as facilities and infrastructure such as the new hospital and Moruya Bypass are constructed. Moruya is going to become an increasingly important centre for the region.

The impacts of population growth need to be managed, but they are uncertain. There are clearly recognised links between urban growth and impacts on water quality and / or potential destruction of important ecosystems. These impacts need to be minimised, offset, or balanced in some other way to address possible losses in biodiversity. Similar impacts can arise from major infrastructure, but in practice impacts from these larger projects seem to be somewhat easier to address.

The role of overall, strategic planning to manage population growth and ongoing development is important in this regard, and it is vital that high level decisions regarding significant facilities and infrastructure



consider potential impacts such as determining whether a proposed road corridor is going to affect the extent of potential tidal inundation in future, and hence the natural adaptability and migration of coastal wetlands. This overall concern has been carried through the CMP development process and is reflected in risks and actions addressing the planning for population growth and the implementation of significant infrastructure and facilities.

Due to constraints on Council resources and funding, completion of the full suite of Stage 2 studies that would ideally have informed the CMP was not possible. For this reason, several important studies have been presented as actions within the CMP, such as mapping of the vulnerability areas.

Some of the studies that are yet to be completed could inform potential changes to the extents of coastal areas in the CMP. Aside from assessing and mapping the coastal vulnerability area, there are also actions which could potentially lead to the introduction of littoral rainforest mapping (Flying Fox Bay, Wagonga Inlet), and modifications to the coastal wetland mapping through:

- Additional effort to inform current and historical extents of wetlands within Mummuga Lake.
- Additional effort to provide for the mapping of potential migration pathways for coastal wetlands as sea levels continue to rise.

There is already some recent mapping of estuarine macrophytes in Wagonga Inlet and around Moruya River (Elgin Associates, 2018) which could inform changes to the Coastal Wetland Maps within the CM SEPP.

To change the extent of coastal management areas in the CM SEPP, a *planning proposal* would need to be prepared by Council to support the changes. If such changes were proposed, the CMP would need to identify the proposed amendments and present the evidence supporting those amendments.

For the present ECMP, evidence to support amendments to the CM SEPP Maps is either incomplete (in the case of coastal wetlands) or does not yet exist (coastal vulnerability). Actions which aim to fill these knowledge gaps are included within the ECMP, but no planning proposal is proposed at this stage.

1.5.2 Stage 2 Risks, Vulnerabilities and Opportunities

Two small studies were completed as part of Stage 2:

1 A review of the Estuary Health Risk Dataset3 for Wagonga Inlet and Mummuga Lake (Appendix B1), noting that the dataset did not provide outputs for Moruya River. Ultimately, it was determined that

³ https://www.environment.nsw.gov.au/research-and-publications/publications-search/nsw-estuary-health-risk-dataset



the "Risk-based Framework" methodology used (OEH, 2017) would need to be revisited for some locations where risks have been identified. In revisiting the methodology, a more local-scale determination of water quality objectives and, potentially, modification of aspects of the methodology should be considered. Several sites throughout New South Wales are presently being assessed in more detail as part of actions under the Marine Estate Management Strategy, and the findings of those ongoing studies should be used to inform any changes to the approach.

2 A review of tidal inundation extents surrounding the three estuaries for future sea level rise of 0.5, 1.0 and 1.5m. The data, provided by Department of Planning, Industry and Environment (DPIE), was part of the dataset used to underpin the coast wide tidal inundation exposure assessment (OEH, 2018). For our purposes, we have assessed the increase in inundation that would occur around the key wetland complexes mapped by the CM SEPP for the subject estuaries. The assessment highlighted the importance of managing upslope migration of coastal wetlands downstream of Moruya, with particular importance indicated for the wetland complex surrounding Malabar Creek. As sea levels rise, this wetland will expand greatly across the Mullenderee Floodplain to the west of the existing mapped wetland. Opportunities exist here to offset losses of wetland from other areas. Further technical studies are required to understand the implications of sea-level rise on coastal wetlands. Actions have been included in the ECMP and will inform potential amendments to the mapped extents of coastal wetlands in the CM SEPP.

Appendix B contains more detail regarding the methodology and key findings of the Stage 2 studies.

Following completion of the two studies, and in conjunction with ongoing consultation, the preliminary risk assessment completed during the scoping study was upgraded. To ground the risk assessment in the requirements of the CM Act, all risks were categorised in terms of the coastal management area of most relevance to the risk and the relevant objectives from the CM Act which are affected, or potentially affected by the risks.

The risk assessment is provided in Appendix D, alongside categorisations for likelihood and consequence and the assessment of risks into extreme, high, moderate, or low risk categories.

Understanding a level of risk alone is not enough to enable assessment of when and how mitigative action should be undertaken. An understanding of the time frame over which a certain risk may impact helps to understand the <u>urgency</u> with which a risk should be addressed.

The CMM requires that different time frames be considered by a CMP, including Immediate, 20, 50 and 100 years. While it could be argued that this type of assessment is more useful for assessments of



coastal vulnerability, particularly with continuing sea level rise, it is also useful to assess broad time frames to help drive actions associated mitigating risks to estuarine/environmental values.

The risk assessment in Appendix D contains coarse assessments of time frames for emergence of the risk, and time frames for an impact requiring action. For the sake of consistency with the CMM, the time frames required by the CMM have been applied in an indicative manner. The urgency expressed by the time frames has been used as a guide in the assessment and timing of management actions designed to address the risks as part of Stages 3 and 4 of the CMP process.

1.5.3 Stage 3 Identify and Evaluate Options

Through ongoing consultation and the risk assessment process, potential management options have been identified A discussion regarding the different options is presented in the risk assessment.

Options identified as part of ongoing consultation and arising from the risk assessment were subjected to evaluation as presented in Appendix E. The evaluation comprised two stages:

- A filtering exercise of the 'long-list', where options were assessed against a series of 'road-blocks' such as being out of scope of a CMP, clearly infeasible or already being addressed as part of another process by Council. Examples of actions being addressed elsewhere by Council include recreational maritime facilities, which are currently the subject of studies by both Council and Transport for NSW (TfNSW).
- A thorough, detailed assessment against all objects and objectives of the CM Act regardless of the coastal management area to which it corresponds. The consideration of all objectives was made to assess overall benefit, noting that some benefits extend beyond the coastal management area boundaries represented by the CM SEPP. One example is the rehabilitation of coastal wetland areas, which has benefits to overall ecological functioning and water quality in an estuary. In addition, an informed cost estimate was made, based on experience with similar works undertaken in other localities and/or standard published rates. The scale of impact was also scored to derive a scaled impact score and different management options were ranked based on the scaled impact score and the cost estimate.

Utilising both the objects and objectives of the CM Act as criteria to categorise risks and assess management actions, the links between different management actions in promoting and enacting the varied foci and goals of the CM Act are clear. The performance of each shortlisted management option has been scored in terms of overall performance against those aspects of the CM Act, with detailed tables resulting from that process presented in Appendix E.



Taking advantage of opportunities as they arise should not be stifled by the CMP process. Adaptability is important, alongside a general awareness among estuary management agencies of where other agencies are active.

During later stages of development of this ECMP, several additional management actions which were accepted by the relevant stakeholders as being feasible, viable, practical and highly likely to provide suitable benefits were identified. While these were not subject to the detailed assessment outlined above, the management actions have been qualitatively considered and align with the objectives of the CMP, promote the objects of the CM Act and are consistent with the objectives of the CM SEPP. These actions have been included within the ECMP providing that a responsible agency for the action and funding source could be confirmed. These were Actions Mo7, Wa11 and Wa12, and components of Action Mu3 and Wa5.

An overarching management action proposed by this ECMP is that representatives from all the key agencies meet regularly to share information and ensure that overall effort from state and local government is coordinated, cohesive and informed. It is through this regular contact that we expect that flexible, adaptive, and sometimes opportunistic management action can be accommodated.

1.5.4 Stage 4: Prepare, Exhibit, Finalise and Certify

The ECMP has been prepared under the guidance of Eurobodalla Shire Council and the Department of Planning, Industry and Environment (DPIE). Furthermore, other state government agencies have been contacted to confirm that they are committed to supporting execution of the ECMP, including providing funding where necessary and possible.

A CMP must be placed on public exhibition and any comments of relevance considered and addressed. Following exhibition, the CMP is finalised and submitted to Council for adoption. Once adopted by Council, the CMP is forwarded to the Minister for Local Government for certification.

1.5.5 Community and Stakeholder Engagement

Consultation has been an important feature through Stages 1 - 3 of the CMP development process. During Stage 1, as outlined in Appendix A (Sections 3.2, 4.2 and 5.2 of that Appendix), the following tasks were completed in 2018:

- Three community workshop/drop-in sessions in Narooma and Moruya.
- A stakeholder meeting held in Narooma.



These activities underpinned the identification of issues considered in the preliminary risk assessment during the scoping study.

Additional consultation was completed to accompany Stages 2 and 3 of the CMP development process during 2020, including:

- An online survey drafted by Council and Salients and managed by Council which took responses between August and September 2020.
- Site meetings held in late August with Local Aboriginal Land Councils, Oyster Farmers, representatives from other community groups and state government agency representatives.
- Ongoing teleconferencing, telephone, and email correspondence with state government agencies during September-November 2020.

The outcomes of these later stages of consultation are summarised in Appendix C to this ECMP. Additional review of drafts by government stakeholders and exhibition of the document were also completed during Stage 4 of ECMP preparation.

1.6 Whether the CMP identifies recommended changes to the relevant planning controls, including any proposed maps

The Coastal Management Manual, as a mandatory requirement, specifies that a section must be included in a CMP with the title *"Whether the CMP identifies recommended changes to the relevant planning controls, including any proposed maps".* This section addresses that requirement.

In summary:

Amendments to the CM SEPP Mapping are not recommended by the present ECMP and a planning proposal is not yet required. Once the studies required by the ECMP are complete, a planning proposal covering all coastal management areas should be prepared if required.

This ECMP does not recommend any changes to existing planning controls, although these may arise once the studies required by this ECMP are completed.



1.7 Maps

The Coastal Management Manual, as a mandatory requirement, specifies that a section must be included in a CMP with the title *"Maps"*. This section addresses that requirement.

Maps are inserted into the relevant sections of the CMP as shown in Table 2.

Title	Page Number
Map MO1: CM SEPP Coastal Management Areas for Moruya River	38
Map MO2: Representative Locations of Key Issues for Moruya River	39
Map MO3: Management Actions for Moruya River Estuary	48
Map MO4: Preliminary Foreshore and Wetland Restoration and Environmental Protection Plan	49
Map MU1: CM SEPP Coastal Management Areas for Mummuga Lake	54
Map MU2: Representative Locations of Key Issues for Mummuga Lake	56
Map MU3: Management Actions for Mummuga Lake Estuary	62
Map MU4: Foreshore and Headland Management and Access Management Plan	65
Map WA1: CM SEPP Coastal Management Areas for Wagonga Inlet	70
Map WA2: Representative Locations of Key Issues for Wagonga Inlet	71
Map WA3: Management Actions for Wagonga Inlet Estuary	78
Map WA4: Preliminary Foreshore and Wetland Restoration and Environmental Protection Plan	79

Table 2 Schedule of Maps



2 OVERARCHING ISSUES AND ACTIONS

2.1 A Snapshot of Key Issues

There are several issues that are important across all three estuaries, including common problems experienced at all sites and overall management of estuaries throughout the local government area, particularly keeping an eye on long-term outcomes. Herein, we have highlighted the "extreme" and "high" risk issues identified by the ECMP development process. Several "moderate" level risk issues are also addressed by actions in the ECMP.

2.1.1 Long Term Migration Capacity of Coastal Wetlands

ASSESSED RISK LEVEL

Extreme

RELATED ACTIONS EM1, EM2, Mo2, Mo3, Mu1, Mu2, Wa2, Wa7 Sea levels offshore of New South Wales continue to rise over time. As this happens, tide levels within estuaries will also continue to rise. The different ecosystems that comprise coastal wetlands inhabit tidal "niches" relating to the frequency of inundation or depth of water where they can survive. As tide levels rise, the frequency of inundation of different areas will increase and, as a result, there will be a tendency for coastal wetlands to spread further out across the floodplain.





Similarly, areas previously inhabited by these ecosystems will be 'drowned' out if they are inundated too frequently. In several locations in NSW, a process whereby mangroves are encroaching upslope into areas inhabited by saltmarsh is already known to be occurring. The balance of vegetation in coastal wetlands is incredibly important for several reasons, including the filtering and trapping of sediments and for fisheries.

Ensuring coastal wetlands continue to thrive into the future is vitally important, but there still exist data gaps that need to be addressed to make sure that this can be planned for. In NSW, local councils are responsible for adopting an appropriate sea level rise projection. This sea level rise projection needs to be revisited as the scientific understanding of climate change and sea level rise improves and new scientific information becomes available.

2.1.2 Potential Loss of Aboriginal Heritage Sites due to Sea Level Rise

ASSESSED RISK LEVEL Extreme

RELATED ACTIONS EM1, EM3 The rise of sea level is highly likely to gradually inundate heritage sites of importance to the Aboriginal people of the Eurobodalla Shire. Estuaries have been utilised extensively by the Aboriginal people as a source of food and for cultural purposes for millennia. For this reason, they are often a hot spot for cultural and heritage sites.

Based on consultation completed with Local Aboriginal Land Councils and Aboriginal representatives during the preparation of this CMP, we are aware that a relationship with the land for food and ceremonial purposes continues to this day. Most of the south coast of NSW, stretching from Bundeena on the southern outskirts of Sydney to Eden, is presently subject to a Native Title application by the Yuin People (see Section Appendix F.17 of the Scoping Study for further information). This includes the coastal strip, estuaries, and offshore waters.





Any actions undertaken on Crown Land will need to be undertaken in accordance with the requirements of the *Native Title Act 1993*.

It is important that potential impacts of future sea level rise on heritage sites be discussed, and a way forward determined by, and in cooperation with, the local Aboriginal people of the Eurobodalla Shire.

2.1.3 Population Growth

ASSESSED RISK LEVEL High

RELATED ACTIONS EM4, EM5, Mo2, Mo3, Mu1, Mu6, Wa2 Population growth will mainly be reflected in expansion and/or intensification of urban development. There are recognised links between urban growth and impacts on water quality and/or potential destruction of important ecosystems. These impacts, such as increased runoff, erosion and pollution, need to be minimised, offset, or balanced in some other way to address environmental impacts and the possible loss of biodiversity. Similar impacts can arise from

the major infrastructure required to accommodate a growing population, but in practice impacts from these larger projects seem to be somewhat easier to manage. These matters are ideally addressed at a high level, and through strategic development. It is important that all strategic decisions consider the issues raised in this ECMP and make appropriate allowances to ensure ecologically sustainable development.





2.1.4 The Need for Coordination

	There exist administrative and organisational barriers to managing
ASSESSED RISK LEVEL	estuaries in NSW.
High	There are already strong contacts between different state government
RELATED ACTIONS	departments and Council at the local level and these have tended to
EM5	remain resilient to reorganisation and restructuring that occurs at
	higher levels in government departments.

Delivery of the ECMP will require a formalised commitment, particularly given the agreements for funding and timing that underpin the ECMP. It is important that the CMP is cognisant of key legislative and management responsibilities. The identification of key land managers and legislative responsibilities helps to achieve a coordinated and integrated approach to coastal zone management.





2.1.5 Litter from Urban Stormwater

ASSESSED RISK LEVEL

RELATED ACTIONS

EM6, Mu6, Wa9

Initiative 1 of the Marine Estate Management Strategy (MEMS) is *"Improving water quality and reducing litter"* to benefit marine habitats, wildlife, and the community. The MEMS was developed under the *Marine Estate Management Act 2014* and strongly interacts with the framework for coastal management in NSW.

Options to address areas of concern relating to litter within the estuary have been included in the ECMP.



2.1.6 Working towards a Planning Proposal

ASSESSED RISK LEVEL

Extreme

RELATED ACTIONS EM1, EM7, Mo2, Mo3, Mu1, Mu2, Wa2, Wa7 The existing CM SEPP maps, which define the coastal zone and its constituent coastal management areas were developed by the NSW State Government. In some respects, such as the extent of coastal wetlands and potentially littoral rainforests (at Flying Fox Bay, Wagonga Inlet), these are incomplete or out of date. In other matters, such as the coastal vulnerability area associated with tidal inundation inside estuaries, the existing information required to

draw these maps does not yet exist and studies are needed to fill this gap.



A Planning Proposal will eventually be required to recommend changes to the CM SEPP Maps. Planning proposals should also look at acceptable pollutant targets and development controls in Council's DCP to ensure that development is appropriately sited and designed to achieve a neutral or beneficial ("NorBe") outcome for water quality in the estuaries. For example, stormwater management on all developments should be designed using water sensitive urban design principals to achieve a NorBe outcome in water quality.

There should also be mandatory requirements for riparian setbacks and replanting and management of tributaries leading to the estuaries, in both the lower and upper catchments. The current pollutant targets in the DCP should also be reviewed to ensure that they will provide adequate protection with the growing pressure of development.



2.2 Actions to Be Implemented by Eurobodalla Shire Council and / or Public Authorities

2.2.1 Action EM1: Future Tidal Inundation Mapping to Inform other Actions

This action requires a different approach for each of the estuaries and is to be implemented as an adjunct to Council's existing Floodplain Risk Management Process (FRMP). The individual actions for each estuary are detailed below, in the sections dedicated to each estuary. It is important that the required modelling



considers a range of normal tidal planes, including High High Water Solstice Springs (HHWSS), Mean High Water (MHW) and Mean High Water During Springs (MHWS) and Mean Tide Level.

As part of the FRMP, hydraulic models are established but often not calibrated to tidal behaviour, as the focus is directed towards extreme catchment flooding. Calibration of existing models to extreme storm surge and tidal behaviour may be required before completing the required mapping.

For maximum utility, it is recommended that simulations cover scenarios incorporating open coast sea level rise values of 0.3, 0.6, 0.8, 1.0 and 1.2m. The benefit of this approach is that it provides flexibility in modifying the extent of inundation maps that would inform, for example, a change to the adopted extent of the coastal vulnerability area if Council chooses to change its adopted sea level rise projection in future. Updated maps can be derived by processing existing model results and a consultant needn't be engaged to execute new flood model simulations to derive the updated extents.

Intermittently Opening and Closing estuaries (i.e., ICOLLs) such as Mummuga Lake require special consideration as they experience times when they are non-tidal. To properly account for the natural water level variation, periods when the entrance is open need to be considered alongside periods when the entrance is closed. Ideally, a continuous water level record would be available, and Action Mu7 aims to fill this data gap for Mummuga Lake.

Outputs from the studies should include vector GIS layers of the extent of inundation for each scenario/tidal plane combination and raster data sets of the depth of inundation.

2.2.2 Action EM2: Mapping of Migration Pathways for Coastal Wetlands

Coastal wetland migration pathways, under a future sea level rise scenario, need to be mapped. However, to properly examine this, the results from Action EM1 (and its subordinate Actions Mo3, Mu1 and Wa2) will need to be completed. In addition, the study of historical coastal wetland extents at Mummuga Lake (Action Mu2), to rationalise differences in wetland extents during open and closed entrance conditions should also be completed.

The migration pathways assessment will consider and identify potential barriers to coastal wetlands expanding across the landscape as sea levels rise. The rate of potential sea level rise over time frames of 20, 50 and 100 years are to be considered, and likelihoods associated with different wetland extents at different future times are to be assessed. In addition to the area over which the wetlands expand, consideration needs to be given to the loss of mangrove and saltmarsh vegetation where they can be "drowned out".



This action aligns with Initiative 2 (Action 2.3.2) of the Marine Estate Management Act (MEMA), which targets Estuary-specific intertidal marine vegetation management strategies. An opportunity exists to link this action with the upcoming Department of Primary Industries (DPI) marine vegetation mapping strategy. That strategy will involve mapping predicted and potential migration paths for mangrove and saltmarsh at various sea level heights in an interactive map. The map will identify areas important for protection both at the present time and for various future sea levels.

The timing of this action will need to carefully consider how the statewide mapping is being rolled out to avoid duplication of effort where possible. Communication with DPI-Fisheries should continue to maximise efficiency.

2.2.3 Action EM3: In Consultation with Local Aboriginal Representatives Undertake Preliminary Mapping of "At-Risk" Aboriginal Heritage sites around Estuaries

Preliminary discussions with local First Nations representatives, council officers and DPIE have highlighted a concern that there are many Aboriginal heritage sites that are low lying and susceptible to loss with sea level rise. Some sites may already be threatened and the extent of the threat from sea level rise has not been assessed.

Council has access to sites recorded on the AHIMS database, and preliminary inundation extent analyses completed by OEH (2018). These data are enough to provide a preliminary assessment of the degree of the threat. That assessment would be suitable for initiating discussions with Council's local Aboriginal Advisory Committee and Local Aboriginal Land Council representatives to ascertain an appropriate way forward. This is important as the AHIMS database is known to be an incomplete register for various reasons and culturally important areas exist which aren't recorded in that management system.

Staff from DPIE have advised that its Climate Change and Sustainability section is presently undertaking a heritage adaptation pathways project with First Nations representatives from the Illawarra region, and opportunities may exist to further this action through that avenue as this concern is carried forwards.

2.2.4 Action EM4: Appropriately Planning for Population Growth and Identifying Offsets

The Environmental Planning and Assessment Act (1979) provides the legal framework for planning in NSW and facilitates effective planning through consideration of social, economic, environmental and cultural factors. Both State and Local Government have a role in this process. State government is



Section 18

responsible for the development and implementation of strategic plans and infrastructure projects, whereas Council manages local development and planning outcomes. Specific matters around Moruya which are imminent and will require special consideration from both state and local government in fulfilling these planning roles include:

- Moruya's population is forecast to increase by around 30% in the next 15 years. Decisions need to be made around where these people will reside.
- The Princes Highway Moruya Bypass for which the impact of the selected route is presently being considered (as of late September 2021).
- The proposed Moruya Hospital to the east of the Moruya TAFE campus between Albert Street and the Princes Highway.

The flat terrain and presence of coastal wetlands throughout the Moruya floodplain mean that all these matters have the potential to impact or block the ability of wetlands to adapt and migrate as sea levels rise.

Discussions with the Planning section of DPIE have indicated that wetland migration pathways are an issue of interest, and they can be considered as part of the environmental impact assessment for state significant projects. The planning process for large infrastructure projects should consider avoidance of impacts on wetlands, including future migration pathways, or the adoption of suitable mitigative strategies such as offsets where a conflict is identified.

Similarly, future urban development in and around all estuaries needs to be approached with care to ensure that appropriate measures are taken to prevent the decline of water quality.

In relation to the ECMP, population growth will require ongoing consideration when implementing and reviewing its actions. This will form part of the Monitoring, Evaluation and Reporting (MER) plan included in this ECMP. Coordination and execution of the MER Plan will be the responsibility of the Estuarine Management Advisory Committee (see Action EM5). Development review activities carried out by the Committee are to be recorded against this action as part of the MER Plan.

2.2.5 Action EM5: Establish Estuarine Management Steering Committee and Meet Regularly

A formalised, government agency based advisory committee is to be formed, meeting bi-monthly to assist in resolving difficulties around estuary management throughout the Eurobodalla. The committee is to be



focussed on the operational requirements of delivering the ECMP, will be chaired by Council and is to comprise staff from the following agencies:

- Council.
- South East Local Land Services.
- Department of Primary Industries (Fisheries).
- Department of Planning, Industry and Environment (EES).
- Batemans Marine Park.
- TfNSW
- DPIE Crown Lands

The committee will be responsible for the following:

- Ensuring that there is broad understanding across government of ongoing Estuary Management matters in the Eurobodalla Shire.
- Identifying and assessing additional management actions that should be considered for completion as part of the ECMP, as new issues arise and/or funding becomes available.
- Ensuring that relevant outcomes from the Eurobodalla Shire Council Bushfire Recovery Action Plan are integrated into the CMP through an interim review once that Plan becomes available.
- Recording and tracking the progress of different Management Actions to facilitate subsequent reporting by Council.
- Grant funding opportunities from State and Federal Government vary from year to year, and a primary
 role of the committee will be to identify these opportunities and to access additional funding to carry
 out or expand upon the actions identified in this CMP.
- To ensure that all relevant parties are suitably familiar with new information, such as the outcomes of studies arising from Marine Estate Management Strategy initiatives, so that informed advice can be provided, and actions can be coordinated.
- Reviewing major future development applications in the context of the objectives of the CM Act, including those required to accommodate increasing population while protecting the overall ecological integrity and water quality within the estuaries from decline.



Some of these activities may require external assistance from research organisations and/or independent consultants. The committee should also consider consistency between the Local Strategic Planning Statement, the Local Environment Plan, Development Control Plan and the Coastal Management SEPP.

Where problems are identified, actions should be taken by the Committee aiming to rectify these inconsistencies in a way that is consistent with the CM Act. In many cases, this may take the form of appropriate correspondence to the agencies that would normally take responsibility for the identified inconsistency.

There is some flexibility in works that can be undertaken under the CMP. This is particularly the case for the Foreshore and Wetland Restoration and Environmental Protection Plans for Moruya and Wagonga Inlet (Mo1 and Wa1). Implementation of works at different sites under these plans is often dependent on the willingness of private landowners to participate, so timing and precise location of works cannot always be prepared in advance. The Committee will be responsible for documenting progress on those actions and the reasons behind decisions made in scheduling or pursuing rehabilitation or protection works.

This committee will have a very important role in tracking progress against the original CMP as part of the monitoring, evaluation and reporting program. It will be prudent to invite other agencies to attend this committee from time to time, when actions requiring those agencies input or authorisation are being considered.

While the function of this committee is firmly focused on government agency operations and responsibilities, there is a clear overlap with the scope of the Coastal and Environmental Management Advisory Committee (CEMAC) which includes community representatives. For this reason, there may be occasions when the two committees can come together for efficiency. However, their roles should remain distinct.

2.2.6 Action EM6: Trial Installation of End of Pipe Litter Capture Device in Moruya (Litter Baskets)

Batemans Marine Park has indicated willingness to contribute to the trial installation of a litter capture device, such as a filtering net to capture gross pollutants, at a suitable location in Moruya.

This device will be installed, maintained, and monitored for a period of two years to assess performance. A report on performance will be prepared and a decision made as to whether such devices should be rolled out to other locations where urban areas discharge stormwater to the Eurobodalla Shire's Estuaries



2.2.7 Action EM7: Investigate and validate CM SEPP mapping and update where required using a planning proposal

One overriding aim of the CMP is to prepare a planning proposal for modification of the CM SEPP maps as necessary to accommodate a more robust consideration of sea level rise and the effects of increased inundation by rising tides.

There are several related management actions which need to be completed to prepare a single planning proposal to support future planning around Eurobodalla's estuaries (see actions EM1, Mo2, Mo3, Mu1, Mu2, Wa2, Wa7).

Some of these studies will take time, but for efficiency and to minimise rounds of consultation with the community, it is seen as advantageous to combine these into a single planning proposal. It is likely that the planning proposal could be prepared around five years into the Program as laid out in the Business Plan.

Where feasible, planning proposals relating to CM SEPP mapping should occur concurrently with a commensurate update to Council's LEP.


3 MORUYA RIVER ISSUES AND ACTIONS

3.1 Key Estuary Management Objectives for Moruya River

The coastal zone associated with the Moruya River is shown in Map MO1.

Relevant objectives for the estuary have been extracted from the *Coastal Management Act 2016* based on the management issues present. These were then considered as part of the risk assessment presented in Appendix D. Following that exercise, the "key" objectives, being those most associated with "extreme" or "high" level risks for this estuary, were identified.

The selected objectives were assigned a "focus" rating (very strong, strong, moderate, or minor) based on the risk assessment outcomes. The focus rating can be considered a qualitative measure of the total effort that the Program contains to achieve that objective. These are presented in Table 3.

The priority scores in Table 3 are directly related to the coastal management area to which each objective applies in the CM Act. For example, objectives associated with the coastal wetlands area have a priority score of 1, whereas those associated with the coastal use area have a priority score of 4.

3.2 A Snapshot of Issues

The key issues identified by the risk assessment process are outlined below and presented in Map MO2. More information about these issues is presented in the Scoping Study (Appendix A).



Table 3Key Objectives and Classification for Moruya River Estuary

Objective	CM Area	Focus	Priority
To protect coastal wetlands in their natural state, including their biological diversity and ecosystem integrity.	Wetlands	Strong	1
To promote the rehabilitation and restoration of degraded coastal wetlands.	Wetlands	Strong	1
To improve the resilience of coastal wetlands to the impacts of climate change, including opportunities for migration.	Wetlands	Strong	1
To protect and enhance the coastal environmental values and natural processes of the estuary, and enhance natural character, scenic value, biological diversity and ecosystem integrity.	Environment	Moderate	3
To reduce threats and improve the resilience of the estuary, including in response to climate change.	Environment	Moderate	3
To maintain and improve water quality and estuary health.	Environment	Moderate	3
To support the social and cultural values of the estuary.	Environment	Moderate	3
To maintain and, where practicable, improve public access, amenity and use of foreshores.	Environment	Moderate	3





Legend



Coastal Wetlands Proximity Area for Coastal Wetlands Coastal Use Area

Coastal Environment Area

MORUYA AIRPORT

Moruya River

SHELLY BEACH

QUANDOLO ISLAND

MORUYA HEADS



Map MO1: CM SEPP Coastal Management Areas for Moruya River CMP for Eurobodalla Estuaries

 $GIS\ File;\ Z: \ \ Business Share \ Them \ \ Projects \ \ PO0053 \ \ CMPs for Moruya \ \ \ GIS \ \ \ Coastal Management \ SEPPB, ags$

Salients 0.2 0.4 0.6 km

REV DRAWN CHECK EN DJW



3.2.1 Uncertain Extent of Future Tidal Inundation around Moruya River Estuary

ASSESSED RISK LEVEL Extreme

RELATED ACTIONS EM1, Mo3 Understanding the future tidal inundation extents for the Moruya River Estuary is of particular importance given the large flat expanses of floodplain adjacent to the estuary, particularly downstream of Moruya. For future planning purposes, this needs to be better understood.



3.2.2 Considering the Future Migration Pathways of Wetlands around Moruya River Estuary

ASSESSED RISK LEVEL

Extreme

RELATED ACTIONS EM1, EM2, Mo3, EM7 As sea levels rise, areas of this floodplain, including locations adjacent to the Ryans/Racecourse Creek Wetlands and Malabar Wetland, will be inundated more frequently, resulting in migration of wetlands and estuarine/riparian vegetation. Because of the local topography, this matter is of special interest to the Moruya River.





3.2.3 Ongoing Damage to Coastal Wetlands through Grazing

ASSESSED RISK LEVEL High

RELATED ACTIONS

Mo1, Mo2

There are several locations around the Moruya Estuary where cattle are presently able to access wetland areas which are trampled and have limited subsequent capacity to recover.

Management of this issue in the past decade by fencing to exclude livestock has been very successful at several locations.





3.2.4 Mismatch between Mapped Wetland Vegetation and that Existing on Ground

ASSESSED RISK LEVEL High RELATED ACTIONS EM1, EM2, EM7, Mo2 Ground truthed mapping completed by Elgin Associates (2018), based on field work completed in 2017, has demonstrated that wetland vegetation extents at several locations around the Moruya Estuary extend beyond the mapped extents currently provided for in the CM SEPP. This new data will need to eventually be incorporated into the CM SEPP, although it may be superseded by considerations of wetland

migration pathways in a future with additional sea level rise.



3.2.5 A Need to Better Understand Malabar Lagoon

ASSESSED RISK LEVEL

High

RELATED ACTIONS

A better understanding of estuarine processes in and around the Malabar Lagoon Wetland is considered important to the Moruya Estuary, as:

• It is the only part of the estuary given the highest level of protection under the zoning for the Batemans Marine Park (Sanctuary Zone) in an estuary that is otherwise open for commercial fishing.



- Exchange between the main river and the wetland is presently constrained by a weir, which has an unknown impact on ecological function (including fish passage).
- The construction of North Head Drive has further constrained exchange between the main river and the wetland.
- There are, reportedly, several barriers to inundation of the upper extents of the wetland and the effect of these is currently poorly understood.
- The area surrounding the lagoon is the area where sea level rise will cause the largest migration of wetland vegetation over time (See Appendix B2) in the Moruya system.
- Much of the wetland is fringed by privately owned land that is grazed and those landowners should be consulted regarding how adaptive land use practices could facilitate improved environmental outcomes for the estuary.

Council and LLS have spent some effort in recent years to work on fencing areas that were previously used for grazing. However, effective management of this area requires a better baseline understanding of the processes that make Malabar Lagoon an important site.





3.2.6 Desire for a Healthy, Vegetated Riparian Zone

ASSESSED RISK LEVEL

High

RELATED ACTIONS

Council and LLS have also put substantial effort into the rehabilitation and maintenance of riverside riparian zones along the Moruya River involving revegetation, fencing and erosion protection works.

The degradation of native riparian vegetation is considered a key threatening process under part 7A of the *Fisheries Management Act*

1994. Riparian vegetation is vital to healthy and productive fisheries – a matter of particular importance for the Moruya River. Being an estuarine waterway, the NSW Policy and Guidelines for fish habitat conservation and management (Department of Primary Industries, 2013) classifies the Moruya Estuary as a "major key fish habitat" (CLASS 1) and the preference of those guidelines is that a 100m wide buffer zone be established.

In several locations, particularly in the reaches of the estuary upstream of Moruya and commonly on the inside of bends on private land, stock have free access to the waterway, which damages the banks, can destroy native vegetation, and enables the establishment of weeds. Ongoing environmental repair, consulting with private landowners where required, is a continued recommendation for the management of the Moruya River.





3.2.7 Use of areas around Moruya Heads by Migratory Waders

ASSESSED RISK LEVEL

RELATED ACTIONS Mo6 Several sources including the National Parks and Wildlife Service and Birdlife Australia⁴ indicate that the area around the entrance to the river, near Moruya Heads and including Quandolo Island and the training walls, are used by several important species of migratory waders and shorebirds. While much of the area is contained within the Eurobodalla National Park, access of the public to sensitive areas is of some concern. Appropriate

signs warning of the use of the area by migratory waders and shorebirds is indicated as a first step in managing this issue.



3.2.8 Other Issues

Several other issues which are of importance also require ongoing vigilance. Action is warranted in some cases, particularly if relatively easy and cost-effective actions which will almost certainly have a positive impact can be identified. Some of these matters are also, at least partly, being managed through other processes. Several of the 'moderate' risks identified in Appendix D for the Moruya Estuary will be addressed by the overarching actions outlined in Section 2.2. The remaining issues of note are:



⁴ https://birdata.birdlife.org.au

- Potential future acid drainage from the floodplains of the Moruya River.
- Ongoing influx of sediment from the ocean at Moruya Heads and its interaction with navigation.
- A perception that tidal ranges are increasing, possibly affected by training of the entrance and gradual deepening of the area around the entrance.
- Issues relating to uncontrolled/informal public access to the foreshores of the estuary.
- Ongoing commercial fishing within the Moruya Estuary.
- A perception of poor water quality in Racecourse Creek.

3.3 Actions to Be Implemented by Eurobodalla Shire Council and/or Public Authorities

The actions forming part of the program are outlined below and presented in Map MO3. Most of the Moruya River estuary below mean high water mark is Crown land, as are several foreshore reserves. Appendix F contains a list of key areas of Crown land relevant to the actions contained in this section.

3.3.1 Action Mo1: Foreshore and Wetland Restoration and Environmental Protection Plan

During preparation of this Program, dedicated consultation with the staff from LLS and Council was undertaken, with data captured from field inspections discussed and used to prepare a preliminary *Foreshore and Wetland Restoration and Environmental Protection Plan.* Map MO4 shows the locations of works, including works within areas mapped as CM SEPP wetlands. The layers used to construct this map have been provided to Council for future reference and updating as this sub-program progresses.

There are, broadly, three different types of works targeted:

- Riparian corridors, including revegetation, reconstruction, and fencing. Ideally, up to 100m wide riparian corridors would be established, but experience has shown that aiming for around 30m is more palatable for private landowners.
- Fencing of low-lying areas where saltmarsh is likely to establish if grazing is excluded.
- Maintenance work, which typically involves weeding and replanting, where required, of native vegetation.

In addition to the above, Council will continue to supplement these actions by routinely utilising native species in roadsides, reserves and parks adjoining waterways.



The works identified by this action all constitute environmental protection works in the context of the CM SEPP. Any structural works identified by this action constitute coastal protection works as defined under the CM Act, and those works are therefore subject to the development consent requirements of s27 of the CM Act.

Standard rates used by LLS have been used to cost the restoration options. The work is difficult to schedule for the following reasons:

- Progress is often dependent on the willingness of private landowners to participate.
- Funding sources, such as seasonal grants opportunities, are not always amenable to taking advantage of a willing landowner.

Aside from private land, Council is also responsible for the management of riparian zones including those around Yarragee, Glenduart, Riverside Park and Ryans Creek.

Potential sources of funding for works include:

- Private land: Local Land Services.
- Public land: DPIE Grants streams (Coasts and Estuaries, Environmental Trust) and Local Land Services.

For the reasons outlined above, it is difficult to precisely program when works at a given site will be achievable. The time estimates and costs provided in the Business Plan are based on the experience of LLS and Council over recent years and it is estimated that works shown in Map MO4 would take around 5 years to complete.

Council will take the lead role in administering the Foreshore and Wetland Plan, with LLS providing support and project management services, particularly on Private Land. Council will keep up to date records, as described in Section 7, and works will be coordinated through the Estuarine Management Advisory Committee established and operated through Action EM5.





ID P	RIORITY	COMMENT
		PROPERTIES
21 (2)	2	Some areas fenced but not others.
2(2)	2	Monitor existing foreshore fencing and repair as required.
P3(2)	2	Monitor existing foreshore fencing and repair as required.
P4(2)	2	Monitor existing foreshore fencing and repair as required.
P5(3)	3	Council Reserve has burned and recovery is promising. Monitor.
P6(1)	1	Target for resolution of Crown lease arrangement to allow into public hands, enabling reinstatement of riparian zone.
^o 7(3)*	3	Maintenance: stock exclusion.
P8(1)	1	Requires fencing for stock exclusion.
² 9(3)*	3	Previous work: maintain stock exclusion.
°10(3)*	3	Previous work: maintain stock exclusion.
P11(3)*	3	Has been fenced. Needs monitoring and possibly modification of elevations to encourage establishment of vegetation.
P12(2)*	2	Maintenance (weed control) required.
P13(2)*	2	Maintenance: weed control and ongoing exclusion of livestock.
P14(2)	2	Maintenance (weed control).
P15(2)*	2	Maintenance: (fencing and stock exclusion).
P16(2)*	2	Maintenance: ongoing stock exclusion and management of Sharp Rush (J. Acutus).
P17(1)*	1	Area requires fencing to protect saltmarsh, swamp oak and paperbark.
		FORESHORES
F1 (2)	2	Weed control required
F2(1)	2	Revegetation, weed control and fencing required
F3(1)	1	Fencing required, some areas fenced but not others
F4(1)	1	Needs fencing, some areas fenced but not others
F5(2)	2	Check legality of clearance works
F6(2)	2	Fencing: stock exclusion
F7(2)	2	Maintenance: weeding of previous works
F8(1)	1	A target for riparian vegetation and widening where required
F9(1)*	1	To be fenced to exclude stock
F1O(1)	1	Requires fencing to exclude stock
=11(1)*	1	Fencing to exclude stock
F12(1)	1	Fencing required
F13(1)	1	Fence to avoid stock crossing
F14(1)	1	Fencing required
F16(1)	1	Council to stop mowing this area
F17(2)	2	Requires maintenance – vegetation and weeding
F18(2)	2	Negotiate with Golf Club to remove weeds (willow & privet)
E19(2)	2	Erosion at isolated locations along here may need treatment
113(2)		
F20(2)	2	Weed control and revegetation required
F20(2) F21(2)	2	Weed control and revegetation required Weed control and revegetation required



3.3.2 Action Mo2: Scientific, Hydraulic, Heritage and Migration Feasibility Study of Malabar Wetland

A detailed study of Malabar Lagoon would be undertaken. This study would aim to identify priority targets for restoration works and offset areas, and then recommenced these actions be carried out as part of action Mo2. The need for the study is outlined under Section 3.2.5 and would include the following strands:

- Hydraulic assessment including modelling with and without the weir and a variation of the constraint at North Head Drive (e.g., would a longer bridge help?). The potential for installing a fishway or other controlling structure should also be assessed. The study should identify existing floodplain blocking structures and assess their impact. Data loggers may need to be installed to collect data for model calibration.
- Sea level rise assessment, determining the extent to which the floodplain could be inundated under several sea level rise scenarios for varying levels of connectivity between the wetland and the river.
- Ecosystem assessment, including potential use of the wetland for important commercial species, if fish passage were improved.
- Floodplain soils assessment, including testing for the presence of acid sulfate soil to determine whether increased inundation and/or drainage of the area is likely to result in acid leachate.
- One-on-one consultation with fringing landowners to explain the work that is being completed and the reasons why, as the study progresses, and to discuss what may happen in future and what options might be considered regarding the future land use.
- Identify sites of concern and specific management actions to address the risks to Malabar Wetland highlighted by the study.

3.3.3 Action Mo3: Map Coastal Vulnerability Area for Moruya

Action EM1 describes broad parameters surrounding the application of existing flood models to look at tidal inundation under future sea level rise scenarios. In the case of Moruya River, it is expected that a flood model presently being applied to assess the Moruya Bypass options on behalf of TfNSW will eventually be used in a revised Flood Study for the Moruya Area. As part of that study, it is recommended that the model be calibrated to replicate measured tidal behaviour and tidal planes mapping be completed, as outlined under Action EM1.



Some follow-up work will be required to translate the outputs into actual extents of tidal inundation related to the coastal vulnerability area, and some additional thought will need to go into achieving this, hopefully based on an emerging standard of practice in the next few years. It is not expected that the revised flood study would be undertaken until 2023/24, and it could be co-funded under DPIE's Floodplain Management Grants program.

3.3.4 Action Mo4: Deua River Sediment Delivery Assessment

Upstream of the tidal limit, the waterway which flows into the Moruya River is known as the Deua River.

The Scoping Study (Appendix A) revealed a concern that the amount of sediment flowing from the Deua River had been enhanced beyond natural levels. Consideration of activity within the catchment indicates that this may be a result of gold mining in and around Araluen from the mid-1800s. Following the 2019/2020 bushfire season, concerns were also raised that the severity of the fire would enhance the amount of sediment carried by runoff into the Deua River.

The nature, scale and severity of this problem is not presently well understood. At the time of drafting this ECMP, ongoing recovery works are underway, including preparation of the *South East Catchment and Waterways Fire Recovery Plan*. While it appears that the Fire Recovery Plan has not considered sediment delivery from the Deua River, analyses have been undertaken of different rivers and the outcomes from those assessments should be used to scope and guide a suitable study for the Deua.

3.3.5 Action Mo5: Assess Historical Changes to Tides

Tidal range inside an estuary increases when an entrance is initially trained. However, there is anecdotal evidence that the tidal range in the Moruya River is continuing to increase. Given the availability of data records for tide gauges in Moruya, a study and documentation of results is required. Preliminary 'tidal planes' analysis was completed by the NSW Government's Manly Hydraulics Laboratory (MHL) during drafting of the ECMP, but more detailed analysis should be completed to:

• Remove any effects of ongoing sea level rise.

Part - ----

- Normalise calculated tidal ranges inside the estuary against the corresponding tidal ranges in the Ocean.
- Consider the possible effects of entrance scour during flood events and subsequent infilling of the entrance with sand on tidal range measured from year to year.

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This study is relatively minor in nature and, based on the preliminary assessment by MHL, it is not expected that there is ongoing resulting from entrance training. The expected purpose of the study is to document the available evidence and avoid management effort being distracted in future with claims about a continuing increase in tidal range due to entrance training.

3.3.6 Action Mo6: Provide Interpretive and Educational Signage around Quandolo Island / Eurobodalla National Park

To provide notification to the public using the Eurobodalla National Park around Moruya Heads, signs shall be installed in appropriate locations to advise people of the presence of important migratory waders and shore birds.

The work identified by this action constitutes environmental protection works in the context of the CM SEPP.

3.3.7 Action Mo7: Stabilise banks through restoration of rock walls at Brierley's Boat Ramp and Russ Martin Park.

Two sections of failing rock wall have been identified for repair. These are:

- Adjacent to the Moruya Swimming Pool; and
- At the new Brierley's Boat Ramp Facility.

Any structural works identified by this action constitute coastal protection works as defined under the CM Act, and those works are subject to the development consent requirements of s27 of the CM Act.



4 MUMMUGA LAKE ISSUES AND ACTIONS

4.1 Key Estuary Management Objectives

The Coastal Zone Associated with Mummuga Lake is shown in Map MU1.

Relevant objectives for the estuary have been extracted from the *Coastal Management Act 2016* based on the management issues present. These were then considered as part of the risk assessment presented in Appendix D. Following that exercise, the "key" objectives, being those most associated with "extreme" or "high" level risks for this estuary, were identified.

The selected objectives were assigned a "focus" rating (very strong, strong, moderate, or minor) based on the risk assessment outcomes. The focus rating can be considered a qualitative measure of the total effort that this Program contains to achieve that objective. These are presented in Table 4.

Table 4 Key Objectives and Classification for Mummuga Lake

Objective	CM Area	CMP Focus	Priority
To protect and enhance the coastal environmental values and natural processes of the estuary, and enhance natural character, scenic value, biological diversity and ecosystem integrity,	Environment	Moderate	3
To reduce threats and improve the resilience of the estuary, including in response to climate change	Environment	Moderate	3
To maintain and improve water quality and estuary health	Environment	Moderate	3
To support the social and cultural values of the estuary	Environment	Moderate	3
To maintain and, where practicable, improve public access, amenity and use of foreshores.	Environment	Moderate	3
 To protect and enhance the scenic, social and cultural value of the coast by ensuring development: is of an appropriate type, bulk and scale for its location avoids or mitigates against adverse impacts on heritage values supports and/or incorporates water sensitive urban design incorporates adequate public open spaces for recreation and associated infrastructure 	Use	Moderate	4



BODALLA STATE FOREST

Lawlers Creek

EUROBODALLA NATIONAL PARK

Mummuga Lake

AMHERST ISLAND

Lawlers Creek

EVANS POINT

Spring Creek



Coastal Wetlands

Proximity Area for Coastal Wetlands

Coastal Use Area

Coastal Environment Area

MUMMUGA HEAD

DALMENY



 $GIS\ File; Z: \ Business Share \ Them \ Projects \ PO0053 \ CMPs for Moruya \ GIS \ Coastal Management \ SEPPB. ags$ **REV DRAWN CHECK** A EN DJW

50 100 150 200 m

Salients

The priority score in Table 4 directly related to the coastal management area to which that objective applies in the CM Act. For example, objectives associated with the coastal wetlands area have a priority score of 1, whereas those associated with the coastal use area have a priority score of 4.

4.2 A Snapshot of Issues

The key issues identified by the risk assessment process are outlined below and presented in Map MU2.

4.2.1 Considering the Extent of Future Tidal Inundation around Mummuga Lake

ASSESSED RISK LEVEL

Extreme

RELATED ACTIONS EM1, EM2, Mu1, Mu2, EM7 The future tidal inundation extents for Mummuga Lake are of some importance to inform planning decisions and to gain an appreciation of how the wetlands in and around the lake will migrate as sea levels rise. There are some low-lying areas adjacent to the Lake that are already prone to flooding when the lake is closed to the ocean. This is expected to be exacerbated as sea levels rise. For future planning

purposes, this needs to be better understood.







4.2.2 Informal Access around the Entrance and Mummuga Headland, Dalmeny

ASSESSED RISK LEVEL Extreme RELATED ACTIONS Mu3 Following site inspections and meetings with key stakeholders on site, several issues have been identified around the southern foreshores of the Mummuga Lake entrance and extending out onto the adjacent headland.

The key issues are:

- The foreshore protection provided in the immediate vicinity of the entrance seems to have been placed without considering the impact that waves may have on this structure.
- There are lengths of foreshore inside the entrance that are now over steepened due to severe erosion, and vegetation has been substantially undermined and is at risk of collapsing into the channel.
- Informal access across the crest of the foreshore and down the slope in several locations has the potential to enhance erosion and cause bank instability.
- Informal access down the slopes adjacent to the entrance and the northern edge of Mummuga Headland is poorly managed and damage to sites of significance to the local Aboriginal community has been noted and is continuing.
- In some locations, the over steepened slope and lack of a barrier at the crest may pose a safety risk to the public.





4.2.3 Management of Saltmarsh around Southern Foreshores of Mummuga Lake

ASSESSED RISK LEVEL High RELATED ACTIONS

Mu4, Mu5

Semi formalised vehicular access is provided through foreshore vegetation around 100m west of the tennis courts. This allows relatively easy access for vehicles onto one of the largest salt marsh areas along the southern foreshores of the lake based on mapping by Elgin Associates (2018). The saltmarsh is present within the Eurobodalla National Park and the Batemans Marine Park and is clearly being

damaged by ongoing vehicular access.

An additional area where saltmarsh rehabilitation activities have been undertaken historically by Council exists to the rear of properties along Myuna and Attunga Streets, adjacent to the main body of the lake. Inspection of this site in 2018 indicated that the plantings were reasonably robust, although there was some variability, with some areas being mowed and Kikuyu invading the landward edge of the saltmarsh in others. There is an opportunity here to engage with the community and collaborate on a way forward to managing this area.





4.2.4 Stormwater Runoff from Urban Catchments

ASSESSED RISK LEVEL

High

RELATED ACTIONS Mu6 Improving water quality was the top issue of concern for the local community, based on analysis of the survey completed in 2020. However, limited data provided for review by DPIE, from samples collected in 2014 and 2015, indicates that overall quality is good, although a sparse cover of macroalgae was present during one of the sampling dates.

Water quality within coastal lakes, even relatively undisturbed ones such as Mummuga, can vary significantly from season to season depending on rainfall patterns and the state of the entrance. The variability is mostly natural and communities which live around the fringes of these lakes often struggle with this variability. It is not uncommon for a system such as this to have relatively 'good' water quality for a few years and then for conditions to change (rainfall/runoff, entrance condition) such that the quality rapidly deteriorates. Furthermore, what constitutes 'good' water quality for recreational purposes (swimming, boating) is not necessarily optimal for a healthy thriving ecosystem.

The opportunity exists to put some effort into analysing and explaining the context and importance of urban stormwater from Dalmeny to the local community. Any study undertaken can also be used to inform future planning for the expected increase in population at Dalmeny over the next 15 years (~10%).





4.2.5 Boating Access

ASSESSED RISK LEVEL High

RELATED ACTIONS EM5 General concerns were expressed by some in the community that there is a lack of access to the lake for boating, resulting in informal access at several locations and damage to foreshores. Certainly, the boat ramp at Attunga St (Evans Point) is in relatively poor condition and the overall facility does not lend itself to intensive use. Runoff from the road here is poorly managed and erosion of sediment from informal parking and

unsealed manoeuvring areas would be contributing some sediment to the Lake.

However, discussions with Council staff and TfNSW have indicated that this boat ramp is unlikely to be a priority for upgrade soon. We note that both Council and TfNSW are in the process of reviewing maritime facilities in the Eurobodalla Shire.

The situation should continue to be monitored by the Estuarine Management Advisory Committee (see Action EM5). While no action is proposed under this Program, Council may consider taking steps to reduce the impact of informal parking at the site, potentially paving some areas to facilitate boat turning at the facility.





4.2.6 Other Issues

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Several other issues of importance also require ongoing vigilance. Action is warranted in some cases, particularly if relatively easy and cost-effective solutions with a high likelihood of a positive impact can be identified. Some of these matters are also, at least partly, being managed through other processes. Several of the 'moderate' risks identified in Appendix D for Mummuga Lake will be addressed by the overarching actions outlined in Section 2.2. The remaining issues of note are:

- Existing CM SEPP mapping does not completely match the full extent and variability of coastal wetlands.
- Concerns relating to overfishing within the lake.
- Entrance management, including raising the community's awareness on the variability and effectiveness of entrance opening to improve water quality. At the time the CMP was being prepared, NPWS was working on updating their entrance management policy for Mummuga.

4.3 Actions to be Implemented by Eurobodalla Shire Council and/or Public Authorities

The actions forming part of the ECMP are outlined below and presented in Map MU3. A substantial area of Mummuga Lake falls within the Eurobodalla National Park and actions should be undertaken in consultation with NPWS.

4.3.1 Action Mu1: Map Coastal Vulnerability Area for Dalmeny

Action EM1 describes broad parameters surrounding the application of existing flood models to look at tidal inundation under future sea level rise scenarios. In the case of Mummuga Lake, there is a preexisting model of the estuary, and the Floodplain Risk Management Study and Plan (FRMSP) was being developed alongside this ECMP.

An additional study will need to be commissioned to replicate measured tidal behaviour and produce the requirements for mapping tidal planes outlined under Action EM1. However, current tidal behaviour and its variability need to be better understood, and this will require the capture of a water level record from inside the lake (refer to Action Mu7).





Some follow-up work will be required to translate the outputs into actual extents of tidal inundation related to the coastal vulnerability area, and some additional thought will need to go into achieving this, hopefully based on an emerging standard of practice in the next few years. It is not expected that the new study would be undertaken until 2025/26, and it could be funded under DPIE's Coast and Estuaries Grants program.

4.3.2 Action Mu2: Investigate Historical and Future Coastal Wetland Extents for Mummuga Lake

Action EM1 provides broad coverage for this action. However, some additional effort should be undertaken at Mummuga Lake. During the scoping study, it was recognised that differences existed between the wetland extents in the CM SEPP and those which were present from other mapping exercises and aerial photography. ICOLLs exhibit variable behaviour and salinity changes in response to the entrance condition, general rainfall patterns, and the volume of water retained behind a closed entrance barrier.

The extent of seagrasses and saltmarsh can be expected to also vary significantly at some locations within Mummuga Lake over time. A study is to be undertaken, including updating and ground truthing the existing condition of vegetation and completing aerial photo / satellite image interpretation to gain a better understanding of the natural variability of different types of wetland vegetation around Mummuga Lake. The study would also assist in identifying how wetland vegetation may respond over time to rising sea levels.

DPI Fisheries intends to repeat seagrass mapping to build upon historical data in the Eurobodalla region. Although Mummuga Lake, Wagonga Inlet and Moruya River are not identified as priority estuaries, it would be advantageous for Council to utilise the standard DPI seagrass mapping methodology for accurate comparison over time.

4.3.3 Action Mu3: Foreshore and Headland Management and Access Management Plan

An access management and landscape plan for Mummuga Headland, the southern foreshore of Mummuga Lake (east of the Tennis Courts) and the adjacent parkland is required. The plan should consider the following:

 Substantial cultural heritage values, and the possibility of installing informative signage. The local Aboriginal community should be involved in development of the plan.



- The need to rationalise access including railings at the top of the slope by fencing or otherwise separating foot traffic from areas where existing middens could be damaged.
- Provision of safe access down the face of the slope where necessary to address safety issues arising from steep, informal tracks.
- Removal of unstable trees from eroding slopes.
- Assessment of existing structures, particularly where exposed to ocean waves, against coastal engineering standards and development of concepts for improving / replacing those structures. Detailed design and construction can follow as needed.
- Revegetation of areas at the crest of the slope with suitable low relief native species to discourage access down slopes in areas other than those identified for formal access.

Elements of work that have been identified, by Council, as suitable for action are presented in Map MU4. An allowance for funding of those actions has been incorporated into the Business Plan. When undertaken, those actions should remain cognisant of the overall *Foreshore and Headland Access Management Plan* to ensure consistency.

The southern foreshore area adjacent the entrance is Crown land reserved for public recreation and managed by Council. This action should be pursued in consultation with DPIE-Crown Lands.

4.3.4 Action Mu4: Prevent Vehicular Access to Saltmarsh Area near Tennis Courts

Bollards are to be installed on Council land to prevent vehicular access onto the area of saltmarsh near the tennis courts on Mort Avenue. Initially, 3-5 standard timber bollards may suffice, although if these are vandalised a more robust solution may be required.

In addition, the short, unsealed track which leads from Mort Avenue and through the foreshore vegetation will be removed and planted out with turf, to eliminate the perception that vehicular access is permitted. In consultation with NPWS, signs may be erected to notify the public that the saltmarsh is at least partly located within the National Park, and to highlight the sensitivity of this area.





4.3.5 Action Mu5: Engage with Community on Saltmarsh Management, Myuna and Attunga Streets

Council and DPI will engage with the community, where properties on Myuna and Attunga St back on to the area of previously rehabilitated saltmarsh. This is likely to take some time and effort to gain a mutual agreement on the importance of the saltmarsh and to develop a way forward in terms of future management.

The destruction of saltmarsh which exists on public land without a permit is an offence under the *Fisheries Management Act 1994*. At other locations, following consultation, an agreement has been reached whereby markers are installed to identify the boundary to which mowing is allowed and DPI Fisheries issues a permit for landowners to mow to that boundary, but not beyond.

Following agreement and implementation of the markers, Council, DPI, and the Batemans Marine Park will ensure that the following occur:

- Regular maintenance to prevent infestation of the salt marsh with grasses and other escapees from residents' back yards.
- Robust monitoring and compliance activities including fines as required.

4.3.6 Action Mu6: Water Quality Risk Management Study

The "Risk-based Framework" methodology (OEH, 2017) shall be used to examine the water quality issues that are a concern for the community. While the methodology has been applied across the NSW coast more broadly, it needs to be revisited with a more local focus. Storm water management should include examining the current protections included in the DCP.

In modifying the approach taken, the study is to incorporate the findings from risk-based framework studies being completed at several estuaries on the NSW coast under the Marine Estate Management Strategy.

Importantly, the community needs to be involved in this study from an early stage to ensure that their concerns are being adequately accounted for and addressed by the study.

The study will be used to inform an urban stormwater management strategy which considers ongoing growth of the population surrounding Mummuga Lake.



4.3.7 Action Mu7: Entrance Management

An entrance management plan is presently being prepared for NPWS, which is the lead agency responsible for entrance management at Mummuga.

Discussions with NPWS have identified the need for a near real time permanent water level recorder to support entrance management activities. Such a recorder would have multiple benefits for the lake (see Action Mu1). Recorders such as these are normally installed and managed by DPIE.

NPWS and Council are also collaborating at present regarding replacement of the pedestrian bridge across the entrance channel, and this bridge may be upgraded to enable earth moving machinery to cross the bridge, providing better flexibility during entrance opening operations.

This action involves ongoing communication between agencies regarding entrance management activities and the installation of a permanent water level recorder.



5 WAGONGA INLET ISSUES AND ACTIONS

5.1 Key Estuary Management Objectives

The coastal zone associated with Wagonga Inlet is shown in Map WA1. Relevant objectives for the estuary have been extracted from the *Coastal Management Act 2016* based on the management issues present. These were then considered as part of the risk assessment presented in Appendix D. Following that exercise, the "key" objectives, being those most associated with "extreme" or "high" level risks for this estuary, were identified.

The selected objectives were assigned a "focus" rating (very strong, strong, moderate, or minor) based on the risk assessment outcomes. The focus rating can be considered a qualitative measure of the total effort that the Program contains to achieve that objective. These are presented in Table 5.

The priority score in Table 5 directly related to the coastal management area to which that objective applies in the CM Act. For example, objectives associated with the coastal wetlands area have a priority score of 1, whereas those associated with the coastal use area have a priority score of 4.

5.2 A Snapshot of Issues

The key issues identified by the risk assessment process are outlined below and presented in Map WA2.

5.2.1 Considering the Extent of Future Tidal Inundation around Wagonga Inlet

ASSESSED RISK LEVEL

Extreme

at the second

RELATED ACTIONS EM1, EM2, Wa1, Wa2, Wa7, EM7 Understanding the future tidal inundation extents around Wagonga Inlet is important for the following reasons:

• There exists low lying development in and around Narooma, particularly at Narooma Flats, which is already experiencing some impacts from more frequent flooding and tidal inundation.

• Due to topography, the future migration of wetlands is constrained (see also Section 5.2.2).



Table 5Key Objectives and Classification for Wagonga Inlet

Objective	CM Area	CMP Focus	Priority
To protect coastal wetlands and in their natural state, including their biological diversity and ecosystem integrity,	Wetlands	Very Strong	1
To promote the rehabilitation and restoration of degraded coastal wetlands	Wetlands	Very Strong	1
To improve the resilience of coastal wetlands to the impacts of climate change, including opportunities for migration	Wetlands	Very Strong	1
To protect and enhance the coastal environmental values and natural processes of the estuary, and enhance natural character, scenic value, biological diversity and ecosystem integrity,	Environment	Strong	3
To reduce threats and improve the resilience of the estuary, including in response to climate change	Environment	Strong	3
To maintain and improve water quality and estuary health	Environment	Strong	3
To support the social and cultural values of the estuary	Environment	Strong	3
To maintain and, where practicable, improve public access, amenity and use of foreshores.	Environment	Strong	3
 To protect and enhance the scenic, social and cultural value of the coast by ensuring development: is of an appropriate type, bulk and scale for its location avoids or mitigates against adverse impacts on heritage values supports and/or incorporates water sensitive urban design incorporates adequate public open spaces for recreation and associated infrastructure 	Use	Moderate	4



Sec.



NORTH NAROOMA

Barlows Bay

LAVENDER POINT

Clarks Bay

BLACK BREAM POINT

Wagonga Inlet

RINGLANDS POINT **Ringlands Bay**

Freshwater Bay

Flying Fox Bay

Legend

Coastal Wetlands

- Proximity Area for Coastal Wetlands
 - Coastal Use Area
 - Coastal Environment Area

WAGONGA HEAD

ROTARY PARK

LEWIS ISLAND

QUOTA PARK

NAROOMA

SHELL POINT

Forsters Bay



Map WA1: CM SEPP Coastal Management Areas for Wagonga Inlet CMP for Eurobodalla Estuaries

GIS File: Z:\BusinessShare\Them\Projects\P00053_CMPsforMoruya\GIS\CoastalManagementSEPPB.ggs




The issue of how tidal inundation will evolve is compounded by the behaviour of the entrance. The entrance to Wagonga Inlet was trained in the latter half of the 1970s. Since that time, the entrance has been scouring, tending towards a minor fall in mean lake level and less super-elevation of tides. Partly offsetting this tendency is a gradual rise due to rising mean ocean water levels (sea level rise).



5.2.2 Considering the Future Migration Pathways of Wetlands around Wagonga Inlet Estuary

ASSESSED RISK LEVEL

Extreme

RELATED ACTIONS EM1, EM2, Wa1, Wa2, Wa6, Wa7, EM7

Increasing mean tidal levels is an important issue for wetlands around Wagonga Inlet. Neilsen and Gordon (2017) have analysed tidal records and estimated that the mean spring tide range in the estuary has increased in recent decades by 3mm/yr. This has flow on effects, such as a threefold increase in the rate that saltmarsh is being lost from the estuary since the entrance was trained. The loss of saltmarsh from Wagonga Inlet is a cause

for considerable concern, and future management of areas where saltmarsh may migrate requires an understanding of potential pathways for that migration.





5.2.3 Mangroves – Narooma Flats

ASSESSED RISK LEVEL High RELATED ACTIONS

Wa6

The area of concern stretches from the southwestern edge of the Princes Highway Bridge, adjacent to Riverside Drive, down to approximately McMillan Road. It is presently fringed by a (typically) 30-50m wide stand of riparian mangroves. The grassed reserve to the rear of this stand of mangroves is being mowed, preventing the establishment of saltmarsh in this area.





5.2.4 Entrance Channel Instability

ASSESSED RISK LEVEL

High

RELATED ACTIONS Wa7, Wa8 As noted under Section 5.2.2, training of the entrance in the late 1970s has resulted in ongoing change as the entrance channel becomes deeper and larger in response.

There are a series of ongoing impacts that will need management. Navigation of the entrance channel upstream of the Princes Highway

Bridge is variable and unreliable. Related to this, overall deepening of the channel is resulting in the net movement of sand upstream along the channel and depositing onto the dropover into the deeper part of the estuarine basin. The sand tends to move upstream in waves, which explains why navigation in the area can be unreliable.

Lewis Island is located adjacent to the northern side of the channel, upstream of the bridge, and the ongoing erosion of the southern shoreline of this island and its relationship to dynamics inside the entrance channel is not yet well understood.





The channel will continue to deepen and widen, making high tides in Wagonga Inlet higher and increasing the tidal range. This may, for example, expose the foreshore of Lewis Island to even larger wind waves.

Overall, the dynamics of the channel are not well understood. A study to understand the mechanics of changes in the entrance, the expected time scale for ongoing evolution, and an assessment of the overriding impact of the process when combined with sea level rise is included in the Program.

5.2.5 Sedimentation and Pollution of Punkally Creek

ASSESSED RISK LEVEL High

RELATED ACTIONS

Wa3

The oyster industry is important to Wagonga Inlet and the surrounding district. Activities in the catchment of Punkally Creek may be threatening the oyster leases operating at the mouth of the creek.

While it is understood that the sediment load flowing down the creek is high, and that some sources have suggested intermittent faecal

pollution of the waters, the exact nature of any faecal pollution and the main causes of erosion and sedimentation are not well understood.





5.2.6 Management of Brices Bay Historic Wharf

ASSESSED RISK LEVEL

High

RELATED ACTIONS Wa4 Repair works were recently undertaken on Brices Bay Historic Wharf. However, the wharf lacks any public facilities such as a toilet or bins. Increased use of this area has resulted in pollution and potential risks to both water quality and cultural heritage in the area. Restoration and revegetation works have recently been undertaken to provide a buffer to at-risk cultural heritage areas.

There is a requirement to maintain and monitor the efficacy of that buffer, and to assess whether further revegetation is necessary. A monitoring and revegetation program would assess whether damage and pollution are continuing and would identify options for future prevention. Future management should involve the Wagonga Local Aboriginal Land Council on future management requirements for the area.





5.2.7 Other Issues

Several other issues of importance also require ongoing vigilance. Action is warranted in some cases, particularly if relatively easy and cost-effective actions which will almost certainly have a positive impact can be identified. Some of these matters are also, at least partly, being managed through other processes. Several of the 'moderate' risks identified in Appendix D for Wagonga Inlet will be addressed by the overarching actions outlined in Section 2.2. The remaining issues of note are:

• A perception of water quality issues within parts of Forsters Bay.

5.3 Actions to Be Implemented by Eurobodalla Shire Council and/or Public Authorities

The actions forming part of the CMP are outlined below and presented in Map WA3 Most of Wagonga Inlet below mean high water mark is Crown land, as are several foreshore reserves. Appendix F contains a list of key areas of Crown land relevant to the actions contained in this section.

5.3.1 Action Wa1: Foreshore and Wetland Restoration and Environmental Protection Plan

During preparation of this Plan, dedicated consultation with the staff from LLS and Council was undertaken, with data captured from field inspections discussed and used to prepare a *Foreshore and Wetland Restoration and Environmental Protection Plan*. Map WA4 shows the locations where works are required including some works that are within areas mapped as CM SEPP wetlands. The layers used to construct this map have been provided to Council for future reference and updating as this sub-program progresses.

There are, broadly, three different types of works targeted:

- Riparian corridor rehabilitation, ideally 30-100 metres wide and including revegetation, reconstruction, and fencing.
- Fencing of low-lying areas where saltmarsh is likely to establish if grazing is excluded.
- Maintenance work, which typically involves weeding and replanting, where required, of native vegetation.

The works identified by this action all constitute environmental protection works in the context of the CM SEPP. Any structural works identified by this action constitute coastal protection works as defined under the CM Act, and those works are subject to the development consent requirements of s27 of the CM Act.







D	PRIORITY	COMMENT
		PROPERTIES
(1)	1	Private property, overly cleared to foreshore, needs remediation.
(1)	1	Parts of foreshore require revegetation.
(1)	1	Difficult site. Foreshore vegetation required on private land.
		FORESHORES
(2)	2	Ongoing weeding required.
(2)	2	Maintenance: ongoing weed control and revegetation works.
(1)	1	Council foreshore reserve needs revegetation.
(1)	1	Foreshore revegetation required. Fencing needs maintenance.
(1)	1	Foreshore needs revegetation.
(1)	1	Ongoing weeding required.
(2)	2	Continue weed management.
(2)	2	Ongoing maintenance of foreshore vegetation required.
(1)	1	Revegetation of council reserve required.
)(2)	2	Weed control, maintenance and some revegetation required.

In addition to the above, Council will continue to supplement these actions by routinely utilising native species in roadsides, reserves and parks adjoining waterways.

Standard rates used by LLS have been used to cost the restoration options. The work is difficult to schedule for the following reasons:

- Progress is often dependent on the willingness of private landowners to participate.
- Funding sources, such as seasonal grants opportunities, are not always amenable to taking advantage of a willing landowner.

Aside from private land, Council is also responsible for the management of riparian zones, including the substantial coastal foreshore reserve along the southern foreshore of Wagonga Inlet, stretching from Hobbs Bay around to the eastern foreshore of Forsters Bay. <u>While not shown on Map WA4, general repair and protection works throughout southern Wagonga Inlet are included in this Management Action.</u> Potential sources of funding for works include:

• Private land: Local Land Services.

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 Public land: DPIE Grants streams (Coasts and Estuaries, Environmental Trust) and Local Land Services.

For the reasons outlined above, it is difficult to precisely program when works at a given site will be achievable. The time estimates and costs provided in the Business Plan are based on the experience of LLS and Council over recent years and it is estimated that works shown in Figure WA4 would take around 5 years to complete.

Council will take the lead role in administering the Foreshore and Wetland Plan, with LLS providing support and project management services, particularly on private land. Council will keep up to date records, as described in Section 7, and works will be coordinated through the Estuarine Management Advisory Committee (Action EM5).

5.3.2 Action Wa2: Map Coastal Vulnerability Area for Wagonga

Action EM1 describes broad parameters surrounding the application of existing flood models to look at tidal inundation under future sea level rise scenarios. In the case of Wagonga Inlet, there is a pre-existing model of the estuary, and the Floodplain Risk Management Study and Plan (FRMSP) was being developed concurrently with this ECMP.

An additional study will need to be commissioned to replicate measured tidal behaviour and produce the requirements for mapping tidal planes outlined under Action EM1. In the case of Wagonga Inlet, it will be important that the Dynamics Study of Wagonga Entrance Channel (Action Wa7) be completed before Action Wa2, so that future evolution of the channel can be incorporated into the projected changes in tidal behaviour.

Some follow-up work will be required to translate the outputs into actual extents of the tidal inundation related coastal vulnerability area, and some additional thought will need to go into achieving this, hopefully based on an emerging standard of practice in the next few years. It is not expected that the new study would be undertaken until 2024/25, and it could be funded under DPIE's Coast and Estuaries Grants program.

5.3.3 Action Wa3: Punkally Creek Attribution and Monitoring Study

LLS, in conjunction with the Soil Conservation Service, are in the process of implementing a plan to protect some foreshores within the Punkally Creek catchment. At the time of drafting, plans for the proposed works were not available. Any works that are undertaken in the catchment should be based on sound science and an understanding of the geomorphological effects that will arise from, for example, the implementation of works that harden the banks or bed of the creek. Care needs to be taken to ensure that the protection strategy adopted along the creek does not result in enhanced erosion in other areas.

Furthermore, we understand that staff from DPIE EES have recently collected a sample from the waterway for subsequent testing to determine the presence or otherwise of faecal pollution and the origin of any faecal pollution detected (human or animal source).

Ultimately, a cohesive, well thought out strategy for managing issues along Punkally Creek needs to be developed to ameliorate any ongoing threats to the oyster industry. This management action aims to provide the necessary background scientific understanding to justify development of such a strategy.

The Attribution Study should contain the following elements:

- Field inspection of the creek to determine the characteristics and state of the waterway and to pinpoint any areas of particular concern.
- Inspection of aerial photography and historical ground survey data (and LiDAR) to assess the historic morphological evolution of the creek, identifying both historical and current locations of erosion and the rate at which shoals at the downstream end of Punkally Creek have grown in recent times.

- Identification of key land use practices (both historical and current) that have led to ongoing sedimentation.
- Identification of areas of saltmarsh that should be targeted for fencing to exclude stock access.
- Development of recommendations for future management, including conceptual design of any foreshore treatments around areas of acute erosion.

A formal report detailing the findings of the study should be prepared.

Furthermore, as works are presently going ahead, steps need to be put in place to monitor the impact of those works and to identify if additional corrective actions are required.

This management action is to be led by LLS, with support and involvement from DPIE, Council, local oyster growers, and the NSW Food Authority.

5.3.4 Action Wa4: Revegetation and Monitoring Program, Brices Bay

If the historic site at Brices Bay is to remain accessible to the public, a monitoring and revegetation program should be set up to evaluate the impacts to:

• Water quality.

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- Cultural heritage sites in the vicinity of Brices Bay.
- Efficacy of the recent revegetation, which serves as a physical buffer for foot traffic.

The function of this action will be to monitor the performance of the buffers and increasing their size as needed, while gathering data on use of the area. In the short term, education of the public and businesses that organise trips to the site needs to be undertaken to ensure there is general awareness of the limited toilet facilities and to ensure that all rubbish is removed from the site.

5.3.5 Action Wa5: Implementation of Foreshore Treatments in Narooma

Council has recently prepared a Plan of Management for the Narooma Sport and Leisure Precinct, which includes the Nata Oval Crown Reserve including the Caravan Park to the northeast of the Princes Highway and the foreshore reserve between the Caravan Park and the Inlet.

Saltmarsh species are already forming on the sand flats between the foreshore and the training wall of Wagonga Inlet. There is substantial interest in improving the ecological values at this site, considering that saltmarsh is likely to disappear from other locations around Wagonga Inlet as sea levels rise due to coastal squeeze. DPI are also considering the installation of an oyster shell reef in the near vicinity of this site.

Oyster reefs are still a distinctive estuarine habitat in Wagonga and Moruya estuaries where they exist along small sections of the foreshore edge and as remnant shell beds. These remnant reefs provide important fish habitat alongside opportunities for oyster reef restoration within the CMP study area.

The Nature Conservatory (TNC), along with DPI Fisheries and DPI Batemans Marine Park are looking to incorporate a new oyster reef into the foreshore designs to create a "living space".

The design of this area is in progress. The cost estimate for works included in the business plan, and the indicative diagram presented in Figure 3 were provided by Council.

Figure 3 Elements of Foreshore Redesign, Narooma (supplied by Council)

It is expected that an initial ~200m length of foreshore will be treated as part of a first stage of works.

5.3.6 Action Wa6: Management of Wetland Areas, Narooma Flats

The grassed foreshore behind the mangrove stand is to be surveyed and assessed for the viability of saltmarsh species. From site inspection saltmarsh species are present but being mown during

maintenance activities. This activity is an offence under the *Fisheries Management Act 1994* and should cease.

The area is to be surveyed and markers or an edging placed at the landward extent of the saltmarsh viable area to delineate where mowing should and should not occur. Council will continue to maintain this area through periodic inspection and weeding to encourage salt marsh to establish.

The works identified by this action all constitute environmental protection works in the context of the CM SEPP.

5.3.7 Action Wa7: Dynamics Study of Wagonga Entrance Channel

In preparation for completion of this study, DPIE have been approached to complete a hydrosurvey upstream of the bridge at Narooma, including the entirety of the flood tide delta to its upstream extents where it drops over into the main estuarine basin and into Forsters Bay. Recent (2018) airborne laser scanned bathymetry exists for the area downstream of the bridge. The dynamics study of Wagonga Entrance Channel will be the responsibility of the NSW Stage Government and should include the following:

- Comparison of available hydrosurveys to determine the amount of sediment that has been scoured from the channel and exported into Wagonga Inlet.
- Processing of the airborne laser scanned bathymetry data to assess bedforms in the channel and ascertain the dominant directions of sediment transport.
- Interpretation of historical aerial and satellite imagery from before and since training of the entrance to assess shoal development patterns.
- Completion of an Escoffier type analysis and incorporation of sea level rise projections to estimate the rate at which the entrance channel will continue to evolve over coming decades and up to 100 years in the future if the available information warrants it.
- Assessment of the processes (wind wave, current) contributing to the erosion of Lewis Island and whether there are options which could be adopted to arrest erosion.
- Provide recommendations regarding the expected changes to entrance bathymetry over different time frames for subsequent use in the flood model used to calculate future tidal inundation (Action Wa2).
- Provide recommendations regarding likely medium-term evolution of the entrance channel upstream of the Highway Bridge to help with planning navigation channels.
- Provide recommendations regarding whether dredging is likely to be feasible to assist with navigation, noting that the entrance was dredged in the mid-2000s, but its effectiveness was short lived.

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5.3.8 Action Wa8: Engage with community on strategy for Lewis Island

Issues surrounding future use and access to Lewis Island are complicated. The Island is valued very highly by the local community, but its southern foreshore is receding rapidly. Attempts to arrest this erosion in recent years, including substantial effort from the local community, have been unsuccessful.

Overlying issues with Lewis Island which need to be balanced with the concerns of the local community include:

- Public access and safety.
- Past use by a pair of endangered Pied Oystercatchers, which seems to have been disturbed by public accessing the Island at night and lighting fires.
- The apparent presence of sites of importance to Aboriginal Heritage as suggested by the Wagonga LALC.
- Concerns with mangrove specimens being smothered by sand.

This action will be informed by the completion of Action Wa7, which will answer whether there is a feasible solution that would enable protection of the foreshore from erosion.

Options for future management which may be considered include:

- Foreshore protection.
- Nourishment.
- Completely removing the timber boardwalk leading to the island.
- Commit to investigating illegal use of the island, such as illegal camping, littering or consumption of alcohol.
- Fencing of Pied Oystercatcher nesting areas during breeding season.
- Prominent signage on the importance of Pied Oystercatchers and fines associated with their disturbance.
- Restriction of dog access to Lewis Island and installation of ordinance signs to support this.

The community needs to be invited to contribute to finding a solution which balances the competing values at Lewis Island. Information or on-site drop-in sessions informing the community of the potential and preferred options to manage the foreshore erosion would provide an opportunity to do this.

5.3.9 Action Wa9: Water Quality Management Study – Wagonga Inlet

The "Risk-based Framework" methodology (OEH, 2017) shall be used to examine the water quality issues that are a concern for the community in and around Forsters Bay. While the methodology has been applied across the NSW coast more broadly, it needs to be revisited with a more local focus.

The study is to be informed by experience gained during studies being completed at several estuaries on the NSW coast under the Marine Estate Management Strategy, as well as Council's water quality report cards collected in the interim. The report cards provide a 'snapshot' of the ecological health of our estuaries using several important ecological indicators. The study will be used to inform an urban stormwater management strategy which considers ongoing growth of the population surrounding Wagonga Inlet.

The Estuary Ecosystem Health Report Cards discussed as part of the MER Program (Section 7) will help support the required study.

5.3.10 Action Wa10: Demolish Ringlands Jetty

The derelict jetty on the Eastern Side of Ringlands Point is a council asset and should be demolished. While this item did not feature as a major issue in terms of risk assessment, this relatively simple task should be undertaken as part of Council's overarching duties for management of the waterway.

5.3.11 Action Wal1: Investigate and Map Rainforest at Flying Fox Bay

There are, presently, no littoral rainforests mapped in the CM SEPP around Wagonga Inlet. However, a potential area has been identified by Council staff in Flying Fox Bay.

This action will involve investigation of this area and, if it is confirmed as meeting the required hydrological and floristic characteristics of littoral rainforest, the development of maps for consideration in a future planning proposal (Action EM7).

5.3.12 Action Wa12: Bank Stability works in Wagonga Inlet

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Two locations along the shoreline in Wagonga are experiencing bank instability and have been identified for foreshore protection works. The description of these sites and the requirement for works are based on text provided by Council staff.

Any structural works identified by this action constitute coastal protection works as defined under the CM Act, and those works are subject to the development consent requirements of s27 of the CM Act.

Location 1. Centenary Drive above the iconic Mill Bay boardwalk on the northern shoreline of Wagonga Inlet has become increasingly unstable. Following storm events in early 2021, the road partly collapsed, and one lane was closed. This presents a significant access limitation to Bar Beach and boat ramps, including the only ramp in Wagonga Inlet with boat trailer parking. Without bank stabilisation works, the condition of this road is likely to worsen, and the road may collapse. Damage and potential closure of the Mill Bay boardwalk, a very popular walking and bicycle route, could result.

Location 2. A low-lying revetment protects the foreshore of Quota Park, Narooma from erosion. A short (few metres long) gap between revetment walls near public amenities adjacent to the southern end of the car park exists to the rear of a small mangrove stand, and shoreline erosion has occurred here. It is proposed to fill this gap using an environmentally friendly solution consistent with DPIE EES guidelines, designed in collaboration with Batemans Marine Park.

6 BUSINESS PLAN

6.1 Intent of the Estuarine CMP

Key to determining the timing and way that different actions of the ECMP will be funded and implemented is understanding the benefits that will arise from the ECMP, and who the beneficiaries are.

Examination of the key management objectives for each Estuary (Sections 3.1, 4.1 and 5.1) demonstrates that:

- The focal Coastal Management Areas are the Coastal Wetland and Coastal Environment Areas.
- Where objectives aren't seen to have "Environmental Benefit" as the focus, such as preservation of heritage items, public access, or public facilities, the objectives can be seen as contributing to building or maintaining collective wealth within the community.

From these two points, most benefits are widespread and not targeted to any group or individual. Individual consideration of each proposed action (Sections 3.3, 4.3, and 5.3) also supports this conclusion.

In summary, all actions presently included in this ECMP can be seen to overwhelmingly accrue benefits to public and not private interests.

Accordingly, all funding should come from public sources (Local, State and Federal Government).

6.2 Costs and Funding Arrangements

A detailed discussion of funding options and responsibilities is outlined in Appendix F. One substantial difficulty for small local councils when planning for estuary management in NSW is that future funding from grant sources, at both state and federal level is uncertain in the medium term. Grant funding programs are normally contestable, and the likelihood of success can be affected by:

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- The rules surrounding the matching funding required changing from year to year.
- Variability in the pool of available funding, depending on other demands on public funds. For example, substantial uncertainty could be expected to arise as the economic impact of COVID-19 continues to be felt across Australia.

Eurobodalla Shire Council most commonly uses funds from general revenue, mostly derived from ordinary council rates, to leverage additional funding from external grants programs that provide funding for coast and estuary related management activities. A review of Council's operational plan at Scoping Study stage, indicated that council used around \$115,000 of its Environmental fund, largely derived from an environmental levy, for coast and estuary management in the 2017/2018 financial year. Council's operational plan for the past two years has not separated out expenditure on coast and estuary management.

Under section 495 of the *Local Government Act 1993* Council can levy a special rate on some of the land in its local government area, to cover works that would benefit that land. At this point in time, amounts additional to the existing Environment Levy already charged to residents are not recommended.

Discussions with Council staff during preparation of this CMP, noting that council manages other estuaries and the open coast, have indicated that no more than \$50,000 per annum should be assumed as a forward budget for actions in the CMP for the Moruya, Mummuga and Wagonga Estuaries. This is based on experience over the past few years, noting the present highly constrained funding environment for local councils.

Several grant programs have been identified (see Appendix F):

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- Coast and Estuary Planning and Implementation Funding from DPIE (presently funding on a 1:2, Local: State Govt. ratio).
- Floodplain Management Grant Funding from DPIE (presently funding on a 1:2, Local: State Govt. ratio).
- NSW Environmental Trust, Environmental Education, Environmental Research and Restoration and Rehabilitation Administered by DPIE (funding ratio is variable, success more likely with some contribution assume 1:2).
- DPI Fisheries: Habitat Action Grants (1:1 funding available for projects up to \$40,000).
- DPI Flagship Fish Habitat Rehabilitation Grants (supports works including hydrological and environmental investigations and on-ground works, A maximum of \$400,000 with projects running for up to two years).
- MIDO Rescuing our Waterways Program: For the case of this CMP, works would require 1:1 funding.
 To be successful, works would typically need to be of primary benefit to navigation. However, TfNSW is presently reviewing rules and eligibility.

In addition to these grant sources, South East Local Land services also has funds to help with environmental repair and restoration works. There may also be opportunities for Council to access Federal grant programs. However, these tend to be ephemeral in nature, rather than a regularly programmed funding scheme. As such, they should be considered a supplementary source of funding and should not be relied upon for completing the actions programmed into the CMP.

Consultation with state government agencies has secured advice committing to support the management actions proposed in the CMP. The relevant advice is provided as Appendix G. For contestable grants programs, Council has secured commitment that the proposed projects will be eligible for consideration.

Expenditure for the four-year period has been outlined, covering the short and medium terms. After four years, we expect the CMP will be reviewed. This is necessary as many of the actions proposed are studies and research which are needed to inform future management actions that could result in the recommendation of further on-ground works.

The breakdown of funding, indicating expected council contributions and funding from external sources for each calendar year is presented in Table 6. A more detailed breakdown of funding for all management actions is presented in Section 6.3.

Year	Council Funds	External Funds
2022/23	\$104,500	\$1,005,000
2023/24	\$104,967	\$1,032,033
2024/25	\$44,000	\$300,000
2025/26	\$57,333	\$211,667

Table 6 Projected Expenditure on ECMP for Moruya, Mummuga and Wagonga Estuaries

6.3 Program for Delivery

A program for delivery of the Management Actions in the ECMP, including funding sources, contributions and timing is presented in Table 7. Actual timing for different actions is dependent on both the expected value to be derived from the action, the urgency surrounding the issues each action is intended to address and the availability of funds from year to year. The annual costs in Table 7 are inclusive of both operational and maintenance costs.

Table 7 Eurobodalla Estuary Management Program - Business Plan: Delivery

	Management Option	Capital Cost	Annual Cost	Total ESC Contribution	Total External Contribution	External Funding Source	Re	sponsibility for Delivery Other		2022 ESC	/2023	xternal	ES	2023	Funding /2024 Externa	and Del	livery Program 2024, ESC	/2025 External	ES	2025/2 C	2026
	EM1: Future Tidal Inundation Mapping to Inform	\$ -	ś -				Council	DPIE-EES					s	-	s		Ś -	ś -			_
su	EM2: Map Migration Pathways for Coastal	¢ _	¢ .				Council	DPIF-FFS	\$	-	4	-	\$		5	-	<u>د</u>	¢ _	4		\$
Action	Wetlands EM3: Preliminary Mapping of "At-Risk" Aboriginal	\$ 1,500.00	\$ -	\$ 1,500.0	0		Council	DPIE	\$	1,500.00			~					-			
urching	EM4: Apppropriately Planning for Growth and Identifying Offsets	\$ -	\$ -				DPIE-Planning	DPIE-EES, Council	\$	-	\$	-	\$	-	\$	-	\$ -	\$ -	\$		\$
Overa	EM5: Establish Estuarine Management Steering	\$ -	ś -	\$ -	\$ -	General Agency	Council	DPIE-EES, DPI-Fisheries, Batemans	s	-	s	-	s		s	-	\$ -	ś -	s		\$
-	EM6: Trial Installation of End of Pipe Litter Capture Device in Moruva	\$ 10,000.00	\$ 1,500.00	\$ 6,000.0	0 \$ 10,000.00	Operations Batemans Marine Park	Batemans Marine	Marine Park, Local Land Services			\$	10,000.00	\$ 2	,000.00	\$	-	\$ 2,000.00	\$ -	\$	2,000.00	\$
	EM7: Submission of Planning Proposal	\$ -	ş -				Faik												\$		\$
	Mo1: Foreshore and Wetland Restoration and Environmental Protection Plan	\$-	\$ 100,000.00		\$ 400,000.00	LLS, C&E Grants	Ш	Council, DPIE-EES	\$	-	\$	100,000.00	\$	-	\$ 100,0	00.00	\$ -	\$ 100,000.00	\$		\$
	Mo2: Scientific, Hydraulic, Heritage and Migration	\$ 250,000.00	\$ -		\$ 250,000.00	DPI-Fisheries Flagship	Council	DPI-Fisheries, DPIE-EES, LLS, Batemans					\$	-	\$ 125,0	00.00	\$ -	\$ 125,000.00			
F	Mo3: Map Coastal Vulnerability Area for Moruya	\$ 10.000.00	s -	\$ 10.000.0	0		Council	DPIE-EES								-	\$ 10.000.00	ś -			
ya Rive	Mo4: Deua River Sediment Delivery Assessment	\$ 100,000.00	\$ -	\$ 33,333.3	3 \$ 66,666.67	C&E Grants	Council	DPIE-EES								_			\$ 3	3,333.33	Ş
Moru	Mo5: Assess Historical Changes to Tides	\$ 5,000.00	ş -	\$ 1,666.6	7 \$ 3,333.33	C&E Grants	Council	DPIE-EES	\$	1,666.67	\$	3,333.33									
	Mo6: Provide Interpretive and Educational Signage around Quandolo Island / Eurobodalla National	\$ 10,000.00	ş -		\$ 10,000.00	NPWS	NPWS				\$	10,000.00									
	Mo7: Restore rock walls at Brierly's Boat Ramp and	\$ 172,000.00	\$ -	\$ 57,333.3	3 \$ 114,666.67		Dol-Industry	Council	\$	57,333.33	\$	114,666.67	<u> </u>								
	RUSS Marun Park																				
	Mu1: Map Coastal Vulnerability Area for Dalmeny	\$ 15,000.00	\$ -	\$ 5,000.0	0 \$ 10,000.00	C&E Grants	Council	DPIE-EES		nd and and and and and and and and		nd and and and and and and and and and	\$ 5	,000.00	\$ 10,0	00.00	nd n	adadadadadadadadadadada	te dand and and and and and and a		ininini
	Mu2: Investigate Historical and Future Coastal Wetland Extents for Mummuga Lake	\$ 20,000.00	\$ -	\$ 6,700.0	0 \$ 13,300.00	C&E Grants	Council	DPIE-EES			+		\$6	,700.00	\$ 13,3	00.00					
Lake	Mu3: Foreshore and Headland Access Management Plan	\$ 48,000.00	\$ -	\$ 16,000.0	0 \$ 32,000.00	C&E Grants	Council	DPIE-EES	\$	4,000.00	\$	8,000.00	\$ 4	000.00	\$ 8,0	00.00	\$ 4,000.00	\$ 8,000.00	\$	4,000.00	\$
nuga	Mu4: Prevent Vehicular Access to Saltmarsh Area near Tennis Courts	\$ 10,000.00	\$ -	\$ 10,000.0	0		Council	NPWS	\$	10,000.00	\$	-									
Mumr	Mu5: Engage with Community on Saltmarsh Management Myuna and Attunga Streets	\$ 20,000.00	\$ -	\$ 10,000.0	0 \$ 10,000.00	DPI-Fisheries Habitat	Council	DPI-Fisheries									\$ 10,000.00	\$ 10,000.00			
-	Mu6: Water Quality Risk Management Study	\$ 30,000.00	ş -	\$ 10,000.0	0 \$ 20,000.00	C&E Grants	Council	DPIE-EES			+						\$ 10,000.00	\$ 20,000.00			
	Mu7: Entrance Management	\$ -	\$ 1,000.00	\$ 4,000.0	0		NPWS	Council	\$	1,000.00	\$	-	\$ 1	,000.00	\$	-	\$ 1,000.00	\$ -	\$	1,000.00	\$
	Wa1: Foreshore and Wetland Restoration and Environmental Protection Plan	\$-	\$ 25,000.00		\$ 100,000.00	Ш	LLS	Council, DPIE-EES	\$	-	\$	25,000.00	s	-	\$ 25,0	00.00	\$-	\$ 25,000.00	\$		\$
	Wa2: Map Coastal Vulnerability Area for Wagonga	\$ 20,000.00	\$ -	\$ 6,600.0	0 \$ 13,400.00	FRMP or C&E Grants	Council	DPIE-EES					\$6	600.00	\$ 13,4	00.00					
	Wa3: Punkally Creek Attribution and Monitoring Study	\$ 100,000.00	\$ -		\$ 100,000.00	Ш	LLS	Council, DPIE-EES	\$	-	\$	100,000.00									
¥	Wa4: Revegetation & Monitoring, Brices Bay	\$ -	\$ 3,000.00	\$ 4,000.0	0 \$ 8,000.00	C&E Grants	Council	DPIE-EES	\$	1,000.00	\$	2,000.00	\$ 1	,000.00	\$ 2,0	00.00	\$ 1,000.00	\$ 2,000.00	\$	1,000.00	\$
a Inle	Wa5:Implementation of Foreshore Treatments in Narooma	\$ 1,220,000.00	\$ -	\$ 20,000.0	0 \$ 1,200,000.00	TNC Grant, DPI Grant, C&E Grants	Council	DPIE-EES	\$	10,000.00	\$	600,000.00	\$ 10	,000.00	\$ 600,0	00.00					
/agong	Wa6: Management of Wetland Areas, Narooma Flats	\$ 1,000.00	\$ 1,000.00	\$ 5,000.0	0		Council		\$	2,000.00	\$	-	\$ 1	,000.00	\$	-	\$ 1,000.00	\$-	\$	1,000.00	\$
5	Wa7: Dynamics Study of Wagonga Entrance Channel	\$ 36,000.00	\$ -	\$ 12,000.0	0 \$ 24,000.00	C&E Grants	Council	DPIE-EES	\$	6,000.00	\$	12,000.00	\$ 6	,000.00	\$ 12,0	00.00					
	Wa8: Engage with Community on Lewis Island	\$ 30,000.00	\$ -	\$ 10,000.0	0 \$ 20,000.00	C&E Grants	Council	DPIE-EES, NPWS	\$	5,000.00	\$	10,000.00	\$ 5	,000.00	\$ 10,0	00.00					
	Wa9: Water Quality Management Study – Forsters Bay	\$ 60,000.00	\$ -	\$ 20,000.0	0 \$ 40,000.00	C&E Grants	Council	DPIE-EES	\$	5,000.00	\$	10,000.00	\$ 5	,000.00	\$ 10,0	00.00	\$ 5,000.00	\$ 10,000.00	\$	5,000.00	\$
	Wa10: Demolish Ringlands Jetty	\$ 10,000.00	\$ -	\$ 10,000.0	0		Council				1								\$ 1	D,000.00	
	Wa11: Assess and Map Rainforest at Flying Fox Bay	ş -	\$ -	\$ -	\$ -	General Operations	Council	DPIE-EES			1										
	Wa12: Bank Stability works	\$ 155,000.00		\$ 51,666.6	7 \$ 103,333.33						+		\$ 51	,666.67	\$ 103,3	33.33					
			1	1		+	1	+	1		<u>+</u>				1			1	t		

Abbreviations: C&E: Coast and Estuary, DPI: Department of Primary Industry, DPIE: Department of Planning, Industry and Environment, FRMP: Floodplain Risk Management Program Grants (DPIE), LLS: Local Land Services, NPWS: National Parks and Wildlife Service, TNC: The Nature Conservancy

6 External	Notes
	Funded under subordinate actions (Mo3, Mu1, Wa2).
-	Funded under subordinate actions.
-	In hour a contribution Council and Agencies
-	In-house contribution Council and Agencies
-	
-	As required, once all preceding actions are complete. May occur Post 2024/2025
100,000.00	
	To be delivered over two years.
	Expected Adjunct to FRMP Modelling for Moruya River
66,666.67	
8,000.00	
-	
25.000.00	
23,000.00	
2,000.00	
	Council Funding is actually external, via The Nature Conservancy
-	
10,000.00	

7 MONITORING, EVALUATION AND REPORTING PROGRAM

Beyond action implementation, the ECMP requires ongoing monitoring, evaluation, and reporting (MER). The objective of this process is to maintain focus on program implementation, highlight successful actions and provide early warning of potential problems. The responsibility for the MER program sits mostly with the Estuarine Management Advisory Committee, chaired by Council, with membership from relevant public authorities. The committee would be established upon certification of the ECMP.

The implementation of ECMP actions for which the Council is to take responsibility, including the MER program, are to be enacted by Council through the Integrated Planning and Reporting (IPR) System. The IPR framework provides a means by which State Plans and Strategies, and Councils Community and Strategic Plans are activated into meaningful operational projects, with progress reported back to stakeholders and the community. The ECMP will form one of the "Other Strategic Plans" within this framework.

The current Eurobodalla Shire Council Community Strategic Plan (2017), Delivery Program (2017-2022) and Operational Plan (2021-2022) are due for review in late 2021. This provides an ideal opportunity to integrate the ECMP within the IP&R Framework. Specifically, the following actions will be taken:

- The updated Community Strategic Plan will be consistent with the vision and key objectives of this ECMP.
- The Delivery and Operational Plan are a combined document.

- The implementation of the ECMP will be listed within the local government responsibilities for relevant delivery plan outcomes, such as those relating to protection of the natural environment.
- o The ECMP will be listed as a Key Supporting Document within the Delivery Program.
- o Implementation of the CMP will be identified as a Key Project within the Operational Plan.

Under the IP&R framework, Council produces an Annual Report documenting the progress of key project actions within the Delivery and Operational Plan. Eurobodalla Shire Council produces both a 6 monthly

and annual report. It is via this mechanism that the progress and outcomes of the ECMP will be reported to stakeholders and the community

Figure 4 IP&R Framework followed by Council⁵

To facilitate the monitoring required by the IP&R Framework, progress of ECMP management actions against the Business Plan Delivery Table (Table 7) will be tracked by the Estuarine Management Advisory Committee. More specifically, the Committee's role includes:

- Evaluation and delivery of all actions including those which are not included in the IP&R framework.
- Facilitation and Oversight of the production of ecosystem health report cards for estuaries based on the NSW Government's Monitoring, Evaluation and Reporting (MER) protocols, including the required data collection.
- Determining the implementation status of all actions, including:

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• Identifying the cause of delay for any actions that have failed to be implemented within projected timeframes and developing compensatory actions to facilitate future implementation.

⁵ Sourced from https://www.esc.nsw.gov.au/council/plans-and-reporting/reporting-framework.

- Updating the Business Plan Delivery Table to reflect any changes in timeframe or funding for delayed actions.
- Evaluating completed actions against the performance measures for that action and the relevant objectives of the CM Act. Did the action perform as expected? What worked? What could be improved upon? Does the action require ongoing monitoring or subsequent actions?
- Identifying potential funding opportunities for upcoming actions and reporting on submitted funding applications.

The Estuarine Management Advisory Committee will review the Business Plan Delivery on at least an annual basis, with quarterly review and planning of actions within the current and upcoming implementation phases. The results of the quarterly review are to be reported to Council's Coastal and Environment Management Advisory Committee (CEMAC).

The Committee will take responsibility for maintaining sufficient information and records about Councils management of the relevant parts of the coastal zone that will enable it to demonstrate:

• How the CMP has been implemented.

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• The achievements of the CMP, including whether coastal management actions have been carried out within the timeframes identified in the CMP.

The entire ECMP must be reviewed at least every 10 years. However, due to the number of studies required to progress this ECMP, a thorough review after around four years will be required, with the timing of that review set to enable provision of new actions into the next round of Delivery Program Planning (around 2025).

A suitable mechanism for completing the review would be to re-visit the ECMP risk assessment to determine if key risks have been addressed or moved to a lower priority through implementation of the CMP actions. Further, whether any new risks have arisen or existing risks escalated in priority, new actions can be considered further.

Table 8 outlines the recommended performance measures and stages associated with different actions that could be used to gauge whether the actions have been successfully implemented. These measures are indicative and will depend largely on decisions made by the Committee and its member agencies regarding how different actions will be most appropriately implemented as delivery of the ECMP progresses.

Table 8 ECMP Action Performance Measures

Overarching Actions	Key Progress Indicators
EM1: Future Tidal Inundation Mapping to Inform other Actions	• Completion of subordinate Actions MO3, MU1 and WA2
EM2: Map Migration Pathways for Coastal Wetlands	Completion of subordinate Actions Mo2 and Mu2Carry forwards to Action EM7
EM3: Preliminary Mapping of "At- Risk" Aboriginal Heritage Sites	 Documentation of Internal Study by Council Communication of Results to local First Nations People Provide support in any follow up actions
EM4: Appropriately Planning for Growth and Identifying Offsets	 Records to be kept of meetings where significant developments are considered. Records of written responses to external agencies regarding developments. Records of any changes to Planning Instruments arising from ECMP Actions.
EM5: Establish Estuarine Management Steering Committee and Meet Regularly	Committee FormedMeeting Minutes Kept
EM6: Trial Installation of End of Pipe Litter Capture Device in Moruya	 End of pipe litter capture device installed Litter capture records for a two-year period (record litter removal frequency and volume, regular water quality monitoring in vicinity) Monitoring report completed at end of trial period including recommendations for installation at other locations.
EM7: Submission of Planning Proposal	 Completion of actions to inform planning proposal Submission of planning proposal including support of Committee

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Management Actions: Moruya	Key Progress Indicators
Mo1: Foreshore and Wetland Restoration and Environmental Protection Plan	 Records of: Decisions relating to prioritisation of areas for treatment. Design reports to ensure requirements of coastal protection works under s27 of CM Act are met. Environmental impact assessment as required for development consent. Preparation of maps in GIS showing treated areas and adding areas identified for future treatment and scheduling of works. Records of all works completed, including photographs, costs and follow up inspection, issues encountered etc. Timetabling and facilitation of follow up maintenance as required Records of follow up maintenance.
Mo2: Scientific, Hydraulic, Heritage and Migration Feasibility Study of Malabar Wetland	 Hydraulic and sea level rise assessment completed Ecosystem assessment completed Floodplain soils assessment completed Fringing landowners consulted Sites of concern and management actions identified
Mo3: Map Coastal Vulnerability Area for Moruya	 Prepare Brief Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverables Carry forward to Action EM7
Mo4: Deua River Sediment Delivery Assessment	 South East Catchment and Waterways Recovery Plan received and reviewed Engage consultant for study Monitor study progress Review and finalise report Consider whether management actions are justified
Mo5: Assess Historical Changes to Tides	 Engage consultant for study Monitor study progress Review and finalise report
Mo6: Provide Interpretive and Educational Signage around Quandolo Island / Eurobodalla National Park	 Assess required locations for signs Install signs Ensure signs added to asset management system and regular inspection and maintenance
Mo7: Restore rock walls at Brierley's Boat Ramp and Russ Martin Park	 Design reports to ensure requirements of coastal protection works under s27 of CM Act are met Environmental impact assessment as required. Records of as-constructed works provided, including photographs, costs and follow up inspection, issues encountered etc. Timetabling and facilitation of follow up maintenance as required Records of follow up maintenance. Ensure walls added to asset management system, regular inspection and maintenance.

Management Options: Mummuga	Key Progress Indicators
Mu1: Map Coastal Vulnerability Area for Dalmeny	 Prepare Brief Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverables Carry forward to Action EM7
Mu2: Investigate Historical and Future Coastal Wetland Extents for Mummuga Lake	 Prepare Brief Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverables Carry forward to Action EM7
Mu3: Foreshore and Headland Access Management Plan	 Engage with local First Nations People Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverables Plan for implementation of Actions
Mu4: Prevent Vehicular Access to Saltmarsh Area near Tennis Courts	 Install Bollards and turf over access Regular Inspections and mapping of saltmarsh extents, confirm that vehicles are being excluded If necessary, install more robust access prevention, or formalise access
Mu5: Engage with Community on Saltmarsh Management, Myuna and Attunga Streets	 Establish multi-agency strategy for consultation Execute engagement strategy Community education and determination of bollard locations Install bollards Regular compliance management Maintenance works scheduled and completed to prevent grass infiltration into saltmarsh
Mu6: Water Quality Risk Management Study	 Assess maturity of knowledge bank for application of risk-based framework When appropriate, Prepare Brief Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverables Consider how recommendations may be implemented
Mu7: Entrance Management	 Install water level recorder Ensure records are made available online and backed up Maintenance of water level recorder and QC of records

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Management Options: Wagonga	Key Progress Indicators
Wa1: Foreshore and Wetland Restoration and Environmental Protection Plan	 Records of: Decisions relating to prioritisation of areas for Treatment Design reports to ensure requirements of coastal protection works under s27 of CM Act are met Environmental Impact assessment as required for development consent. Preparation of maps in GIS showing treated areas and adding areas identified for future treatment and scheduling of works Records of all works completed, including photographs, costs and follow up inspection, issues encountered etc. Timetabling and facilitation of follow up maintenance as required Records of follow up maintenance
Wa2: Map Coastal Vulnerability Area for Wagonga	 Prepare Brief Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverables
Wa3: Punkally Creek Attribution and Monitoring Study	 Field inspection complete and brief developed Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverables Consider Outcomes and whether further action is required
Wa4: Revegetation & Monitoring, Brices Bay	 Regular site monitoring undertaken (water quality, Cultural heritage, maintenance of vegetation buffers) Public education, signage (if required)
Wa5: implementation of Foreshore Treatments in Narooma	 -Design reports to ensure requirements of coastal protection works under S27 of CM Act are met Environmental Impact assessment as required for development consent. Records of as-constructed works provided, including photographs, costs and follow up inspection, issues encountered etc. Timetabling and facilitation of follow up Maintenance as required Records of follow up Maintenance Ensure works added to asset management system, regular inspection and maintenance
Wa6: Management of Wetland Areas, Narooma Flats	 Site ecological survey complete Markers established, and field staff educated/work method modified Follow up inspections Maintenance and weeding as required

Management Options: Wagonga	Key Progress Indicators
Wa7: Dynamics Study of Wagonga Entrance Channel	 Hydrosurveys completed across Wagonga Inlet entrance Develop Brief Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverables Consider Outcomes and where further actions are justified
Wa8: Engage with Community on Lewis Island	 Establish multi-agency strategy for consultation Execute engagement strategy Community education and determination of preferred strategy Implement strategy Regular compliance management
Wa9: Water Quality Management Study and Estuary Ecosystem Report Health Cards– Wagonga Inlet	 Assess maturity of knowledge bank for application of risk-based framework When appropriate, Prepare Brief Engage Consultant for Study Monitor Study Progress Review and Finalise Report and Deliverable Consider how recommendations may be implemented Continue Council's Estuary Ecosystem Health report cards
Wa10: Demolish Ringlands Jetty	Ringlands Jetty demolished
Wa11: Assess and Map Rainforest at Flying Fox Bay	 Records reviewed for plus inspection for compliance with Scientific Determination Update mapping and carry forwards to action EM7 if justified
Wa12: Bank Stability works	 Design reports to ensure requirements of coastal protection works under S27 of CM Act are met Environmental Impact assessment as required for development consent. Records of as-constructed works provided, including photographs, costs and follow up inspection, issues encountered etc. Timetabling and facilitation of follow up Maintenance as required Records of follow up Maintenance Ensure walls added to asset management system, Regular inspection and Maintenance

- Maria

8 REFERENCE LIST

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APPENDIX A SCOPING STUDY FOR MORUYA RIVER, MUMMUGA LAKE AND WAGONGA INLET

APPENDIX B STAGE 2 STUDIES

APPENDIX C ADDITIONAL CONSULTATION OUTCOMES

C.1 Introduction

Initial consultation activities are outlined in the scoping study which preceded the development of the CMP and is provided as a parallel Appendix.

Consistent with the recommendations of the guidance provided in the toolkit that accompanies the Coastal Management Manual (NSW Government, 2018b), the strategy adopted for public participation in development of the CMP has aligned with the "involve" level of the International Association for Public Participation (IAP2) spectrum. To this end, the community were engaged via drop-in sessions during the scoping study phase, and through direct face-to-face consultation and an online survey during preparation of the CMP. During 2020, some consultation activities have been constrained by the impact of the COVID-19 pandemic.

Following the scoping phase (Stage 1), additional consultation was completed to support Stages 2 and 3 of the CMP development process. The consultation completed needed to be modified from that originally intended due to restrictions around the COVID-19 pandemic and there were some delays. However, the activities ultimately undertaken at this stage were:

- 1 An online community survey was conducted between August and September of 2020. Questions related to values, issues, and access to the three estuaries.
- 2 Stakeholder consultation including:

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- COVID safe, on-site discussions with state government agency representatives in late August 2020; and
- Ongoing email, telephone and online meetings with state government agency representatives and council staff during September November 2020.

The outcomes of these consultation efforts have been summarised into the following two sections, expressing the outcomes in terms of issues for additional consideration in the revised risk assessment and potential management strategies to address risks.

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C.2 Community Consultation

There were 117 responses to the online survey, including multiple choice questions alongside opportunities to submit written answers. Participants were asked to indicate which estuary they interact with the most, and the results corresponding to each estuary are summarised here.

C.2.1 Moruya River

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67 (57%) survey participants reported that, of the three estuaries, they mostly interact with the Moruya River. The range of uses by these participants is presented in Figure C 1. Responses indicate that the Estuary is used for a range of activities, although recreational fishing was the least popular compared to other uses such as boating, walking, swimming, and bird watching.

Participants were asked to rank six management objectives in order of importance for the Moruya River. The management objectives were scored based on a weighted average of their ranking from 1 st to 6th, and the results are presented in Figure C 2. "Improving protection of flora and fauna" followed by "Reducing erosion" were of highest priority. Similarly, when asked to nominate from a list of threats those they believed to be of most significance, the loss of marine habitat (e.g., seagrasses and mangroves) and invasive species were highlighted as the greatest threats. Many participants also submitted written responses to this question, from which commercial fishing, fish netting, and the use of jet skis were also nominated as threats to the estuary.

Figure C 3 Threats to estuaries - Moruya

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Figure C 4 presents the spread of opinion regarding the level of access to the estuary, which received a mixed response. Over a third of responses (37%) indicated that they are satisfied with current access, and 30% indicated that access should be reduced to protect from degradation. A quarter of the responses requested improved access. Improved pedestrian access was a focus of the written responses, and where reduced access was suggested, comments were mostly about vehicle access.

The use of watercraft also received a mix of responses (Figure C 5), with several participants indicating that watercraft are 'definitely impacting' amenity of the estuary, and a similar number indicating that there is 'no issue' with watercraft use. Almost a third of responses acknowledged that the use of watercraft may be impacting amenity. Some written responses indicated that aversion to the use of jet skis is predominantly due to noise levels and their contribution to erosion, and many comments requested that the use of jet skis be prohibited or limited. It was also suggested that the speed limit should be lowered (a 4-knot limit was suggested) and/or better enforced.

Figure C 4 Estuary Access - Moruya

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Figure C 5 Use of watercraft – Moruya

Future management

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Participants were invited to provide written responses outlining the level of intervention required for access to the estuary, and what they would like to see implemented within the next five years.

The issues of most concern for the Moruya River were related to environmental management. The provision of additional bins to reduce litter was highly requested for frequently visited areas and for fishing tackle. Concerns relating to development and land clearing were also raised, as well as calls for the rehabilitation of disturbed natural areas and banks, greater protection for estuarine ecological communities, and improved water quality control measures. Installation of educational signage along walkways was suggested as a means of assisting with environmental conservation.

A marked number of written responses related to requests for improved pedestrian access and recreational amenity, for example, extended walking tracks, board walks, bike paths and racks, and improved access for swimming.

There were mixed responses relating to recreational fishing, where most comments called for more restrictions to be applied to recreational fishing, and some responses requested improved access for recreational fishing. There were multiple requests that commercial fishing be either limited or prohibited.



C.2.2 Mummuga Lake

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Mummuga Lake received the lowest number of survey responses, with only 10 (9%) participants indicating that they mostly interact with Mummuga Lake. The nominated uses of the estuary shown in Figure C 6, which indicated that boating and/or kayaking is the most common use.



Figure C 6 Management priorities - Mummuga

Participants were asked to rank six management objectives in order of importance. The management objectives were scored based on a weighted average of their ranking from 1st to 6th, and the results are presented in Figure C 7. Water quality improvement and the protection of flora and fauna were identified as the highest priority for Mummuga Lake.

When asked to indicate from a list of threats which were of most significance to Mummuga Lake, most participants (80%) identified sand banks and associated shallowing as a threat. The second most common perceived threat was water quality (60%), and it was suggested by one written response that the frequency of opening the lake to the ocean be increased as a means of improving water quality. The perceived threats to Mummuga Lake are presented in Figure C 8.

The use of watercraft received divided responses, as shown in Figure C 9. 40% of responses reported no issue with watercraft use and 40% reported that it may be having an impact. There was one comment written in response to future management of the lake that requested a ban on the use of jet skis.









Figure C 8 Threats to estuaries - Mummuga

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Figure C 9 Use of watercraft - Mummuga

Future management

Participants were invited to provide written responses outlining the level of intervention required for access to the estuary, and what they would like to see implemented within the next five years. Few responses were received for this question, with these mostly related to boating. Improvements to boating facilities were requested, as well as monitoring the depth of the channel for navigation. There were also suggestions to improve fish stocks, prohibit netting, and prohibit the use of jet skis.

C.2.3 Wagonga Inlet

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40 (34%) survey participants nominated Wagonga Inlet as their most used estuary. The range of uses of the estuary by these participants is presented in Figure C 10. A variety of uses were reported, with the most popular activity being photography / birdwatching (70% of responses).

Participants were asked to rank management objectives for Wagonga Inlet in order of importance. The management objectives were scored based on a weighted average of their ranking from 1st to 6th and the results are presented in Figure C 11. The protection of flora and fauna was of greatest importance to participants. The remaining management objectives had similar levels of importance.





Figure C 10 Estuary values – Wagonga







When asked to indicate, from a list, those threats of most significance to Wagonga Inlet, 50% of respondents reported loss of habitat as a concern. This was closely followed by overfishing, erosion, invasive species, and the loss of amenity. The perceived threats to the estuary are presented in Figure C 12. Written responses to this question were also submitted, and fish netting and sewage discharge were cited as additional threats.



Figure C 12 Threats to estuaries - Wagonga

Figure C 13 presents the opinions regarding the level of access to the estuary. 40% of responses indicated that access should be improved, and 30% are satisfied with current access. Less than a quarter of responses wish to see reduced access. In the written responses, there were several requests for improved pedestrian access and facilities such as walking tracks, seating, toilets, cafes, and playgrounds.

The use of watercraft received divided responses, as shown in Figure C 14. Most responses indicated that the use of watercraft is impacting amenity, and in the written responses there were also suggestions to prohibit or restrict the use of jet skis and to lower the speed limit. A similar number of participants indicated that they have no issue with current watercraft use.



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Figure C 13 Estuary Access - Wagonga



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Future management

Participants were invited to provide written responses outlining the level of intervention required for access to the estuary, and what they would like to see implemented within the next five years.

Almost half of the comments related to environmental issues, with multiple requests for increased ecological protection and reduced development and land clearing. Other suggestions for environmental management included restoration of marine sanctuary zones in Wagonga Inlet, increased planting of riparian vegetation, implementation of additional bins, measures to address erosion, and better sewage management. There were also suggestions for informative signage including indigenous history and culture.

Comments relating to boating were the second most common issues raised, with most comments relating to requests for improvement of boating facilities and measures to mitigate shallowing and associated navigational issues. Improved recreational fishing amenity was also suggested.

C.3 Stakeholder Consultation

Consultation, including on-site meetings and ongoing telephone, online meetings and email correspondence were completed with:

- Eurobodalla Shire Council.
- Local Aboriginal Land Councils.
- Department of Planning, Industry and Environment (DPIE): Environment, Energy and Science (EES).
- DPIE (Planning).
- DPIE (Crown Lands).
- Department of Primary Industries (DPI): Fisheries.
- Batemans Marine Park.

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- DPI: NSW Food Authority.
- Transport for NSW (TfNSW): Maritime Infrastructure Delivery Office (MIDO).
- DPIE: National Parks and Wildlife Service.
- South East Local Land Services (LLS).

The "issues" identified during additional stakeholder consultation are described herein. They have been divided into:



- Broad issues which cover all three estuaries, and potentially other estuaries managed by ESC.
- Site specific issues of concern to particular estuaries.

Where issues had already been identified during the Scoping Study, we have not included them here, unless significant new information which could affect our preliminary risk assessment was obtained.

A range of possible management actions were also gained from consultation. These were added to a long list of actions assessed in the parallel Appendix E to the CMP.

C.3.1 Common Issues and Broad Scale Potential Actions

Identified Issues, Threats & Values

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Population Control: The issue of "overpopulation" and carrying capacity of a waterway and the infrastructure servicing the population has been raised. Realistically, a CMP has limited jurisdiction over policy relating to population growth, however strategies associated with new development or redevelopment need to account for impacts on the estuary.

The prime impacts of catchment development on waterways relate to catchment runoff, water quality processes and loss of estuarine and riparian vegetation. Actions which appropriately control impacts arising from these processes need to be set when development decisions are made. Even so, it is rare that development can have a positive or neutral impact when a previously undisturbed part of the catchment is developed, unless a system of offsets is somehow adopted.

Coordination of Actions: There are occasions where Council and the different agencies within state government are unaware of the activities being undertaken by other agencies. Some action to minimise this occurring would be useful.

Managing Litter: Overall, there has been an identified lack of signage in and around entrance points to the estuary. Control of litter and water quality more broadly is a key concern of the Marine Estate Management Strategy.

Aboriginal Heritage: There is a substantial concern that sea level rise could eventually result in the inundation and/or erosion of Aboriginal Heritage sites. Estuaries tend to contain a concentration of important heritage sites, and while there do not seem to be any major acute threats at the present time, it may be wise to prepare for this in advance.

Coastal Wetland Migration Pathways: There is an emerging awareness among government agencies and coastal managers in NSW that the CM SEPP does not yet include a robust mechanism to allow for the



migration of coastal wetlands as sea levels rise. The buffer providing for the *"Proximity Zone"* is uniformly applied in space and does not account for the topography which will govern the upslope migration of wetland vegetation to keep pace with sea level rise in the coming century. The threat is a future threat which will eventually require some planning to manage.

Bushfire Recovery Plan: At present, a bushfire recovery plan is being prepared for Shoalhaven, Eurobodalla, and Bega Valley Councils. There is potential for overlap and duplication between that plan and the CMP.

C.3.2 Moruya River

and the state

Identified Issues, Threats & Values

Commercial Fishing: the Moruya River Estuary is still "netted", and there are ongoing concerns about the continuation of commercial fishing. The process to eliminate commercial fishing from the estuary takes some time and is more appropriately managed by the DPI through other avenues than the Coastal Management Program.

Brierley's Boat Ramp: Brierley's Boat Ramp has received funding for an upgrade, including formalisation of the parking, installation of a gross pollutant trap and installation of a pontoon, toilet block and lighting. However, there are concerns from the Batemans Marine Park that the area is too shallow and that there is a significant risk of extensive seagrass beds being damaged by propellers. These issues will need to be resolved through the planning process and it is likely that the vessels which can realistically use the boat ramp will be limited in size.

Water Quality Concerns Racecourse Creek: There have been concerns relating to water quality in Racecourse Creek. This is something which needs to be investigated by Council.

Pied Oystercatchers: Pied oystercatchers, which are classified as endangered in NSW, and other waders are known to forage and nest around Quandolo Island and upon the breakwall, within the Eurobodalla National Park. A limited amount of signage may result in a lack of public awareness and hence threats to their safety.

Degradation of Mangrove Habitat at South Head: This issue was identified during consultation. However, data do not seem to support any widespread or significant degradation.

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C.3.3 Mummuga Lake

Identified Issues, Threats & Values

Entrance Management: NPWS is responsible for opening the entrance, although Council equipment has been provided to complete the task in the past. The NPWS is presently revising its entrance management policy under a separate process, and we understand that the aim is to keep the entrance opening as natural as possible, but to prevent damage to low lying assets and property. The bridge across the entrance is being considered for replacement by NPWS, and it may be useful to allow for a higher capacity bridge that allows for small plant to cross here. These activities are largely the responsibility of NPWS. It is expected that the entrance management strategy will be completed during the 2020/21 financial year and is likely that a permanent water level recorder would form part of the strategy. Such a recorder would also provide useful information on the behaviour of this ICOLL, and it would be useful for one to be installed at Mummuga Lake.

Boat Ramp: Council is presently developing a Marine Infrastructure Asset Management Plan. We understand that the boat ramp at Mummuga Lake is considered a difficult site and unlikely to be a target for upgrade. However, there remain opportunities to improve/formalise car parking.

Water Skiing: Water Skiing has largely ceased on Mummuga Lake and the licenses permitting this have not been renewed.

Headland Access and Foreshore Usage Management: There are issues with uncontrolled access across Mummuga Headland and extending all the way around to the tennis court. This has issues relating to safety, erosion and first nations heritage.

C.3.4 Wagonga Inlet

Issues, Threats & Values

and the state

Land Clearing: Some of the concern around land clearing at Wagonga Inlet arises from a conflation of:

The Rural Lands planning proposal which resulted in amendments to Council's LEP in October 2019.
In fact, council has advised that increased development in rural areas is minor and kept clear from land adjacent to estuaries.



- ALTERICE

 A substantial increase6 in land clearing in fire affected areas following the 2019/2020 summer bushfire disaster.

As part of consultation, we heard one account of far more rapid runoff from the catchment and sudden impacts on salinity levels, attributed to increased land clearing following the 19/20 bushfires.

Overall, Council seems to have appropriate controls in place to manage clearing and there are penalties for illegal clearing. The issue is not one that will be addressed by the CMP.

Marine Park Sanctuary Zones: Concerns were raised that controls in marine sanctuary zones were overridden in December 2019. While this did occur, we note that any permanent removal of a sanctuary zone would need to be addressed under a separate regulatory process (amendment to the *Marine Park Regulation 1999*, requiring 60-day consultation).

On-site Sewage Management Systems: There seems to be ongoing concern relating to issues around onsite sewerage systems. However, we are not aware of any evidence to indicate that there is significant human faecal contamination in Wagonga Inlet. Some of the concerns we have heard repeated relate to Ringlands Estate and are concerns that were raised in prior Estuary Management Plans for Wagonga Inlet, but again, there is no clear evidence. At the time of writing, there is known faecal contamination of concern to oyster leases at the downstream end of Punkally Creek. This deserves some investigation. Overall, however, we note that Council's code of practice⁷ refers to appropriate guidance including the Australian standard (AS1547) and other documents which specify a buffer distance of 100m to watercourses. Information provided to us demonstrates that Council applies a risk-based approach including scheduled inspection of on-site systems. It is beyond the scope of the CMP to propose modifications to the code of practice which appears to be in line with typical on-site management practice in NSW.

Management of Brice's Bay Historical Wharf: Recent works have been completed to repair the pontoon here and address some erosion issues. We also understand that toilet facilities have been removed. The lack of toilet facilities seems to be a problem with toilet waste being left behind. The area is culturally significant, and contamination of the waterway presents a risk to oyster leases.

Lewis Island Additional Issues: Erosion at Lewis Island was identified at Scoping Study stage. There are also ongoing issues with people illegally using Lewis Island, including camping and lighting fires. This has

⁷ <u>https://www.esc.nsw.gov.au/council-services/public-environmental-health/compliance-and-enforcement/septic-and-waste-water</u>, accessed 24/11/2020

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⁶ <u>https://www.esc.nsw.gov.au/home/news-and-events/media-releases/media-releases/stop-before-you-chop, accessed</u> 23/11/2020

disturbed a breeding pair of Pied Oystercatchers. In addition, it is understood there is a midden on the island which is also being affected.

Coastal Squeeze of Mangroves: There is some concern expressed that Mangroves dieback is a significant issue within the Estuary. However, while dieback in some areas has been highlighted by recent research from the University of Canberra, the long term pattern is one of an increase in overall area of mangroves between 1957 and 2018 (Elgin Associates, 2018; Nielsen and Gordon, 2017). In fact, the endangered ecological community saltmarsh, which tends to exist in areas that Mangroves are encroaching upon, shows a more definite declining trend.



APPENDIX D REVISED RISK ASSESSMENT



APPENDIX E MANAGEMENT OPTIONS ASSESSMENT



APPENDIX F REVIEW OF FUNDING OPTIONS AND STATUTORY RESPONSIBILITIES



APPENDIX G AGENCY CORRESPONDENCE IN SUPPORT OF CMP ACTIONS

