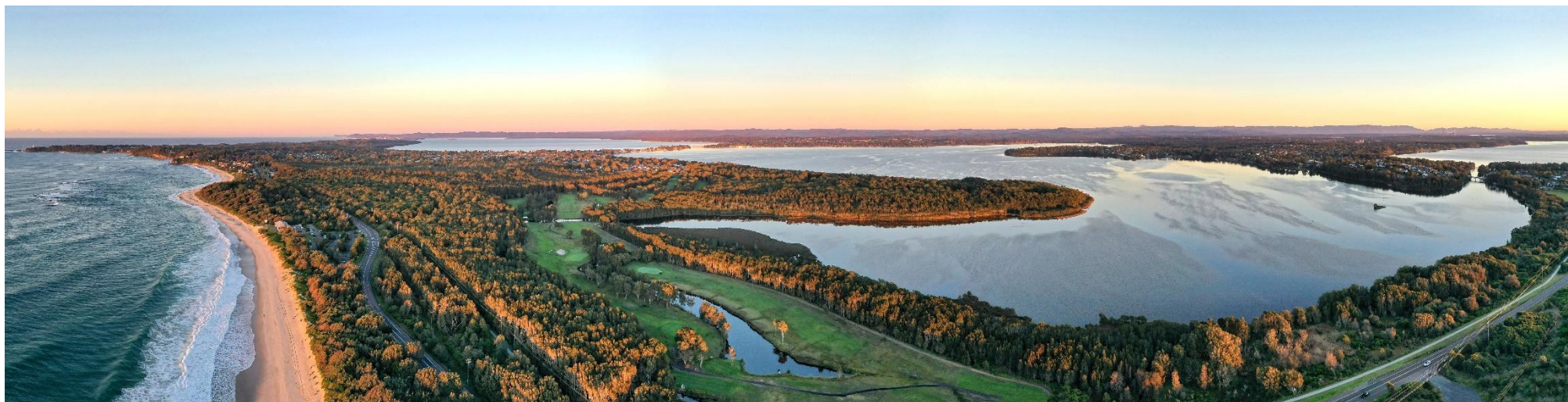




Tuggerah Lakes Estuary Coastal Management Program

Draft management actions

Theme 1: Governance

Establish a Coastal Management Program governance and delivery framework

Establish a Coastal Management Program governance and delivery framework to guide coordinated decision-making, ensure clear roles and responsibilities, and support consistent implementation of coastal management actions across the entire study area. This framework helps maintain alignment between Council, state agencies, and stakeholders, strengthening long-term delivery of the Coastal Management Program. This framework should include:

- Establish a Coastal Management Program working group
- Clearly define its purpose, objectives and functions
- Define its roles and responsibilities of its members
- Develop a list of key contacts within stakeholder organisations
- Execute the function of the Working Group
- Meet regularly to execute Coastal Management Program and track progress

Develop and implement a communications plan for Stage 5 of the Coastal Management Program

Present information on Council's website and in community engagement activities that shows:

- The purpose of the Coastal Management Program.
- The Coastal Management Program background, and an overview of the New South Wales Coastal Management Framework.
- Key Coastal Management Program information, including reports available for public consumption.
- The Status of Coastal Management Program Actions, with details of the actions and recent updates/progress.
- Information pertaining to upcoming community consultation events, and avenues for engagement; and
- Links to relevant materials such as The New South Wales Coastal Management Framework, and the Marine Estate Management Strategy.
- How coastal zone systems function and how integrated management responses benefits Council and local communities.

Enact the Coastal Management Programs Monitoring, Evaluation and Reporting Program for the Coastal Management Program

This will include:

- Ongoing monitoring of Coastal Management Program Actions
- Annual review of actions to ensure they are appropriate and current, with completed actions documented
- Ongoing reporting of progress. Including: accessible updates on Coastal Management Program progress and outcomes to Councillors, Executive Leadership Team (Executive Leadership Team), committees and the community, supported by ongoing governance mechanisms such as the Coastal, Estuary and Floodplain Management Subcommittee.
- Documentation of the effectiveness of the proposed strategies and actions will be reported as part of Council's Annual Report (which is part of the Integrated Planning and Reporting (Integrated Planning and Reporting) framework), including progress towards or full achievement of the performance targets included for each action. Establish clear protocols for data collection, quality assurance/quality control (quality assurance/quality control) (including peer review where appropriate), compliance auditing, and regular reporting.

Strengthen planning controls and development assessment to improve environmental and water quality outcomes, including strengthening Water Sensitive Urban Design and erosion and sediment control through standards, capability and compliance	Strengthen and implement planning instruments and water sensitive urban design (water sensitive urban design) requirements to improve water quality outcomes by: • Mandating water sensitive urban design in new developments and major renovations, and integrating water sensitive urban design into Council renewal, infrastructure and urban growth projects. • Updating Development Control Plans (Development Control Plans), planning controls, stormwater assessment protocols and standard water sensitive urban design drawings to support consistent design, assessment and implementation requirements. • Requiring water quality treatment measures for single dwelling developments and renovations above a defined trigger threshold. • Strengthening riparian buffers, waterway setbacks and protection of wetland migration pathways within development controls. • Limiting shoreline hardening, reclamation and infilling that may adversely impact estuarine and coastal water quality. • Ensuring development assessment and construction processes deliver functional, maintainable and effective water quality treatment assets at handover. • Incorporating water sensitive urban design requirements into street and public domain design, including street tree planting and stormwater treatment measures. • Reviewing and auditing water sensitive urban design and erosion and sediment control (erosion and sediment control) practices to identify implementation gaps, improve compliance and support continuous improvement. • Improving enforcement of erosion and sediment control practices, particularly at the lot scale (ties in with education action 9.02).
Protect and restore foreshore, riparian and catchment habitats through strategic land use planning, consistent land management and development controls, and targeted on-ground management works	• Clarify roles and responsibilities across Council, Crown Land managers, State agencies and private landholders. • Develop, update and implement strategic policies and plans to guide the long-term protection, rehabilitation and management of sensitive and threatened habitats, aligned with broader land use, biodiversity and estuary management frameworks. • Define and enforce foreshore management zones across public and private land to protect ecological values and water quality. • Identify, protect and restore priority riparian corridors, wetlands and catchment habitats that support the ecological health and water quality of the Tuggerah Lakes estuary and catchment. • Develop and implement a fire regime within Colongra Swamp Nature Reserve. • Develop a Plan of Management for both Tuggerah State Conservation Area and Tuggerah Nature Reserve. • Undertake audits to identify opportunities for additional native vegetation planting, including consideration of site suitability and community willingness, to support habitat connectivity and long-term ecological outcomes. • Limit infilling, shoreline hardening and reclamation in sensitive zones, promote permeable surfaces and natural infiltration, and address encroachment and inappropriate mowing practices. • Undertake on-ground rehabilitation works such as native planting, fencing and weed control, informed by strategic priorities and assessments. • Monitor and assess the effectiveness of habitat protection and restoration actions and use findings to refine strategic plans and management approaches over time.
Strengthen inter-agency and research partnerships to support catchment-scale management	• Support establishment of a catchment-scale governance and coordination mechanism, led by State Government, to oversee integrated water quality and catchment management actions. • Strengthen partnerships with universities, research institutions and industry through memoranda of understanding, sponsored research programs (e.g. Australian Research Council Linkage projects), and graduate programs to address priority management and knowledge gaps. • Ensure research outcomes inform Coastal Management Program actions and adaptive management.

Theme 2: Catchment Pressures and Development

Develop a sustainable catchment development plan	Prepare a strategic plan to guide land use, development, and water quality outcomes across the catchment. • Identify priority catchments, based on modelling and monitoring information. • Complete a performance audit of existing Stormwater Quality Improvement Devices (Stormwater Quality Improvement Devices) (water quality outputs, cost effectiveness). • Identify continuing source of funds via Independent Pricing and Regulatory Tribunal or Stormwater Levy. • Prepare water sensitive urban design standard designs for Council and developer projects/purposes. • Review Development Control Plan and Development Assessment consent conditions and deemed to comply planning checklists • Provide planning advice on controls (e.g. single dwelling development) to improve water quality treatment. • Workshop within Council to understand current practices and build capacity. • Provide policy advice on stormwater lifecycle costs. • Include revised water quality targets based on sustainable catchment load modelling. • Include Porters Creek Wetland as a priority location. • Management recommendations to be prioritised and costed, to support development of a balanced and feasible action implementation table.
Deliver urban stormwater quality improvements	Implement construction of new or upgrades to existing stormwater treatment systems such as raingardens and passively irrigated street trees, prioritising high-risk urban catchments.
Implement rural catchment nutrient reduction program	Establish nutrient reduction targets and work with agricultural stakeholders to reduce nutrient runoff through improved on-farm practices and behaviour change.
Support catchment volunteer groups through providing funding and resources	Support existing landcare/bushcare groups through the Environmental Volunteering Program to conduct more environmental programs along riparian areas e.g. environmental weeding. Consider establishing new groups in 'hot spot' areas.
Continue riparian fencing and erosion management works on private properties in high-priority areas	Continuation of Local Land Services program of working with landholders to improve riparian condition and resilience by implementation of Wyong River and Ourimbah Creek Streambank Rehabilitation Plans for erosion on private properties. In areas not covered by the Streambank Rehabilitation Plans conduct a comprehensive audit of high-risk subcatchments to identify erosion locations. Develop and implement a targeted program to undertake fencing installation and bank stabilisation in these critical riparian zones. It would include: • Identify High-Risk Areas: Conduct field surveys and use geographic information systems (geographic information systems) to map high-risk agricultural areas where livestock frequently access riparian zones. • Evaluate Impact: Assess the extent of damage and prioritise sites based on the severity of impact and potential for recovery. • Engage Landowners: Work collaboratively with landowners and stakeholders to secure permissions and support for the fencing installations and erosion stabilisation works. • Install Fencing: Carry out the installation of fences in the identified high-risk areas, ensuring minimal disruption to the environment.

Theme 3: Entrance Management

Implement and periodically review and update the Entrance Management Strategy	Implement and periodically review and update the Entrance Management Strategy to ensure intervention triggers, operational procedures and objectives are based on best practice and most current science. This should be informed by ongoing monitoring, performance, any changes in the natural or built environment or as new information becomes available.
Investigate future entrance and berm behaviour in response to climate change and coastal hazards	Undertake a comprehensive assessment of entrance and berm dynamics within the Tuggerah Lakes estuary to evaluate the potential impacts of climate change, sea level rise and coastal hazards on entrance behaviour, berm formation and stability, flood risk, and ecology, and identify adaptation pathways to inform future updates of the Entrance Management Strategy.
Investigate and pursue funding and investment for entrance management	Secure reliable medium-term funding and seek inclusion of the entrance to the Tuggerah Lakes estuary as a Key Investment Location to support ongoing dredging and management. This may include the Transport for New South Wales Maritime Infrastructure Plan.
Continue coastal and sediment transport monitoring	Undertake coastal monitoring of beaches and sediment movement to assess impacts of structures and nourishment, subject to Transport for New South Wales responsibilities.
Plan, design and implement entrance infrastructure planning and works	Plan, design and implement seawall repair/replacement and a foreshore masterplan to support long-term entrance stability and access. Includes Memorial Park, foreshore in front of Karagi car park, Terilbah Reserve, Marine Parade.

Theme 4: Ecology and Water Quality

Develop an integrated ecological and water quality monitoring, evaluation and reporting program including a data management program

- Implement a coordinated, long-term water quality monitoring program across the Tuggerah Lakes estuary, including real-time monitoring where appropriate. Continuation and improvement of Council's Monitoring, Evaluation and Reporting (Monitoring, Evaluation and Reporting) Program, including continuation of estuary monitoring and addition of regular catchment monitoring.
- Trial of environmental DNA monitoring as an indicator of system change - utilise this emerging technology for priority species/communities to build a biodiversity dataset that can indicate ecological improvement or decline over time, aligned to broader Monitoring, Evaluation and Reporting program where feasible. Allows for detection of cryptic species e.g. White's Seahorse
- Consolidate ecological and water quality datasets into a single accessible internal repository to support compliance reporting, trend analysis, model calibration and evidence-based decision-making. Expand and refine targeted monitoring programs and audits (e.g. Canton Beach)
- Continue and expand on entrance monitoring and data analysis: Collate dredging, flood and coastal records; undertake ongoing bathymetric, topographic and water quality monitoring (including permanent monitoring equipment including buoys) to assess entrance dynamics and tidal exchange.

Deliver a rolling stormwater remediation, drainage upgrade and asset management program for priority catchments

- Prepare and implement an integrated stormwater quality management program supported by a rolling five-year prioritised works plan for priority catchments.
- Assess the effectiveness of past and existing stormwater management programs in achieving water quality and flooding objectives, and adjust management approaches accordingly.
- Design and cost stormwater harvesting, stormwater pollution control and drainage infrastructure upgrades (including lifecycle and maintenance costs), such as gross pollutant traps, bioretention systems and upgrades to improve flow conveyance and reduce backwater flooding during elevated lake levels.
- Investigate and implement redirection of stormwater discharge points where feasible to reduce nutrient trapping and water quality impacts in nearshore areas.
- Deliver priority works through staged design and construction, supported by an ongoing maintenance and asset performance framework.
- Maintain and review stormwater treatment devices and drainage assets, retrofit where required to improve performance and maintainability, and establish systems for handling and disposing of captured material.

Restore estuarine habitats and protect foreshore vegetation

- Restore and manage key estuarine vegetation communities, including saltmarsh and seagrass, to support water quality, habitat condition and ecological resilience.
- Protect existing foreshore vegetation by managing access in sensitive areas through clearly defined access points, fencing, signage and access controls to minimise disturbance.
- Integrate habitat restoration and foreshore protection measures into broader estuary, catchment and shoreline management initiatives to deliver long-term ecological and water quality benefits.
- Could consider Foreshore Masterplans or similar for particular areas with competing uses, eg ecological and recreational. Canton Beach is one example where this could be implemented to protect saltmarsh (along the foreshore between the established sandy beach and Wyrabalong National Park).

Investigate and trial innovative nature-based solutions to improve water quality and biodiversity	- Investigate the feasibility of innovative nature-based solutions, such as floating wetlands and oyster reefs, to improve water quality and enhance biodiversity in suitable locations within the Tuggerah Lakes estuary. - Where appropriate, trial pilot projects informed by best-practice examples and assess their ecological, water quality, amenity and maintenance outcomes to inform future management decisions.
Develop, calibrate and apply a catchment and receiving waters model to inform water quality and growth management	- Develop, update and maintain an integrated catchment and receiving waters modelling framework for Tuggerah Lakes to support evidence-based decision-making and adaptive management. - Review existing models, identify shortcomings and invest in targeted improvements, including collection of additional data to better calibrate and refine model performance. - Work with New South Wales National Parks and Wildlife Service (New South Wales National Parks and Wildlife Service) to ensure National Park Estate is adequately included in models to address concerns about flooding of neighbouring properties. - Design and implement a water quality data collection program to support model calibration, including review of existing catchment and stormwater data, identification of data gaps, and targeted sampling to characterise pollutant sources, land uses and flow pathways. - Use the calibrated model to: > estimate current and future pollutant loads and flows; > determine sustainable pollutant load targets and limits of acceptable change for the estuary; > assess catchment capacity to determine the threshold of development at which estuarine water quality cannot be maintained > assess impacts of projected development and urban release scenarios on downstream receiving waters; and > evaluate the performance and cost-effectiveness of water quality management interventions. - Apply modelling outputs to inform strategic planning, including sub-catchment prioritisation, population and growth planning considerations, and preparation of related plans such as the Sustainable Catchment Development Plan and nearshore water quality initiatives.
Updates to bathymetry across entire estuary	Update bathymetric surveys and assess changes to lake beds, flood delta channels and infill rates to improve understanding of sediment dynamics and inform entrance and estuary management decisions. At the entrance, assess east of the bridge more regularly, Transport for New South Wales to manage assessment of navigable areas of the estuary.
Coordinate integrated water management and rehabilitation planning for Porters Creek Wetland	- Develop and adopt an integrated stormwater and water management plan for Porters Creek to ensure development does not adversely impact wetland condition through changes to flow regimes and pollutant loads. - Ensure planning and future actions align with current investigations and any prescriptive management requirements associated with the Porters Creek Wetland Biodiversity Stewardship Agreement (Biodiversity Stewardship Agreement). - Coordinate with relevant internal teams and State agencies to ensure consistency between water management planning, Biodiversity Stewardship Agreement obligations and implementation pathways.

Prepare and implement a Nearshore Water Quality Improvement Plan to address circulation, pollutant inputs and nearshore ecological health	• Prepare a Nearshore Water Quality Improvement Plan using outputs from catchment and receiving waters modelling to guide evidence-based management of nearshore zones. • Consider nearshore and basin ecological health, recreational water quality, mixing and circulation processes, and relationships with entrance management. Incorporate current understanding of groundwater inputs and their potential influence on nearshore water quality. • Identify and implement feasible actions to improve nearshore circulation, including recommendations from the nearshore flushing project and targeted upgrades to shoreline and infrastructure design. • Investigate the feasibility of redirecting stormwater discharges from poorly flushed nearshore catchments to rivers and creeks where this would result in improved water quality outcomes, informed by catchment and stormwater network modelling as required. • Ensure the Nearshore Water Quality Improvement Plan is integrated with and informs related strategic initiatives, including Entrance Management, the Sustainable Catchment Development Plan and reviews to the Wrack Management Strategy.
Improve conservation of threatened species and Endangered Ecological Communities within the coastal zone and catchment	• Undertake targeted conservation planning and implementation for threatened species and Endangered Ecological Communities (Endangered Ecological Communities) within the coastal zone and catchment, with a focus on cryptic orchid species, aquatic species, migratory bird species, and frog populations. • Identify priority habitats and key threats (e.g. habitat loss, degradation, altered hydrology, invasive species, and disturbance). • Implement management measures to protect and enhance these habitats, including habitat restoration, retention of critical vegetation communities, protection of riparian and aquatic refuges, preventing vehicle access to vulnerable areas, and consideration of threatened species requirements in future planning and development decisions. • Continue working in partnership between agencies to manage areas critical to shorebird habitat - to support threatened shorebird species that nest on the berm and rely on other sites around the system for foraging, nesting etc
Quantify groundwater nutrient inputs and trial feasible treatment measures (including bioreactors)	• Undertake groundwater investigations to quantify the role of groundwater pollution on nearshore water quality, map pathways and quantify nutrient and potential contaminant inputs from the catchment including legacy sites such as reclaimed foreshore land and urban areas. • Develop management strategies to manage ground water inputs, if this is found to be a significant issue. • If groundwater loads are significant, investigate and trial bioreactors at seepage hotspots. • In partnership with relevant agencies, investigate applicability of bioreactors for agricultural runoff in priority sub-catchments. • Ensure the investigation is developed in close consultation with Indigenous partners and the local Aboriginal community where required.
Develop and implement a Wetland Management Plan, including hydrology restoration	• Develop Wetland Management Plan with monitoring programs and triggers for intervention. • Expand wetland rehabilitation in waterways discharging to Tuggerah Lakes. • Tuggerah Nature Reserve and State Conservation Area wetland restoration. • Investigate wetland hydrology and implement feasible actions to restore more natural hydrological regimes. • Implement actions in priority locations.

Improve wetland resilience to sea level rise through transition and accretion monitoring	Building on findings and recommendations from the Coastal Wetland Refugia Study: - Consider freshwater and tidal wetlands within a whole-of-catchment transition context. - Monitor and assess accretion potential in low-lying wetlands susceptible to inundation to understand risk and inform long-term management responses. Target wetlands include: Tuggerah Swamp, Colongra Swamp, Porters Creek, Toukley, Tacoma, Wyong Racecourse and Lower Pioneer Dairy Dam wetland.
Undertake catchment audits, investigate point sources of contamination and priority pollution pressures affecting estuarine ecology	- Investigate polluted sediments in known discharge zones and legacy industrial areas (confirming evidence base/source study as required). - Investigate impacts from potential polluters identified through engagement/technical work (e.g., golf courses, old power station site - including ash dam). - Undertake targeted water quality investigations and catchment audits to identify priority contamination sources affecting recreational and ecological values. Use results of audits to target management actions to improve water quality, including working across Council units to upgrade sewage and stormwater systems to prevent overflows.
Assess dredge island habitat value and determine appropriate management response	Investigate biodiversity/habitat value and threats to sand islands around the entrance channel to inform whether protection, adaptation, or managed degradation is appropriate.
Investigate and scope remediation options for remnant power station infrastructure that impacts the estuary	Investigate remnant estuary modifications, infrastructure and legacy assets associated with the former power station to understand their condition, environmental implications and future management requirements. The investigation will identify opportunities to mitigate risks, improve water quality and estuary health, and inform long-term planning for the site and surrounding waterways. Legacy assests include, San Remo Groyne, Hammond Canal, Colongra Lake
Update and implement streambank management plans	- Updates to Streambank Management Plans for Wallarah, Saltwater, and Tumbi Umbi Creeks are required as the existing plans were developed over a decade ago. Management actions to include: > encroachment/unauthorised works, > a programme of prioritised remediation measures, > investigation and potential upgrades to the existing Schauberger sills at known erosion site within Tumbi Umbi Creek (within Biodiversity Stewardship Agreement (Biodiversity Stewardship Agreement) site). - Implement actions from the Wyong River and Ourimbah Creek Management Plans – currently being developed with Australian Government Funding.

Theme 5: Foreshore/Nearshore and Wrack Management

Undertake community and place-based reserve planning	Develop foreshore restoration plans, masterplans, adaptation strategies and management plans for priority areas, focusing on environmental values and conservation, upgrades to passive recreational facilities, cultural interpretive material and education outcomes and also include (but not be limited to) infrastructure upgrades, raising of infrastructure and/or assets, multi-use community opportunities. Building on the recommendations from the Recreation Uses Study management plans should be developed in collaboration with local communities. Reserves to include in planning as recommended in the Recreation Uses Study are: • Budgewoi Lake Ocowolrolong Point – end of Tingira Street; • Budgewoi Lake, The Corso Reserve at the northern end of The Corso; • Budgewoi Lake, Chelmsford Road Reserve – opportunity to work with students at Gorokan High school; • Tuggerah Lake - Craigie Park; • Lake Munmorah – Reserve at the end of Andrew Street.
Conduct foreshore assessment & prioritisation	Undertake estuary-wide foreshore condition assessments and prioritisation of required foreshore stabilisation works, utilising the process developed through the Lake Macquarie Coastal Management Program. This action will result in a prioritised (and updatable) list of shoreline areas where erosion control or stabilisation works are required and should also include a monitoring program (aerial imagery, photo points) to track shoreline changes. Prioritisation list should be adaptable over time to allow emerging erosion locations or destabilised shorelines to be reassessed, for example following floods or east coast low events.
Undertake foreshore stabilisation program	Foreshore management agencies to undertake foreshore stabilisation works to address areas of foreshore erosion. • Council works program to be completed utilising prioritisation from foreshore condition assessment. • New South Wales National Parks and Wildlife Service rehabilitation sites may include: reducing extent and severity of bank erosion occurring along Lake Munmorah adjacent to Elizabeth Bay Drive through to Budgewoi.
Continue and expand foreshore & vegetation rehabilitation programs	Continue ongoing program of foreshore & vegetation rehabilitation. Action to include identifying key habitat areas, implementing and maintaining rehabilitation programs, and expanding foreshore vegetation studies including design and long-term effectiveness monitoring. Review and update where necessary Foreshore Vegetation and/or Wetland Refugia Studies.
Manage sustainable foreshore use & compliance	Manage private encroachment including incorrect property boundary fences, formalise access, and apply education and enforcement to reduce impacts on public foreshores and sensitive areas. Identify hotspot areas and engage with community through education as a preferred method. Enforcement through clean up orders and fines for repeated offences

Assess and deliver foreshore structure upgrades	Review and upgrade seawalls, infrastructure and hard structures, and develop standardised environmentally sensitive design drawings and guidelines approved by external agencies to streamline approval processes. Identify degraded seawall / foreshores / shared pathways for upgrades. Including ongoing maintenance and/or upgrade of coastal protection work at Elizabeth Bay boat ramp. Action to also ensure future-proofed design and siting of infrastructure, recognising that: • Flood hazard in low-lying foreshore areas is likely to increase due to sea level rise and changes in storm intensity and frequency associated with climate change • Wetland vegetation is expected to migrate inland over time • The design and placement of any new assets must account for these risks, including the findings of Council's Wetland Refugia Study
Undertake shoreline restoration feasibility assessment	• Complete estuary-wide study into improving connectivity between the foreshore and nearshore areas (both laterally and longitudinally) to improve foreshore function and nearshore water quality – key focus on locations where the natural shoreline gradient has been historically modified. • Review shoreline reprofiling/regrading work completed to date as well as passive shoreline rehabilitation, to identify key learnings that should be applied in any future works. • Assess feasibility and cost-benefit of undertaking large scale shoreline realignment and reprofiling against passive approaches in terms of: improving hydrological functioning of nearshore, facilitation of saltmarsh establishment and wrack cycling. Identify key barriers and work with stakeholders (agencies) that may help to address these constraints. This should integrate with Foreshore Vegetation Management Plan and Active Lifestyles Strategy. • Identify priority sites for rehabilitation works. • Link with 'Nearshore Water Quality Improvement Plan
Enhance recreation access & infrastructure	Plan and deliver projects aimed at enhancing recreational use, by improving foreshore connectivity through shared paths, alternative alignments and links between key areas while considering environmental constraints and protecting sensitive environments. This may include: • enhancing shared paths, walking tracks, access points • supporting infrastructure (bins, signage, amenities) • formalising water access points • restricting informal pathways • improvements to birdwatching amenities, in collaboration with birdwatching groups to identify suitable locations and amenity requirements • identifying and elevating shared pathways where wetland/vegetation or hydrology are adversely impacted. • maintenance and improvement of estuary beaches and swimming enclosures • reviewing and improving pedestrian access within Tuggerah Lakes Nature Reserve and State Conservation Area.

Improve recreation opportunities: Lake Munmorah

As recommended in the Tuggerah Lakes Recreation Uses Study:

- Provide a foreshore path through most urban areas of Munmorah Lake, except a small section in the north-east corner.
- Retain and build on the existing shared path in the northern urban area, extending it eastward where feasible.
- In vegetated and sloped sections east of Tom Burke Reserve, prioritise a walking path rather than a shared path.
- Develop a continuous shared path along the foreshore of the south-west urban area.
- Develop a continuous shared path along the foreshore of the south-east urban area.
- Extend the south-east shared path across the existing footbridge to Dunkey Island.
- Construct a new footbridge to connect Dunkey Island to the foreshore at the end of Edward Street.
- Create a continuous path link across the two south-east urban areas via these connections.
- Ensure access and recreation infrastructure is in line with Disability and Inclusion Action Plan.

Improve recreation opportunities: Budgewoi Lake

As recommended in the Tuggerah Lakes Recreation Uses Study:

- Prioritise shared path provision along the northern shore where a continuous foreshore reserve already exists.
- Maintain and support the existing northern shore shared path network, including the extension up Wallarah Creek to the Pacific Highway.
- Identify and implement alternative path alignments in the southern lake section where foreshore reserves are absent.
- Extend shared paths using local streets (e.g. Peel Street) to safely bypass areas with no foreshore reserve and avoid reliance on high-traffic roads such as Main Road.
- Apply this mixed foreshore–road approach more broadly in the western section of the lake, utilising distributor roads where traffic volumes are lower.
- For longer sections of foreshore reserve, enhance natural values by:
 - >Increasing biodiversity values
 - >Installing informal walking tracks
 - >Creating well-defined nodes for passive recreation and biodiversity education
- Ensure access and recreation infrastructure is in line with Disability and Inclusion Action Plan.

Improve recreation opportunities: Tuggerah Lake	As recommended in the Tuggerah Lakes Recreation Uses Study: • Prioritise delivery of shared paths along most of Tuggerah Lake foreshore where continuous foreshore reserves exist, particularly in residential areas. • Recognise constraints to shared path delivery north of Prawn Beach Lane due to discontinuous reserves, steep terrain, cliffs, and dense vegetation. • Extend the existing shared path south from March Street as current works progress. • Shift focus north of Prawn Beach Lane and around Craigie Park to:• > Enhance and protect biodiversity values > Install walking tracks rather than shared paths > Develop Craigie Park as a key passive recreation and biodiversity education node • Provide shared paths in lakeside urban areas around the outlet of Ourimbah Creek where foreshore reserves allow. • Protect high-value conservation areas around Ourimbah Creek by: > Limiting infrastructure to walking tracks (not shared paths) > Avoiding impacts to saltmarsh and shallow water habitats • Investigate opportunities to link northern walking tracks to Tuggerah State Conservation Area. • Install environmental and educational signage in conservation-focused foreshore areas. • Continue to support and promote the existing shared path from Chittaway Bay Lions Park to The Entrance as a successful outcome. • Ensure access and recreation infrastructure is in line with Disability and Inclusion Action Plan.
Undertake Wrack management in accordance with Stage 3 Tuggerah Lakes Wrack Management Strategy	Implement and periodically review and update the Wrack Management Strategy (Wrack Management Strategy) to ensure priority location, operational procedures and objectives are current. This should be informed by ongoing monitoring, performance, any changes in the natural or built environment or as new information or technologies becomes available.
Support lake volunteer groups through providing funding and resources	Support existing landcare groups through the Environmental Volunteering Program to conduct more environmental programs around the foreshore and wetlands e.g. environmental weeding. Consider establishing new groups in 'hot spot' areas.

Theme 6: Coastal Hazards and Climate Risks

Undertake broader transition study for wetlands

Building on recommendations from the Coastal Wetland Refugia Study, undertake a broader transition study for the entirety of the Tuggerah Lakes catchment and develop a vision for the region. This study is recommended due to the potential for changes to the oceanic entrance conditions (either natural or artificial) resulting in changes to the tidal dynamics within the estuary.

In consultation with the community, this overarching management plan can assist in setting an approach to the estuary entrance and tidal dynamics over the next 30-50 years. Outcomes from this study could be subsequently used to determine the potential future tidal inundation regime and the influence on upslope vegetation migration. Outcomes from this study should be linked into future reviews of the Entrance Management Strategy.

Undertake a Planning Proposal to update Resilience and Hazards State Environmental Planning Policy Coastal Wetlands and Littoral Rainforest Mapping

A planning proposal will be undertaken to update the Coastal Wetland and Littoral Rainforest Mapping, where relevant, in the New South Wales Resilience and Hazards State Environmental Planning Policy (Resilience and Hazards State Environmental Planning Policy).

This update would be based on the mapping provided in the Tuggerah Lakes Coastal Wetland Mapping study (Eco Logical Australia, 2022) and additional investigation as required. The Planning Proposal may be submitted in conjunction with the planning proposal for the Coastal Vulnerability Area and/or it may be submitted in conjunction with a proposal for updates to coastal management area mapping for areas within the Central Coast local government area subject to a Coastal Management Program

Undertake Coastal Vulnerability Area mapping and put forward as a Planning Proposal

Mapping for the Coastal Vulnerability Area (Coastal Vulnerability Area) has not been provided from the Resilience and Hazards State Environmental Planning Policy, and no such Coastal Vulnerability Area map yet exists for the Tuggerah Lakes estuary. Subsequently, it is the intent of Council to propose, by way of a planning proposal, the adoption of a map indicating a Coastal Vulnerability Area – which may be comprised of a combination of the following hazards across the study area, which are identified in the Coastal Management Act 2016:

- Beach erosion.
- Shoreline recession.
- Estuary entrance instability.
- Coastal cliff and slope instability.
- Coastal inundation.
- Tidal inundation.
- Erosion and inundation of foreshores caused by tidal waters and the action of waves, including the interaction of those waters with catchment floodwaters.

It should be noted that the Coastal Management Act 2016 requires the consideration of a 100 year planning horizon (considering future climate change impacts). As such, all extents used in defining the Coastal Vulnerability Area should be based on a suitable forward planning horizon, which incorporates the projected effects sea level rise on coastal hazards.

The Council's existing coastal hazard mapping and controls within the Local Environmental Plan and Development Control Plan will be required to be updated to reflect, and be supplementary to, the proposed Coastal Vulnerability Area mapping.

Theme 7: Heritage and Culture

Engage First Nations teams to undertake environmental works on-Country to support improved environmental outcomes.	Engage First Nations teams to work on Country to support environmental rehabilitation focused on returning environment to pre-settlement condition / ecosystem type (e.g., weeding, revegetation, reintroducing native species).
Co-design and deliver cultural heritage and estuary health education programs.	Further develop and implement community education programs that build awareness and appreciation of Indigenous cultural heritage. Include culturally appropriate education and awareness of estuary health issues for First Nations groups and the broader community.
Identify and undertake cultural land and water management practices (including cultural burning).	Identify opportunities for, and undertake cultural land management practices, including cultural burning, in partnership with Traditional Owners and relevant agencies.
Identify and protect cultural landscapes and cultural heritage items across the coastal zone and catchment.	Undertake cultural mapping to identify cultural landscapes and heritage items across the coastal zone and catchment. Project to include development of protocols for emergency management works and protection of sites.
Develop a Land and Sea Country Plan (co-designed with First Nation partners).	Develop a Land and Sea Country Plan that illustrates community priorities and actions regarding land and sea management activities in the Central Coast region. This document should be developed in close consultation with First Nations Stakeholders on the Central Coast.
Undertake a Tuggerah Lakes heritage study (suburbs within Coastal Management Program area).	Investigate heritage significance of buildings, landscapes, trees, maritime items and archaeology, and places in the Study area and make recommendations for Inclusion on Schedule 5, Central Coast Local Environmental Plan 2022 Notes: Heritage Study to review current Heritage Schedule and items, and recommend any new potential listings, recommendations for management, and education and interpretation opportunities.
Develop a Tuggerah Lakes heritage risk management strategy (Indigenous and post-contact).	Risk Identification and analysis assessment and recommendations for the management of Heritage Assets - both Aboriginal and Post Contact. This is to identify hazards (mostly flooding), risks, and causes and assess the consequences. It is anticipated that this strategy will initiate a methodology and framework for similar heritage asset management across other areas of the Central Coast local government area.
Explore dual naming opportunities for foreshore locations, waterways and cultural sites.	This would be a partnership project driven by the First Nations Stakeholders. Notes: Dual naming recognises the connection of First Nations people to the land and waterways, strengthens cultural identity, and reconciles history by pairing and recognising the equal status of both names

Theme 8: Resource Conflicts and Accessibility

Work with commercial fishers/ and Department of Primary Industries Fisheries to assess catch data and understand any changes in aquatic assemblages	Assess catch data and understand any changes in aquatic assemblages to guide management decisions.
Provide dredging assistance or funding for management of navigational channels	Transport for New South Wales to monitor and maintain navigable sections of estuary to support marine rescue and recreational/commercial boating. To include all navigational channels within the estuary west of The Entrance Bridge
Maintain and improve boat ramps	Maintain and improve existing boat ramps, with access to boat ramps to be maintained, including dredging of sediment at base of ramps where applicable. Focus on strategic boat ramps required for use in emergencies - work with Marine Rescue to determine.
Develop a coastal assets at risk register and update asset management program	This action involved auditing coastal assets and infrastructure to inform development of a register identifying those at risk of coastal hazards, now and into the future. This information would be integrated with Council's asset management program to ensure effective maintenance, management and planning of coastal assets to improve amenity, resilience and community safety. (Ties in with Open Coast Coastal Management Program action CW-D03)

Theme 9: Education and Communication

Create, implement and update communication and interpretation resources and campaigns	Support community understanding of the estuary, its natural and cultural values, Council's planning, management and on-ground activities, and the role everyone can play in caring for Country through accessible, engaging and up-to-date communication and interpretation initiatives, such as: • communication campaigns, social media, digital marketing, electronic newsletters and public awareness initiatives • Council webpages, digital information hubs, online maps, dashboards and interactive online content • a visual conceptual model of the Tuggerah Lakes estuary • videos, animations, multimedia resources and digital storytelling • interpretive signage and visitor infrastructure • printed publications, displays and educational resources
Develop and deliver estuary education, stewardship and capacity-building programs	Use evidence-based programs to build estuary literacy, strengthen connections to Country and support long-term behaviours that care for the Tuggerah Lakes estuary. Programs will apply behaviour change science by building knowledge, skills, confidence, motivation, social connection and opportunities for action. • formal education programs, curriculum-linked resources and educator support • citizen science including environmental, water quality and biodiversity monitoring that supports stewardship and data collection • guided walks, kayak tours, field experiences, workshops, and other place-based activities • public education services at community and industry events • leadership, ambassador and capacity-building programs that support community action • support community-led initiatives that contribute to estuary health • internal Council staff education programs that build understanding of estuary processes and water-sensitive practices • form multi-disciplinary Council team to improve education of erosion and sedimentation control (erosion and sediment control) practices, particularly at the lot scale (ties in with erosion and sediment control enforcement in action 1.04).
Establish, strengthen and support collaborative stewardship, partnerships and community engagement for the Tuggerah Lakes estuary	Support collaboration, shared learning and collective action by bringing together Traditional Custodians, community members, businesses, community groups, government agencies, research institutions and other stakeholders to care for Country and contribute via; • community engagement, consultation and feedback processes that support transparent and informed decision-making • partnerships with Traditional Custodians that strengthen cultural connections, caring for Country and knowledge sharing • collaborative stewardship and research initiatives that encourage shared responsibility for estuary health
Develop and implement a Tuggerah Lakes estuary heritage interpretation strategy (Indigenous and non-Indigenous).	Develop a strategy for the sharing of a local heritage and maritime history, increasing the engagement with walks, public reserves, nature reserves and maritime facilities. Use the heritage Interpretation strategy to implement projects to combine heritage interpretation, public art and multimedia approaches to educate and celebrate the history, heritage, Aboriginal Cultural significance and natural resources of key locations. Identify methods, places to be celebrated and stories to be shared to increase heritage understanding, create opportunities for increased cultural tourism and employment, and engender increased sense of place and pride in the local community