

Eastern Beaches Foreshore Reserves Management Plan 2023



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Endorsed by Noosa Council 17th of August, 2023

Acknowledgements

Noosa Council proudly acknowledges and respects Australia's First Nations people and their deep and abiding connection to this country. We recognise the Kabi Kabi people as the Traditional Owners of the lands and waters of the Noosa area and offer gratitude for their careful custodianship of this unique environment over thousands of years. We pay respect to Kabi Kabi elders who have come before us and acknowledge and deeply regret the traumas experienced by Kabi Kabi people through colonialism and beyond.

We pay respect to current and emerging leaders and their enduring commitment in pursuing a strong and healthy future for First Nations people. We seek genuine reconciliation and will work to strengthen our relationship with Kabi Kabi – to listen, to understand their needs, to include them as valuable partners and to facilitate greater opportunities for First Nations people.

Critical to achieving this, Noosa Council is taking the important step of developing Noosa Council's first Reconciliation Action Plan.

Noosa Council expresses its gratitude to the community members, groups and organisations who participated in consultation and contributed to the Eastern Beaches Foreshore Reserves Management Plan.



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1. Executive Summary

Noosa's natural amenity is one of the greatest contributors to its liveability, and the Eastern Beaches Foreshore Reserves (EBRFs) are an iconic part of Noosa's coastal landscapes.

These foreshore reserves are also central to Noosa's coastal neighbourhoods - most of our seaside residents and communities live alongside them.

They are integral to the Noosa resident and visitor experience, with many people walking through the EBRFs to access Noosa's beaches, enjoying the beautiful views the area has to offer.

Noosa's dune foreshores are significant environmental places, too – the ecosystems are unique to open coastal environments, and they provide a critical link between the ocean and westward natural areas.

Some species, such as the Endangered loggerhead turtle and Vulnerable green turtle¹, rely on healthy dunes and beaches to reproduce.

As climate change continues, the buffering functions of Noosa's naturally vegetated foreshores and dunes will play a critical role in our community's resilience during storm events.

The specialness of Noosa's EBRFs is well recognised by Noosa people, past and present. For millennia Kabi Kabi (Gubbi Gubbi) people have lived and worked on the Eastern Beaches, caring for Country through spiritual

and environmental stewardship and practices. Noosa Shire was designated as a Biosphere Reserve by the United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 2007. This designation highlights how important environmental and cultural protection is globally, and how it contributes to Noosa's liveability and success.

More locally, when the Noosa community was asked what people valued most about Noosa Shire, 77% of the 1655 respondents to the Noosa Shire Liveability Survey 2021 rated 'Elements of the natural environment (natural features, views, vegetation, topography, water, wildlife)' as most important².

The Eastern Beaches Foreshore Reserves Management Plan provides a clear plan for the management of the Eastern Beaches Foreshore Reserves for ecosystem health, coastal resilience, recreation, and public access. The plan details a wide-ranging, targeted initiative in response to the Noosa Environment Strategy 2019, which identified the need to implement an Eastern Beaches coastal rehabilitation program to improve the condition, species diversity and stability of dune ecosystems and enhance resilience to climate change.

The plan also responds to the Noosa Coastal Hazards Adaptation Plan preferred management approach to "pursue dune management and revegetation in high risk erosion areas as a critical and immediate priority for Council and the community in helping to build coastal resilience and management of erosion risk".

¹Recovery Plan for Marine Turtles in Australia, Commonwealth of Australia 2017.

²Noosa Shire Liveability Survey, Noosa Council 2021



Figure 1: Eastern Beaches Foreshore Reserves and near-coastal Bushland Reserves

2. About the plan



Scope

The Eastern Beaches Foreshore Reserves Management Plan covers the coastal Eastern Beaches Foreshore Reserves and near-coastal bushland reserves listed below (shown in Figure 1 and detailed in Figures 2-7):

- Burgess Creek Bushland Reserve
- Castaways Beach Foreshore Reserve
- Marcus Beach Foreshore Reserve
- Peregian Beach Foreshore Reserve North (including Osprey Park)
- Peregian Beach Foreshore Reserve South
- Peregian Creek Reserve
- Sunrise Beach Foreshore Reserve
- Sunshine Beach Foreshore Reserve

The plan has strong interlinkages with a range of other programs and projects relating to the eastern beaches, including;

- Coastal Hazards Adaptation Plan – Implementation
- Coastal Monitoring Plan
- Burgess Creek monitoring
- Burgess Creek Integrated Catchment Management Plan
- Noosa Eastern Beaches Creeks - High Risk Erosion Prioritisation and Planning
- Integrated Water Quality Monitoring Program
- Bushfire risk management
- Shire-wide Encroachments Policy

For more information, please see Section 6: Linked projects and programs, and Appendix One: Linked projects and programs and Council's [foreshore and coastal creeks webpage](#) for on-going and updated information.

Purpose

The purpose of the Eastern Beaches Foreshore Reserves Management Plan (EBRFMP) is to describe the social and environmental values of the EBRFs, identifying management issues and actions to maintain and enhance these values in the future.

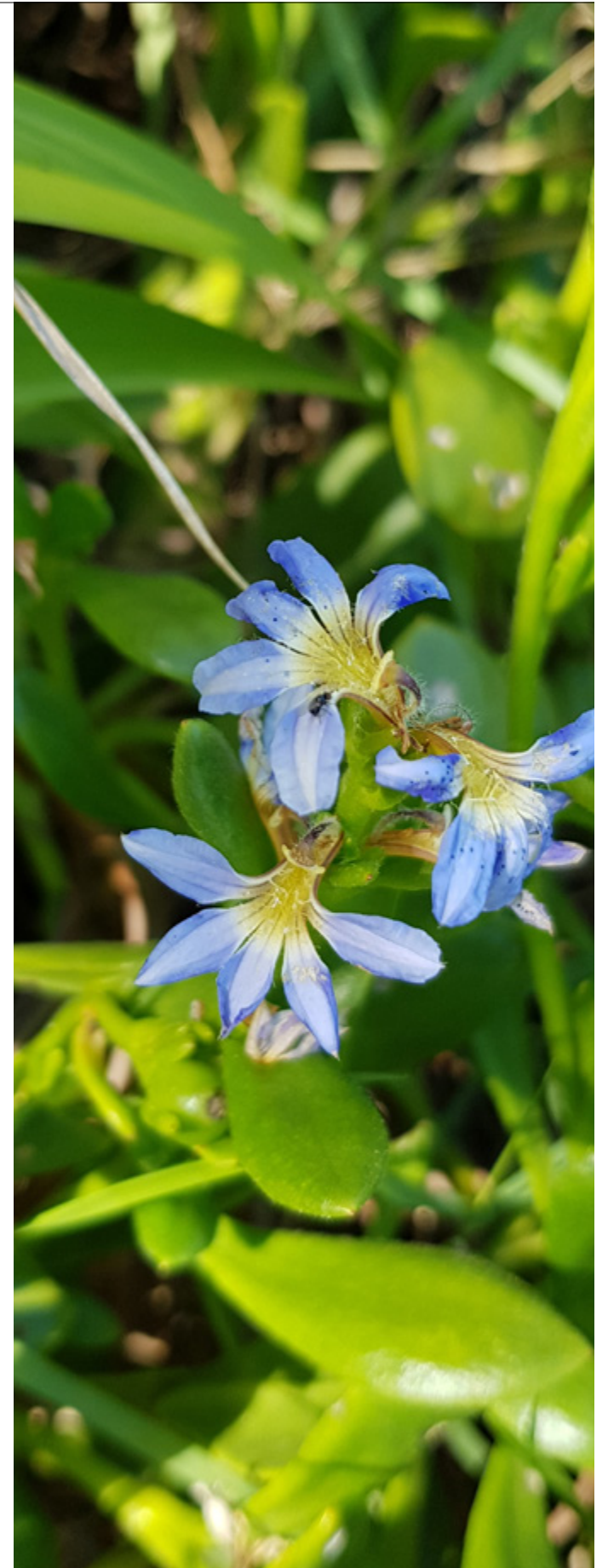
The plan is structured to provide overarching guidance for management decisions and actions.

The development and subsequent implementation of the EBRFMP is in response to clear community desire for nature-based coastal hazards and climate change risk mitigation activities, demonstrated by public consultation for the Noosa Coastal Hazards Adaptation Plan 2021. Many in the community consider that a nature-based approach will best keep the natural look and feel and safeguard the natural environment, while mitigating coastal hazard impacts.

Building the health and natural stability of the natural foreshores and vegetated dunes, and maintaining natural coastal processes of erosion and accretion, are central to this approach.

Reserve Management Plans are prepared by Noosa Council and other local governments for significant bushland reserves or groups of reserves that typically have a wide range of environmental, social, cultural and recreational values and management considerations. In the EBRFs this framework allows for considered and in-depth management of these values to help achieve a range of balanced outcomes.

In particular, the EBRFMP will strike a balance that incorporates the broad range of community values and benefits derived from our coastal bushland, including amenity, public access and recreation.



Structure

The Eastern Beaches Foreshore Reserves Objectives listed in Section 3 set the overarching direction of the foreshore management plan. The plan is broken into ten broad themes, including:

- Partnerships
- Climate change
- Ecology
- Social values
- Public access and recreation
- Coastal creeks and stormwater
- Community education
- Incidents and disaster management
- Encroachments
- Data collection and monitoring

Management Objectives, outcomes, management actions and measures are layered as follows:

<p>Management Objectives Overarching objectives - what we are working to achieve</p>
<p>Theme objective Objective most directly to linked each theme</p>
<p>Outcomes Links the Theme Objective to Theme Actions, details outcomes that will contribute to achieving the objective</p>
<p>Management Actions What we will do to achieve Theme Objectives and Outcomes</p>
<p>Measures Targets and monitoring to measure progress towards achieving the Theme Objective and Outcomes</p>

The Management Actions for each theme are in that theme section and also collated in a table in Section 17: Management Actions.

Sunshine Beach Foreshore Reserve

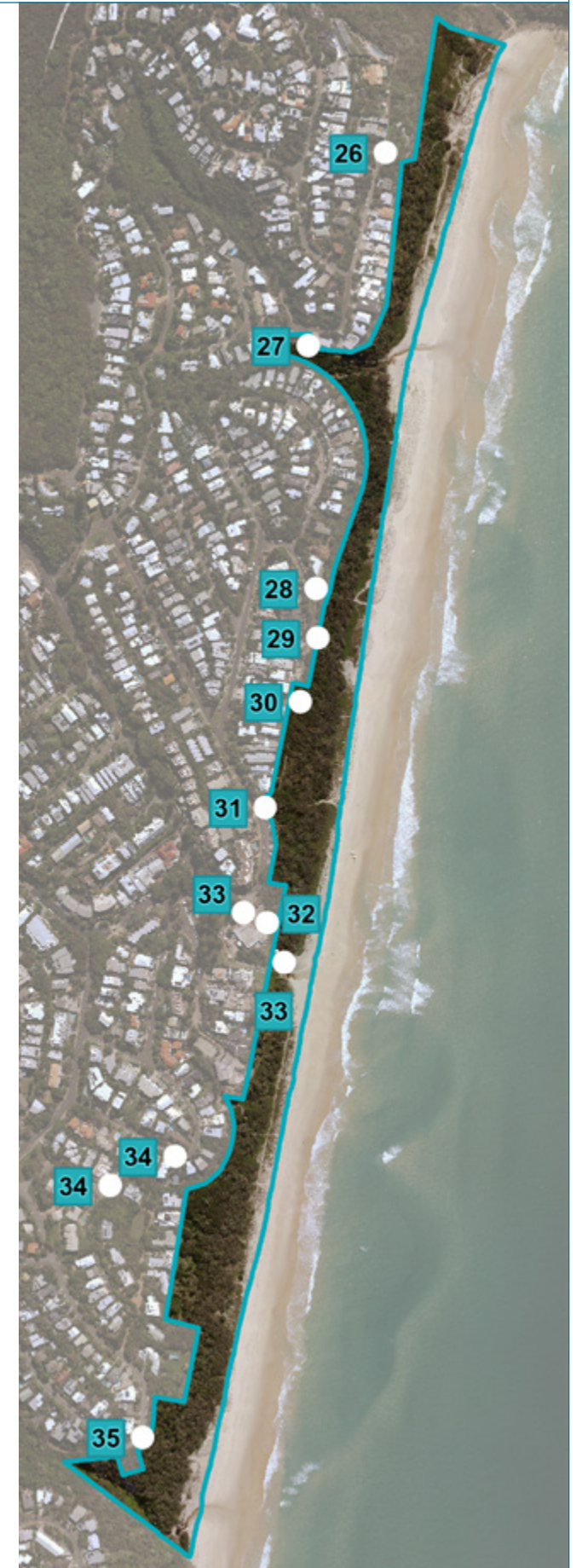
Seaview Terrace, Sunshine Beach
14.4 hectares

Values

- 12 beach accesses
- Three coastal creeks
- High levels of community participation
- Active Community Bushland Care group
- Flagged, patrolled swimming area
- Sunshine Beach Surf Club
- Pedestrian access to Noosa National Park
- Immediately south of Noosa National Park
- Of Concern Biodiversity Status Regional Ecosystem (12.2.15)
- High Value Regrowth (12.2.14)
- High Ecological Value wetlands
- Endangered or vulnerable wildlife
- Special animals
- Core koala habitat area
- Essential habitat
- Watercourse vegetation
- Very High conservation significance riverine wetlands

Management considerations

- Landscape connectivity loss
- High internal fragmentation – beach accesses, clearing
- Significant environmental weed infestations
- Steep slopes and vegetation clearing
- Three coastal creeks
- Significant changes to hydrology and nutrient profiles – stormwater, roof water



Sunrise Beach Foreshore Reserve

David Low Way, Sunrise Beach
10.4 hectares

Values

- 3 beach accesses
- One coastal creek
- High levels of community participation
- Active Community Bushland Care group
- Strategic and in situ conservation values
- High value regrowth
- High value riparian wetlands
- Loggerhead and green sea turtles
- High Value Regrowth (Endangered/Of concern)
- Very High Aquatic conservation significance
- Core Habitat for Priority Taxa
- Remnant forms part of a Bioregional Corridor
- State Biodiversity Significance

Management Considerations

- Significant environmental weed infestations
- High internal fragmentation – beach accesses, clearing
- Fire management
- Steep slopes and landslips
- Concentrated roof and stormwater flows
- One coastal creek
- Significant changes to hydrology and nutrient profiles – stormwater, roof water



Figure 3: Sunrise Beach Foreshore Reserve

Burgess Creek Bushland Reserve

David Low Way, Sunrise Beach
10.9 hectares

Values

- High conservation values
- High levels of community participation
- Active Community Bushland Care group
- Significant species and habitat
- Freshwater wetlands and Burgess Creek
- Connecting Noosa National Park to coast
- Regional and local pedestrian and cycle connectivity
- High Ecological Value wetlands
- Threatened and special wildlife
- Very High Aquatic conservation significance
- State Significance Bioregional Corridor
- State Biodiversity Significance

Management Considerations

- High internal fragmentation – paths, infrastructure, clearing
- Water and sewerage infrastructure
- Burgess Creek
- Significant changes to hydrology and nutrient profiles from Wastewater Treatment Plant and stormwater discharge
- Erosion and creek mouth movement
- Significant environmental weed infestations
- Fire management
- Deed of Management Agreement with Qld Department of Resources



Figure 4: Burgess Creek Bushland Reserve

Castaways Beach Foreshore Reserve

David Low Way, Castaways Beach
31.66 hectares

Values

- 6 beach accesses
- One coastal creek
- High levels of community participation
- Active Community Bushland Care group
- High strategic, in situ conservation values
- Significant species and habitat
- Freshwater wetlands
- Loggerhead and green sea turtles
- High Ecological Value wetlands
- Threatened band special wildlife
- State Biodiversity Significance
- Very High Aquatic conservation significance
- State Significance Bioregional Corridor

Management Considerations

- High internal fragmentation – beach accesses, clearing
- Coastal creek
- Significant changes to hydrology and nutrient profiles – stormwater, roof water
- Significant environmental weed infestations
- Fire management

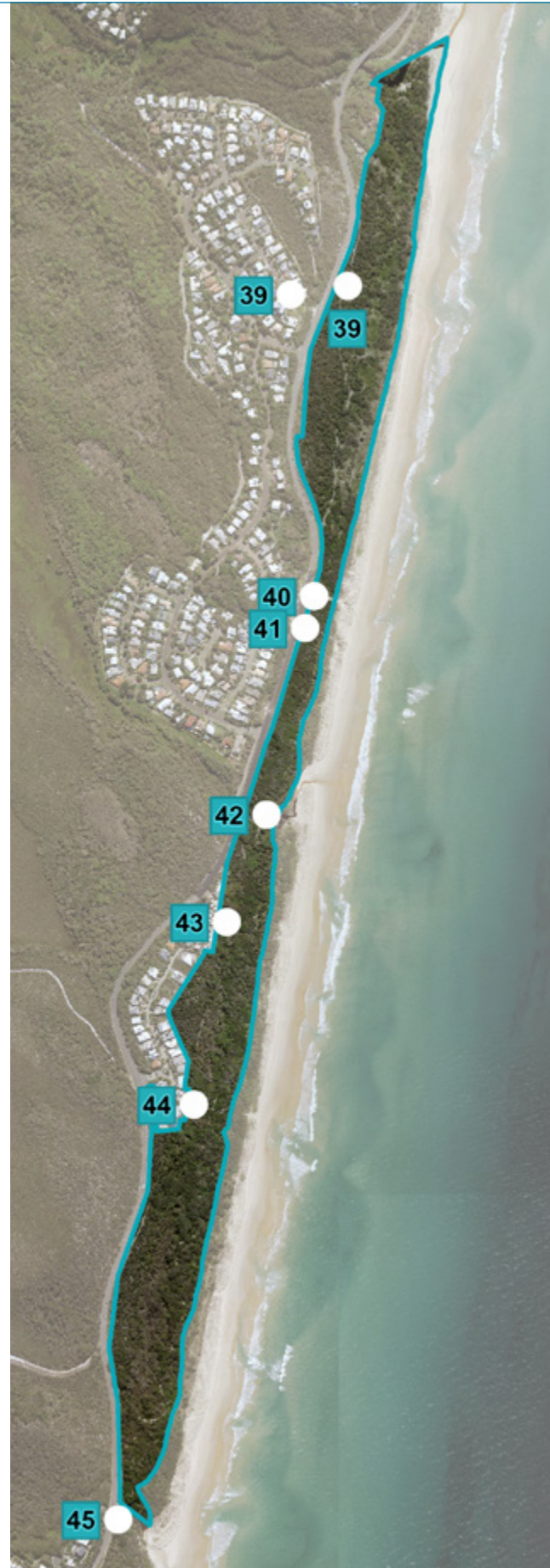


Figure 5: Castaways Beach Foreshore Reserve

Marcus Beach Foreshore Reserve and Peregrin Creek Bushland Reserve

Peregrin Esplanade, Peregrin Beach
14.7 hectares

Values

- 5 beach accesses
- Coastal creeks
- High levels of community participation
- Active Community Bushland Care group
- High strategic and in situ conservation values
- Significant species and habitat
- Loggerhead and green sea turtles
- State Habitat for Endangered, Vulnerable and Near Threatened (EVNT) taxa
- Very High Aquatic conservation significance
- Core Habitat for Priority Taxa
- State Biodiversity Significance
- State Significance Bioregional Corridor
- Connecting Noosa National Park to coastal foreshore

Management considerations

- High internal fragmentation – beach accesses, clearing
- Landscape connectivity issues
- Significant changes to hydrology and nutrient profiles – stormwater, roof water
- Significant environmental weed infestations
- Marcus Creek mouth movement
- Fire management



Figure 5: Marcus Beach Foreshore Reserve and Peregrin Creek Bushland Reserve

Peregian Beach North Foreshore Reserve (including Osprey Park)

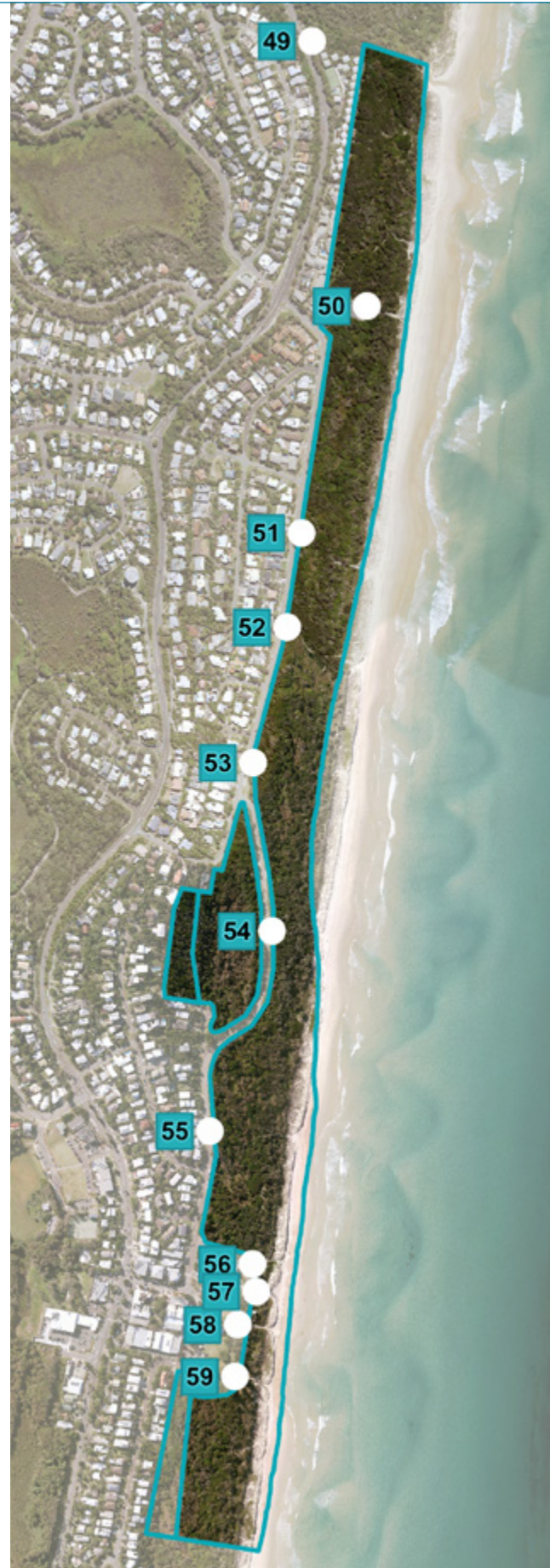
Peregian Esplanade, Peregian Beach
31.24 hectares

Values

- 10 beach accesses
- Coastal creek
- High levels of community participation Active Community Bushland Care group
- High strategic and in situ conservation values
- Significant species and habitat
- Loggerhead and green sea turtles
- State Habitat for EVNT taxa
- Very High Aquatic conservation significance
- Core Habitat for Priority Taxa
- State Biodiversity Significance
- State Significance Bioregional Corridor

Management considerations

- High internal fragmentation – beach accesses, clearing
- Landscape connectivity issues
- Coastal creek
- Significant changes to hydrology and nutrient profiles – stormwater, roof water
- Significant environmental weed infestations
- Fire management



Peregian Beach Foreshore Reserve South

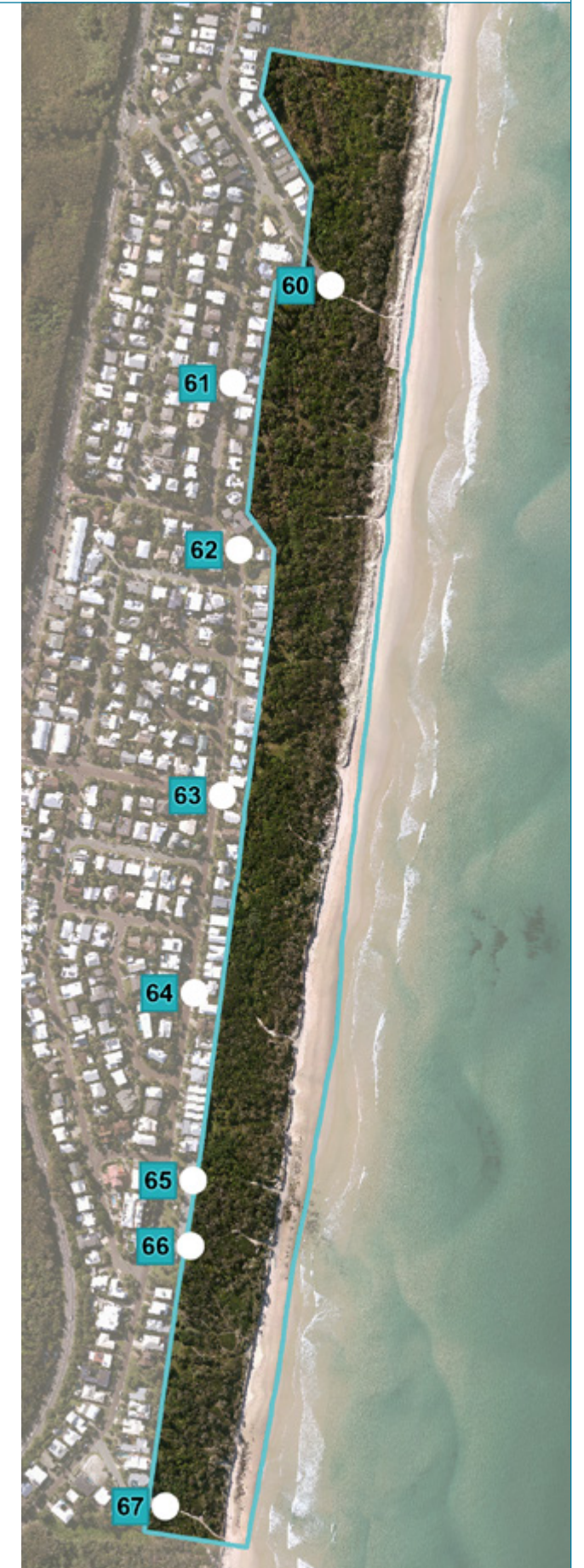
Lorikeet Drive, Peregian Beach
19.8 hectares

Values

- 8 beach accesses
- High levels of community participation Active Community Bushland Care group
- High strategic and in situ conservation values
- Significant species and habitat
- Nesting sea turtles
- Connecting Noosa National Park (Coolum section) to coastal foreshore
- Threatened and special wildlife
- State Habitat for EVNT taxa
- Very High Aquatic conservation significance
- Part of a State Significance Bioregional Corridor
- State Biodiversity Significance

Management Considerations

- High internal fragmentation
- Connecting Noosa National Park (Coolum section) to coastal foreshore
- Nesting sea turtles
- Significant changes to hydrology and nutrient profiles – stormwater, roof water
- Significant environmental weed infestations
- Fire management
- Water infrastructure



3. Management objectives

Eastern Beaches Foreshore Reserves Objectives

1	Contribute to Noosa’s liveability and scenic amenity by managing the coastal landscapes native vegetation and public access in the Eastern Beaches Foreshore Reserves.
2	Maintain adaptive, long-term, inclusive, safe and sustainable public recreational access to beaches, foreshores, waters, and foreshore bushland.
3	Contribute to improved community climate change resilience and stability of coastal landforms for current and future generations, using nature-based methods, protecting and improving native vegetation and managing, and enhancing public access.
4	Contribute towards improved water quality and social and environmental values in the Coral Sea, Laguna Bay, Noosa River, lakes, and coastal creeks.
5	Identify and protect Kabi Kabi and non-indigenous cultural heritage sites and values in the Eastern Beaches Foreshore Reserves.
6	Increase understanding of the social and environmental values of foreshores.
7	Develop and foster partnerships to collaboratively manage Noosa’s foreshores to achieve environmental and community benefit outcomes.
8	Protect and improve the biodiversity values of the Eastern Beaches Foreshore Reserves network, using best practice management techniques.
9	Manage hazardous vegetation, bushfire, flooding, coastal erosion and pest species within the Eastern Beaches Foreshore Reserves according to State Government and Council’s policies, plans, risk appetite and legislative requirements.

4. Strategy and policy links

The EBRFMP sits under the Noosa Environment Strategy 2019 and Noosa Bushland Reserves Strategic Management Plan 2021– 2026 and the Noosa Coastal Hazard Adaptation Plan 2021. It complements and supports a large range of local, regional, state, national and international plans, strategies, charters, agreements, and statutory obligations.



Figure 8: Strategy and policy links

Appendix One: Strategy and Policy Links identifies further relevant legislation and policy links to this plan and provides a summary of the various strategies and implementation actions set out in the Environment Strategy and the Coastal Hazards Adaptation Plan and their status as it relates to the EBRFMP.

5. Linked projects and programs

The EBRFMP deals with aspects of Noosa's coast that are both primarily within the Eastern Beaches Foreshores Reserves and that relate largely to bushland management. Several other Council managed programs, projects and activities occur in and near the EBRFs have strong interlinkages with this plan.

<p>Eastern Beaches Foreshore Reserve Management Plan</p> <ul style="list-style-type: none"> - Beach Access Standards and Review (Commenced) - Bushland Operational Assessment condition mapping (Commenced) - Ecological restoration plans (Commenced) - Annual work plans (Commenced) 	<p>Coastal Hazards Adaptation Plan (Climate Change)</p> <ul style="list-style-type: none"> - Coastal Hazards Adaptation Plan – Implementation (Commenced) - Regional Climate Action Roadmap (Commenced) - Coastal Monitoring Plan (Commenced) - Burgess Creek monitoring (Commenced) - Offshore Sand Supply investigation (Commenced) - COASTS morphology monitoring (Commenced) - Regional Coastal Process Model (Commenced) - Nearshore Coral Reef Monitoring (Commenced) - Living Foreshores Noosa Phase 1 - Designing for resilience (Commenced)
<p>Infrastructure and Asset Management Services</p> <ul style="list-style-type: none"> - Creek mouth realignment (Ongoing) - Burgess Creek Integrated Catchment Management Plan (Proposed) - Noosa Eastern Beaches Creeks - High Risk Erosion Prioritisation and Planning (In development) 	<p>Environmental Services (shirewide programs)</p> <ul style="list-style-type: none"> - Integrated Water Quality Monitoring Program (Commenced) - Bushfire risk management (Ongoing) - Community Bushland Care (Ongoing) - Fauna Recovery Roadmap (Noosa Nine and Co.) (Commenced) - Coastal Fox Control Program (Ongoing) - Pandanus monitoring and treatment program (Commenced)

Figure 9: Linked projects and programs

Appendix Two: Linked projects and programs details these programs, projects, and activities as they relate to the EBRFMP.

6. Consultation

Consultation with Noosa's community is critical to the development and implementation of the EBRFMP. Targeted and broader community consultation has informed the management priorities and specific actions and helped ensure a balanced approach that considers a broader range of community and environmental values for the foreshore reserves, including recreation and public access and coastal buffering functions.

Previous engagement with Noosa's community

Community consultation results from recently completed Noosa Council plans, and surveys have also supported the development and will continue to inform the implementation of the EBRFMP. Community input during the development of the Environment Strategy 2019 and Noosa Coastal Hazards Adaptation Plan 2021 and results from the Noosa Liveability Study 2021 strongly support maintaining natural processes and using nature-based solutions to mitigate and adapt to climate change and conserve and manage natural areas and natural values.

This includes protection and active on-ground management of local beaches, dunes, habitats, and coastal creeks to help build coastal resilience and improve ecosystem health and adopting measures to avoid or minimise threats to these values.

Community stakeholders

Community stakeholders relevant to the development of this plan include:

- Bushland Care and other volunteers involved in the EBRFs
- Environment and Natural Resource Management organisations
- Neighbourhood residents and homeowners
- Noosa residents
- Sunshine Coast and neighbouring Local Government Area residents
- Individuals and community organisations with interests in and near the EBRFs
- Businesses with interests in and near the EBRFs.

The EBRFs are recognised as having regional community importance. Coastal and hinterland communities in the region were invited to participate and offered local

opportunities to contribute. Individuals and organisations living in neighbouring Local Government Areas were invited to participate. Input from further afield was accepted and considered.

Noosa Council provided a range of casual and formal consultation opportunities, including surveys, written feedback, and verbal feedback via pop-ups at community events and street meets, and workshops at community round table meetings.

Public consultation

The public consultation period for the Draft Eastern Beaches Foreshore Management Plan was held from 20 February 2023 to 20 March 2023 and was extended to 31 March 2023.

- Have your Say webpage, complete plan available
- Notification emailed to stakeholders
- Advertised on social and traditional media
- Notice included in March rates notice

A flyer insert was provided as part of the January 2023 rates notice to advise ratepayers of the upcoming consultation. Council emailed out information to people who received rates notices electronically.

Online survey

- 204 online responders

Community Roundtables

- Face-to-face roundtables - March 7 and March 28
- Online roundtable - March 13
- Face-to-face roundtable - March 28 and April 5 (Eastern Beaches Protection Association)
- Approximately 36 people engaged

Pop-up events

- 13 pop-up events at beach accesses, markets and public facilities
- Approximately 485 people engaged
- Overview of plan and consultation opportunities provided, and feedback sought

Written submissions

- 92 submissions received

Survey results

Online survey

- 75.7% of respondents identified as living in the Eastern Beaches area.
- 38.7% respondents identified as members of a community organisation

Results

80.9% of respondents expressed overall support for an EBRFMP, including respondents who raised suggestions or concerns, but were still supportive of having a plan.

Other responses shared by those who support an EBRF plan included:

- “...vitaly important and as stated we would 100% support greater resources are applied to help manage these plans.”
- “...long overdue but hopefully will mitigate any future

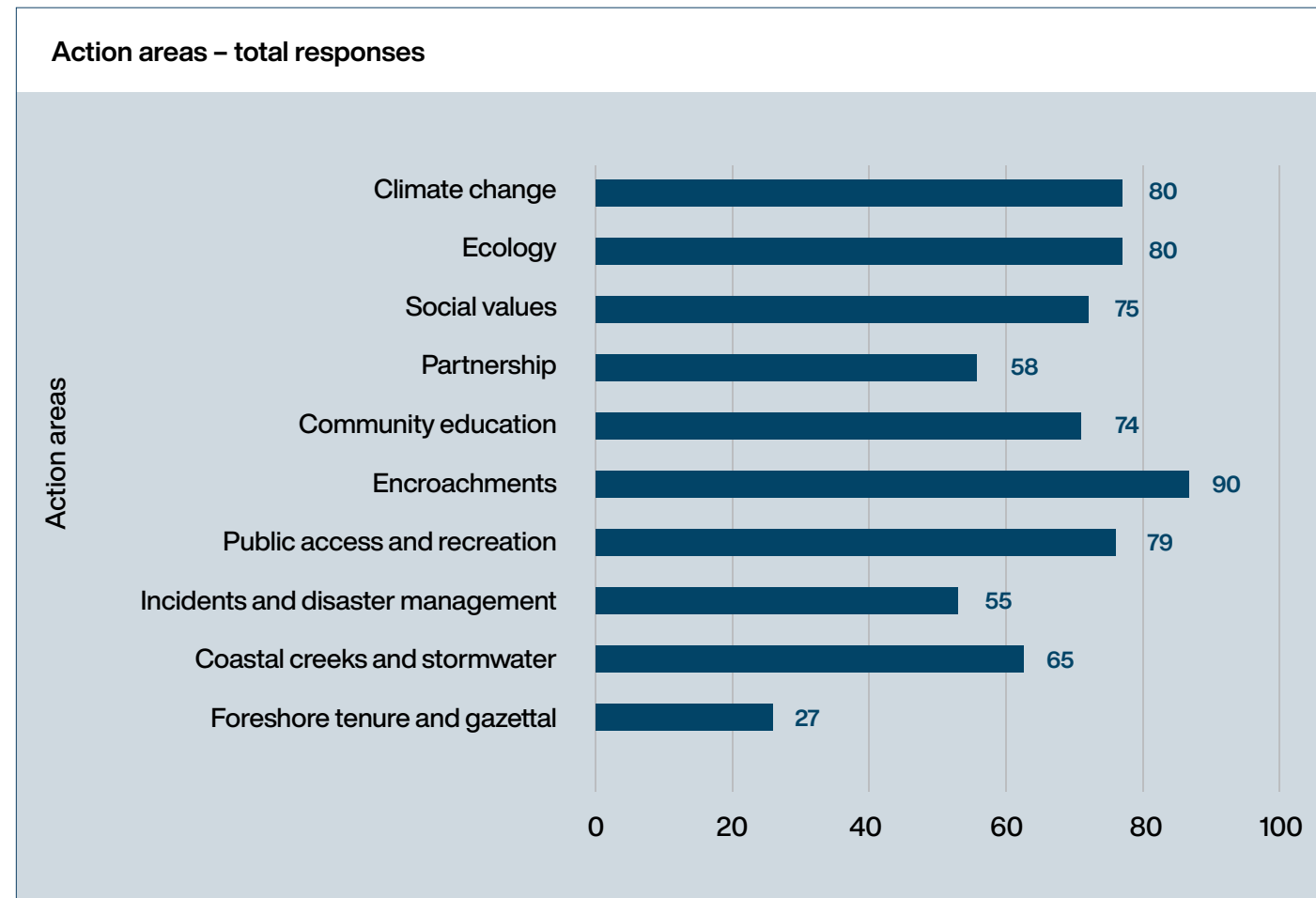
disasters and the long-term impact on the natural environment.”

- “I like the actions and agree things change and need to be addressed. However, I am wary when it gets wrapped up in the term climate change where time and energy are wasted on things that cannot be controlled and may not even be happening or the reason for it.”

When asked how well the draft plan identified the environmental values important to them, 62.5% of respondents chose ‘Well’ or ‘Very well’. 13.8% did not think the draft plan identified the environmental values that were important to them.

When respondents were asked if there was anything missing or overlooked in the draft principles or in each theme, they provided free text answers that informed the review of the principles and themes.

Across the 204 survey respondents, there were a total of 683 written responses across the 10 action areas.



Community round table

All attendees were aged 41 or older.

- 53.8% were male and 38.5% were female.
- 52.1% identified as residents or homeowners in the Eastern Beaches Area
- 42.3% of community roundtable participants are part of a local group.
- Comet Park Bushcare Bushland Care
- Coolum & North Shore Coast Care
- Eastern Beaches Bushcare collaborative
- Eastern Beaches Protection Association
- Natural area contractors
- Noosa and District Landcare
- Noosa Biosphere
- Noosa Bush Beach and Creek Care
- Noosa Heads SLSC
- Noosa Integrated Catchment Association
- Noosa Parks Association
- Non-coastal bushcare groups
- Peregrian Beach Community Association
- Peregrian Family and Friends Association
- Sunshine Beach Surf Club
- Surfrider Foundation Australia
- Zero Emissions Noosa

Key findings

Stormwater and creeks

- 10.1% of survey responses mentioned stormwater or creek/s
- This was also raised in four of the 13 community pop-ups

Major themes included:

- Improve the channelling of stormwater runoff away from the foreshores, particularly following heavy rain events
- Address water quality in Burgess Creek and work with Unity Water to upgrade filtration from their treatment plant
- Place greater emphasis on the issue of erosion at the mouth of creek outlets to the beach

Funding

- 5.7% of survey responses regarding the action areas mentioned fund/funds/funding/budget

Major themes included:

- Concern regarding the capacity to fund all action areas proposed
- Clarity on Council approach to ensure appropriate funds can be allocated from the existing budget
- Establishment of a funding model to resource long term management

Community partnership

- 11.4% of survey responses mentioned neighbour/s or resident/s

Major themes included:

- Leverage community knowledge and interest in caring for and maintaining the reserves
- Increase engagement and partnership with neighbours

Engagement process

- Across the engagement activities there were concerns raised about the consultation process

Major themes included:

- A desire for greater collaboration with community and stakeholders prior to consultation beginning
- Scope of the consultation, as respondents wished to discuss related plans and policies such as the Coastal Hazards Adaptation Plan 2021
- Opportunities for greater partnership and engagement from Council on the plan and how it is delivered

Dogs

- 7.2% of the survey responses regarding the action areas mentioned dog/s
- Dogs were also raised in nine of the 13 community pop-ups

Major themes included:

- Educate owners on the environmental impacts of dog waste
- Use both education and enforcement to ensure dogs are not present in dog-free beach areas and only unleashed in designated leash-free areas
- Address damage caused by dogs (particularly when off-leash) to the dunes, vegetation, and wildlife

Weeds

- 6.7% of the survey responses mentioned weed/s or weeding
- This was also raised in five of the 13 community pop-ups

Major themes included:

- Focus not only on glory lily, but other pest species such as Singapore daisy and asparagus fern
- Collaborate with residents on weed management and acknowledge local knowledge and efforts in this space
- Ensure the removal of weeds is accompanied by an increase of native fauna and flora

Analysis and plan review

Independent engagement consultants analysed data from the community roundtables, online survey, and the popups. All of the independent analysis and data from the community roundtables, online survey, pop-ups, and submissions were considered during the plan review.

Report and Council consideration for release

This report and associated documents including a report of consultation is available on the Council meetings section of Council's website. The independent consultation analysis and reports, the draft plan with track changes and the consultation review table are available on the Eastern Beaches Foreshore Reserves Management Plan web page.



Casuarina equisetifolia – horse-tail she-oak

7. Partnerships

Noosa Council works with a wide range of partners and stakeholders to manage the EBRFs. Council collaborates with dedicated volunteers, and various government, education and community organisations to protect and enhance the natural, cultural and social values of the EBRFs.

Objective

Develop and foster partnerships to collaboratively manage Noosa's foreshores

Outcomes

- Partnerships are mutually beneficial and supportive
- New memberships for existing partnerships are supported and encouraged
- New partnerships are supported and encouraged

Community Bushland Care Program

Community Bushland Care volunteers are very active across the Eastern Beaches, with seven groups working at multiple sites in and next to the EBRFs.

Eastern Beaches Bushland Care Groups include Burgess Creek Bushland Care, Castaways Beach Bushland Care, Marcus Creek Bushland Care, Noosa's Bush, Beach and Creek Care, South Peregian Beach Bushland Care, North Peregian Bushland Care and Sunrise Beach Bushland Care.

Some work twice a week, others weekly, fortnightly, or monthly. Some groups work on more than one site, and some individuals work with multiple groups.

The Bushland Care groups weed and plant in various reserves, and some apply for grants, administer large ecological restoration projects and contracts, run community events, fund and implement community infrastructure and deliver community education projects.

Other activities include citizen science data collection, pandanus leaf-stripping and community liaison. They are supported by Community Bushland Care officers in Council's Natural Areas Team.

Turtles

Turtle monitoring and response in Noosa is a combination of accredited community volunteers and Council officers. A team of accredited volunteers from Coolum and North Shore Coast Care maps and monitors sea turtle nests, protects them from foxes with mesh, relocates nests when they are endangered by storms or tides and monitors turtle hatchings.

Coolum and North Shore Coast Care also advocates for better protection and management of turtle nesting sites and conducts community education on how the community can help turtles. It works closely with Queensland Turtle Care, Sunshine Coast Council, Department of Environment and Science, and Council's Natural Areas Team.

The Natural Areas team also monitors North Shore Beach for turtle activity during the laying and hatching season and responds to North Shore turtle strandings.

Working with educational institutions

Noosa Council has a Memorandum of Understanding with the University of the Sunshine Coast (USC), primarily targeted towards collaborative research projects, and this can extend to paid internships and other workplace learning opportunities.

Similar arrangements and on-ground projects could be developed with other institutions such as TAFEs, and secondary and primary schools. Current projects include 4D beach mapping with USC as well as satellite-derived bathymetry trials as part of Council's Coastal Monitoring Plan.

For more information, please see Section 5: Linked projects and programs and Appendix One: Linked projects and programs

Environmental and social research opportunities

Council hosts or participates in several research projects, including turtle monitoring with local volunteer groups, wallum frog monitoring conducted by Mary River Catchment Coordinating Committee, and algae monitoring.

Other partners in the management of the EBRFs include Noosa & District Landcare, Noosa Integrated Catchment Association, Unitywater, Sunshine Coast Council and Queensland Department of Environment and Science.

Coastal Connect

Coastal Connect is a revegetation and regeneration project run by three Bushland Care Group coordinators along the Eastern Beaches, funding and managing bush regeneration contractor labour days across the EBRF.

The Coastal Connect project is a successful collaborative project that has achieved strong environmental outcomes. It requires significant volunteer time to develop projects, write and administer grants, manage contractors and report on the grants.

According to the Coastal Connect coordinators, project highlights include:

"...observing how our foreshore plantings at Seaview Creek have helped the dunes resist significant weather events."

"...contractor teams enabling work to be undertaken in difficult to access or hard to reach spots and use herbicides, where volunteers don't have the training nor expertise."

"...creating a balance between visual amenity along public pathways and protecting/regenerating ecologically important riparian areas."

Further budget for future years to support the program of works initiated through this volunteer-run Coastal Connect program could provide for an increase in the number of labour days contractors are funded to undertake rehabilitation work along the Eastern Beaches.



EBRFMP Management activities

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
7.1. In collaboration with existing and new partners, develop one-off and alternate volunteer opportunities for locals and visitors.	Environmental Services	Immediate
7.2. Identify gaps and potential partners, actively seek and develop partnership opportunities, and be open to new project and partner proposals that contribute to management vision and objectives.	Environmental Services	Immediate Continuing
7.3. Identify, review and document partner projects and collaborations and make information accessible for others to read about and learn from.	Environmental Services	Medium
7.4. In collaboration with partners, publicise events and volunteer opportunities and host open days to encourage new members and partnerships.	Environmental Services	Medium

Measures

Measure	Responsibility	Timeframe
Partnership meets partners expectations >75%. Assess via satisfaction surveys as part of the EBRFMP review.	Environmental Services	Every 2 years



8. Climate change



Our foreshores are at the front line of climate change with expected climate change impacts such as sea level rise and increased storm intensity and frequency already being felt. Naturally vegetated foreshores play a vital role in sustaining our coasts and protecting foreshore communities as sea levels rise and erosion areas expand landward.

Objective

Contribute to improved community climate change resilience and stability of coastal landforms, using nature-based methods, protecting and improving native vegetation and managing and enhancing public access.

Outcomes

- Preferred adaptation responses for the different localities described in the Noosa CHAP are expressed in reserve management and community coastal infrastructure design, delivery and maintenance.
- EBRFs are managed as natural areas as part of a nature-based approach to mitigating climate change and coastal hazards risks.
- Coastal climate change considerations are incorporated into foreshore reserve planning and management.
- Coastal climate change considerations are incorporated into disaster and emergency preparation and response
- Erosion and vegetation damage associated with public beach accesses and uses is reduced.
- The resilience of beach accesses to climate change and extreme weather is increased.

Noosa Coastal Hazards Adaptation Plan (CHAP) 2021

The Noosa CHAP identifies and maps Noosa’s potential coastal hazards risks, including sea level rise, coastal erosion and storm tide inundation for three future timestamps: 2040, 2070 and 2100.

Virtually all the land in the EBRFs is identified as erosion-

prone, and the beach and some frontal dunes and coastal creeks are identified as vulnerable to storm tide inundation during a major storm event.

Community consultation for the Noosa CHAP strongly identified nature-based solutions as the preferred response to climate change impacts.

Many in the community consider that a nature-based approach will best keep the natural look and feel and safeguard the natural environment, while mitigating coastal hazard impacts.

Building the health and natural stability of the natural foreshores and vegetated dunes, and maintaining natural coastal processes of erosion and accretion, are central to this approach.

The EBRFMP implements this aspect of the Noosa CHAP for the Eastern Beaches. The CHAP implementation program lists and prioritises actions and tasks associated with the CHAP’s five-year plan and adaptation pathway response for each locality. The EBRFMP has been identified as an ‘Extreme’ priority addressing risks identified as ‘Very High’ through the CHAP process. Other aspects of the Noosa CHAP are implemented under other plans and programs.

Coastal hazards monitoring

As part of its strategy to manage climate change impacts along the coastline, Council developed a long-term Coastal Monitoring Plan in 2022 which sets out annual monitoring activities to:

- 1 - Better inform coastal management measures;
- 2 - Identify key areas requiring future management; and
- 3 - Provide data for future coastal hazard studies.

This work responds to a key message received from the community during the development of localised data collection and monitoring of the coastal system should be prioritised to better understand and model the impact of coastal hazards driven by climate change.

This data will inform future climate change mitigation actions and provide feedback on the outcomes of current and future management.

The monitoring plan includes a range of data collection methods including remote sensing techniques to capture shoreline position, beach levels, beach volume, seafloor levels, vegetation extent and density, seafloor sediment volumes, and the movement of creek outlets. The data collection methods include upper beach surveying, photogrammetry and LiDAR topography from drones, fixed cameras, CoastSnap citizen science sites, water-based surveys using single beam echo sounders, and satellite-derived bathymetry. The coastal monitoring program is scheduled to be undertaken annually, before and after the storm season.

Current beach and dune condition

In the early seventies, a series of severe storms and cyclones caused severe erosion to many of Queensland beaches.

In Noosa, significant dunal erosion occurred and extensive area of coffee rock were exposed on the beaches. In many places dunal vegetation was lower and less dense.

Over the last 50 years, Noosa’s Eastern Beaches have benefited from relatively stable weather conditions with only minor to moderate erosion events happening periodically, interspersed by steady accretion as the beaches, dunes and vegetation have recovered.

The dunes and beaches are much wider, coffee rock is only occasionally exposed on the beaches, and dune vegetation is much denser and covers a much bigger area now than after the 1970’s coastal erosion events.

From a risk management perspective, careful planning requires Council to consider the impacts of future events like the early seventies events and put measures in place to minimise impacts.

Ensuring a healthy dune system is an important measure toward this as outlined in the CHAP. Under future climate scenarios we may see the increased frequency and severity of major storm events that trigger erosion.



Figure 10: Beach erosion after Tropical Cyclone Daisy, 1972

How do vegetated dunes buffer our coasts to climate change impacts?

Climate change may increase both the occurrence and intensity of severe weather events and cause sea level rise, increasing storm tide inundation, permanent inundation and beach erosion.

An important ecosystem service that naturally vegetated foreshores provide is the buffering of beaches and dunes to help slow coastal erosion impacts.³

Healthy dune systems absorb wave and wind energy and can reduce flooding, wind, and storm surge impacts.

Dune vegetation helps hold dunes and foreshores together, making them more resilient to wind and wave erosion⁴. The vegetation slows the wind near the surface of the dune and allows sand to drop out of the air. This reduces wind impacts on the dunes and nearby settlements and recreational areas.

Healthy dune systems are self-regenerating and can rebuild more easily after severe weather events, given enough time between storms and availability of suitable material for rebuilding.

Dunes in good condition means that there are sources of seeds and runners nearby to re-colonise disturbed areas after storm events. Vegetation and natural debris act as an entrapment point, allowing the lodgment of sand and seeds that contribute to the rebuilding and revegetation of frontal dunes after disturbance.⁵

Biodiverse, healthy vegetation on dunes means that the native vegetation remains more adaptable and resilient to any changes.

We don't yet know which species are likely to be more adaptable to changed climatic conditions, or more resistant to disease or new predators facilitated by climate change.

Having a wide range of native species mixed in with each other means that change resilient species are more likely to be in place, and that the loss of some species is less likely to significantly reduce vegetation cover and be more easily recovered by remaining species.

Sloping, healthy dunes help keep sand on our beaches. Waves run out on the natural slope, reducing the amount of energy available to lift and carry sand away.

Steep dune faces, left after storms, soon slump and quickly return the back of the beach to a more natural slope.

Dunes are a source of sediment for offshore bars that develop after storms, that then act as a local source of sediment to rebuild beaches and frontal dunes.⁶

EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
8.1. Update and implement ecological restoration plans for all EBRFs.	Environmental Services	Immediate Continuing
8.2. Provide general community information about the values of vegetated foreshores and natural processes for community climate change resilience online, on-reserve and nearby.	Climate Change Environmental Services	Immediate
8.3. Experiment with accelerated assisted natural bush regeneration, vegetation rehabilitation and dune rebuilding, especially at the seaward edge of dunes and foreshores.	Environmental Services Bushcare groups	Immediate Continuing
8.4. Develop design standards for beach accesses and coastal community infrastructure components.	Infrastructure Services	Immediate Continuing
8.5. Allocate emergency contingent ecology funds and resources as part of annual budget process to more readily deploy bush regeneration and recovery activities after severe weather and disaster events.	Environmental Services	Medium
8.6. Develop an overarching beach access plan and maintenance plan for beach accesses and coastal community infrastructure components.	Environmental Services Infrastructure Services	Medium
8.7. Conduct a review of existing beach accesses, viewing platforms, signage, fencing, seat and other community coastal infrastructure, in line with Noosa's Design Principles. Review elements include classification, location, use, construction and maintenance, environmental impacts and defects, overuse and new or moved beach accesses where needed.	Environmental Services Infrastructure Services	Long

³ Morris et al. (2021). The Australian Nature-Based Methods for Reducing Risk from Coastal Hazards. Earth Systems and Climate Change Hub Report No. 26. NESP Earth Systems and Climate Change Hub, Australia.

⁴ Clark GF, Fischer M, Hunter C (2021). Coasts: Coastal ecosystems and habitats. In: Australia State of the environment 2021, Australian Government Department of Agriculture, Water and the Environment, Canberra, <https://soe.dcceew.gov.au/coasts/environment/coastal-ecosystems-and-habitats6>

⁵ De Battisti, D. (2021). The resilience of coastal ecosystems: A functional trait-based perspective. Journal of Ecology. 109

⁶ Laylor, P., Jackson, D.W.T. (2022). A Nature-Based Solution for Coastal Foredune Restoration: The Case Study of Maghera, County Donegal, Ireland. In: Misiune, I., Depellegrin, D., Egarter Vigl, L. (eds) Human-Nature Interactions. Springer, Cham.

Measures

Measure	Responsibility	Timeframe
Conduct a desktop review of the extent of EBRF vegetation every two years, using remote sensing data collected under the Coastal Monitoring Plan. Vegetation % cover.	Environmental Services Climate Change	Every 2 years
Conduct an annual audit to ensure climate change elements are incorporated into new or reviewed management planning and works, aiming for 100% compliance.	Environmental Services	Immediate Ongoing

After-fire bush regeneration at Peregrin Beach – a post-extreme weather event rapid response opportunity

After the September 2019 fires at Peregrin Beach, an area on the western side of David Low Way and backing onto national park was badly affected by fire.

In places most of the canopy trees were destroyed, increasing sunlight, and making the area vulnerable to roadside weed grasses.

The Peregrin Beach Bushland Care group requested that Council allocate a small budget to employ a contractor to treat the weed grasses.

The budget was eventually allocated but the weed grasses had established and expanded, and the originally proposed budget was no longer adequate.

A post-event rapid regeneration response budget will allow flexibility to respond to a range of extreme weather impacts, including fire, which would be cost-effective and help prevent degradation.



9. Ecology

Stretching 11.5 kilometres along Noosa's Eastern Beaches foreshore, and covering about 122 hectares, the EBRFs have a range of on-site and strategic ecological values.

Objective

Protect and improve the biodiversity values of the Eastern Beaches Foreshore Reserves network, using best practice management techniques.

Outcomes

- The extent and condition of EBRF native vegetation is improved
- Internal connectivity and wildlife movement within the foreshore reserve strip is maintained and enhanced.
- External connectivity between the foreshore reserves and nearby natural areas is identified, protected, and restored.
- Threatened species populations and habitats are protected and enhanced
- Climate change considerations are incorporated into ecological management activities.

Information on environmental values is derived from environmental reports from the Qld Department of Environment and Science and Qld Department of Resources. The reports used for this plan are available on the Eastern Beaches Foreshore Reserve Management Plan webpage.

Habitat

The EBRFs conserve ecosystems unique to open beach coasts. A range of land birds, shore birds, reptiles, including sea turtles, and mammals rely on the interaction of land, beach and in-shore ecosystems that occur in coastal dunes and foreshores.

Significant species

Several species scheduled as Endangered, Vulnerable, or Near Threatened (E, V, NT) under the Environmental Protection and Biodiversity Act (Cth) 1999 and/or Nature Conservation Act (QLD) 1992 occur or have suitable habitat in the EBRFs and may have species management and other management documents that require consideration in the EBRF.

Scheduled species include:

- [Caretta caretta](#) - loggerhead turtle (E ICUN, E EPBACA, E NCA)
- [Chelonia mydas](#) - green turtle (E ICUN, V EPBACA, V NCA)
- [Litoria olongburensis](#) - wallum sedge frog (V EPBCA)
- [Litoria freycineti](#) - wallum rocket frog (V NCA)
- [Crinia tinnula](#) - wallum froglet (V NCA)
- [Calyptorhynchus lathami](#) - glossy black-cockatoo (V NCA)
- [Phascolarctus cinereus](#) - koala (V SEQ bioregion NCA)

The mapped ecosystems are recognised as having the following potential significant plant species values:

12.2.5. Potential habitat for NCA listed plant species: *Acacia attenuata*, *Acacia baueri* subsp. *baueri*, *Boronia rivularis*, *Durringtonia paludosa*, *Glycine argyrea*, *Macarthuria complanata*, *Maundia triglochinoidea*, *Persicaria elatior*, *Phaius australis*. This ecosystem is also known to provide suitable habitat for koalas (*Phascolarctos cinereus*).

12.2.7. Habitat for threatened plant species including *Phaius australis*, *P. bernaysii* and near- threatened species including *Durringtonia paludosa*. This ecosystem is also known to provide suitable habitat for koalas (*Phascolarctos cinereus*).

12.2.13. Habitat for threatened plant species including *Allocasuarina emuina*, *Acacia attenuata*, *A. baueri* subsp. *Baueri*, *Prasophyllum wallum* and near threatened species including *Macarthuria complanata*.

12.2.15. Potential habitat for NCA listed plant species: *Durringtonia paludosa*, *Eleocharis difformis*, *Maundia triglochinoidea*, *Thelypteris confluens*.

Ecosystems

Most of Castaways Beach Foreshore Reserve, Marcus Beach Foreshore Reserve, Peregian Beach Foreshore Reserve North, Peregian Beach Foreshore Reserve South and Peregian Creek Bushland Reserve are mapped as remnant Regional Ecosystem (RE) 12.2.14.

About two-thirds of Sunrise Beach Foreshore Reserve and Sunshine Beach Foreshore Reserve are mapped as High Value Regrowth (HVR) 12.2.14.

Detailed regional ecosystem mapping of the EBRFs was undertaken in 2021-22, with significant expansion of mapped high value regrowth and some expansion of mapped RE. In 2021 mapped HVR and RE was 87.3 ha, in 2022 126.9 ha was mapped. Small areas of four new REs, 12.2.5 (HVR), 12.2.7 (RE), 12.2.13 (HVR), and 12.2.15 (RE) were mapped, probably due to more detailed mapping than developing regrowth.

For further information to develop planting lists, rehabilitation targets and monitoring criteria, and short RE descriptions please see Appendix Three: Regional Ecosystem short descriptions. For long descriptions and technical information please see:

Regional Ecosystem [Descriptions](#)
apps.des.qld.gov.au/regional-ecosystems/

Regional Ecosystem [Technical Descriptions](#)
publications.qld.gov.au/dataset/re-technical-descriptions

Regional Ecosystem [Benchmarks](#)
qld.gov.au/environment/plants-animals/biodiversity/benchmarks

Hydrology

Some of the ecosystems and plant and animal species in the EBRFs are groundwater dependant –they depend on specific groundwater conditions including groundwater level, retention (e.g., due to coffee rock or peat layers),

pH, salinity, gradient pressure, and nutrient profile. Bores and other extraction, drains, paths, earthworks and introduced materials can impact on the groundwater profiles, as can climate change factors discussed below.

Environmental values, environmental management and climate change

Like other natural areas, the biodiversity and other environmental values of naturally vegetated foreshores are being impacted by climate change⁷.

But foreshores are particularly vulnerable to many impacts, like increasing inundation, severe weather effects and sea level rise, due to their location.

The characteristics of many urban dune areas (e.g., long, narrow, closely surrounded by development, crossed by tracks) may also increase the impacts of climate change.

Wetlands

Coastal freshwater wetlands are likely to be affected by saltwater intrusion and inundation, and wetlands near frontal dunes are likely to be affected by more frequent periodic, tidal, or permanent inundation due to both rising sea levels and increasing severe weather⁸.

In many cases these wetlands will try to move up the slope, to maintain suitable hydrology, and may be prevented by tracks and other openings near ecosystem interfaces or by cleared, developed land around the dunes.

Ensuring healthy, biodiverse wetland ecosystems through active land management, regeneration and weed control will build resilience to climate-driven changes.

Severe weather

Severe weather events, such as storms, drought, floods, and bushfire, are increasing as climate change progresses and often cause disturbance in natural areas.

⁷ Hoffmann, A.A., Rymer, P.D., Byrne, M., Ruthrof, K.X., Whinam, J., McGeoch, M., Bergstrom, D.M., Guerin, G.R., Sparrow, B., Joseph, L., Hill, S.J., Andrew, N.R., Camac, J., Bell, N., Riegler, M., Gardner, J.L. and Williams, S.E. (2019), Impacts of recent climate change on terrestrial flora and fauna: Some emerging Australian examples. *Austral Ecology*, 44: 3-27. <https://doi.org/10.1111/aec.12674>

⁸ White, E., and Kaplan, D. 2017. Restore or retreat? Saltwater intrusion and water management in coastal wetlands. *Ecosystem Health and Sustainability* 3(1): e01258. doi: 10.1002/ehs2.1258

Increasing disturbance increases the likelihood of ecological degradation and simplification, with reduced ecological values, reduced ecosystem services and the need for increased management. These impacts are exacerbated by neighbour and visitor impacts and the impacts of foreshore reserve bushland patch characteristics, such as small size, and long, narrow shape.

Active management of these disturbances, including maintaining ecosystem health to reduce vulnerability and maximise native species regeneration resources (such as seeds, crowns, and runners) and rapid response after and during disturbances, will help reduce climate change impacts on naturally vegetated foreshores⁹.

Connectivity

Many urban dune networks are narrow and closely surrounded by urban development, which can prevent the safe movement of native animals through them and colonisation of native plants within them.

Landscape connectivity to bushland away from the coast is often entirely prevented or very limited, and internal connectivity is often compromised by clearings, development, paths, and fences.

Connectivity within a natural area, and to other natural areas, can be critical to allowing native plants and animal species and individuals to adapt to climate change. Allowing the movement of individual and populations of species allows them to move to the changing location of climatic conditions (e.g., exposure, temperature, moisture) and environmental conditions (e.g., hydrology, pH, salinity, ecosystem) they need to survive and maintain viable populations¹⁰.

Changing ecosystems and plant and animal distributions

Climate change can affect or change the ecosystems, ecosystem characteristics and the location and distribution of plants and animals.

Observed and likely regional ecosystem and other shifts due to climate change should be acknowledged and incorporated when setting ecological restoration targets, developing planting lists and conducting other ecological management activities^{11,12}.

Sea turtles

Caretta caretta - loggerhead turtle (E ICUN, E EPBACA, E NCA)

Chelonia mydas - green turtle (E ICUN, V EPBACA, V NCA)

Loggerhead and green turtles nest and hatch on the Queensland coast at Noosa. They are found around the globe, travelling extensive distances between their inshore seagrass and seaweed feeding sites and sandy beach breeding grounds each year.

Hatchlings and young turtles drift in the open ocean for years, eating small animals in and near patches of floating seaweed. They start breeding between 10 and 30 years of age and can live up to 70-90 years. While they mostly live in the ocean, some land-based threats can affect them, particularly during nesting and hatching (November-February).

Threatened Fauna Road Map

With Noosa Council's Threatened Fauna Road Map recently endorsed by Council, sea turtles (Loggerhead and Green) have been identified as management priorities for the 2023/24 financial year.

Existing sea turtle research and management actions include ongoing nest monitoring and management, community awareness campaigns and marine debris clean-up initiatives. A Sea Turtle Recovery Action Plan for the Noosa Shire will be developed for the commencement of the 2023 breeding season.

The Sea Turtle Action Recovery Plan will aim to maximum the outcomes of the various conservation efforts currently being implemented by Community Conservation Groups and Council, while also contributing to external local, state and commonwealth government sea turtle recovery programs.

This initiative aims to provide clear management approaches across the Eastern Beaches and Noosa North Shore, to address the threatening process impacting the survival of these threatened and iconic species.

Coolum and North Shore Coast Care (CaNSCC) - Turtle Monitoring Group

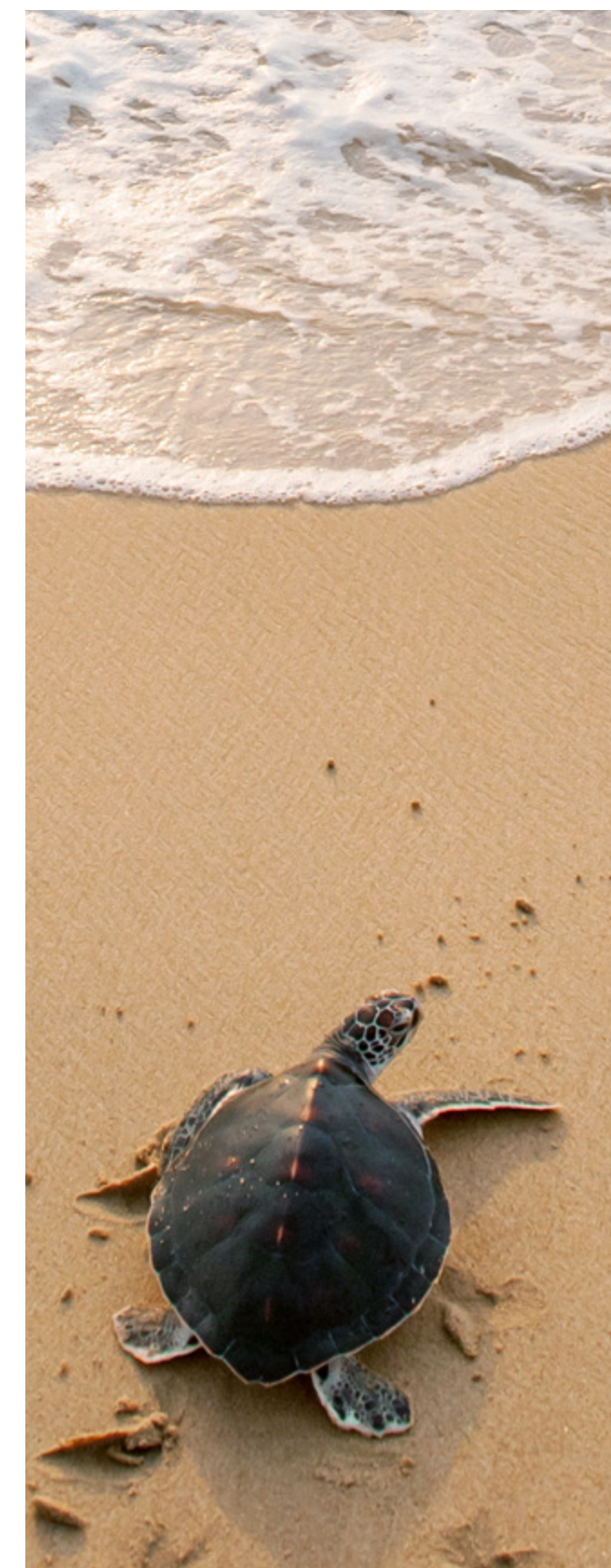
Volunteers from Coolum and North Shore Coast Care's Turtle Monitoring and Council officers respond to reports of turtle nests on Noosa beaches, often reported by regular local beach walkers who volunteer with CaNSCC as spotters for tracks on the beach in the early morning before they are obscured by foot traffic or the tide.

Accredited and experienced volunteers map and record each nest, including species (from track characteristics), date and weather and sand conditions. Each nest is assessed by the volunteers for the likelihood of impacts such as flooding, crushing from traffic, exposure from erosion and similar. If these impacts are considered likely, the nest will be moved by the volunteers to a safer place, usually in the dunes nearby. The turtle nest is meshed with plastic mesh to protect them from dogs and foxes – the mesh must be plastic as metal will interfere with the hatchlings natural magnetic field navigation for later trans-ocean migration and return to their hatching region.

Volunteers monitor the nest and dig the nests to determine the number of eggs and rate of hatching success after the hatchlings have emerged. Data collected is used to inform future turtle conservation and management.

Turtle Monitoring volunteers also respond to reports of ill or dead turtles. Live turtles are transported to treatment and care facilities. Dead turtles may be collected for

necropsy, if fresh, at an associated institution to determine the cause of death. Dead turtles are reported to Council and the Department of Environment and Science.



⁹ Lindenmayer, D. B., Steffen, W., Burbidge, A. A., Hughes, I., Kitching, R. L., Musgrave, W., Mark Stafford Smith, M., Werner, P. A. 2010. Conservation strategies in response to rapid climate change: Australia as a case study. *Biological Conservation*, 55(7), 1587-1593.

¹⁰ Hoffmann, A.A., Rymer, P.D., Byrne, M., Ruthrof, K.X., Whinam, J., McGeoch, M., Bergstrom, D.M., Guerin, G.R., Sparrow, B., Joseph, L., Hill, S.J., Andrew, N.R., Camac, J., Bell, N., Riegler, M., Gardner, J.L. and Williams, S.E. (2019), Impacts of recent climate change on terrestrial flora and fauna: Some emerging Australian examples. *Austral Ecology*, 44: 3-27. <https://doi.org/10.1111/aec.12674>

¹¹ Harrison, P.A. (2021), Climate change and the suitability of local and non-local species for ecosystem restoration. *Ecol Manag Restor*, 22: 75-91. <https://doi.org/10.1111/emr.12520>

¹² McDonald T., Jonson J. and Dixon K. W. (2016). National standards for the practice of ecological restoration in Australia. *Restoration Ecology* 24, S4-S32

Land based threats to turtles

- **Eroded foredunes:** If the frontal dunes are too steep, turtles are not able to climb them. They are more likely to lay their eggs at the foot of the dunes, where they are more vulnerable to flooding, getting washed away, or crushed by vehicles.
- **Foxes, wild dogs and domestic dogs:** They sniff out the eggs, dig them up and eat them.
- **Hard plastic, soft plastic, inflated and burst balloons look like food to turtles:** They can block and fill turtle stomachs and intestines, causing starvation, illness, and death. Biodegradable plastic and balloons still cause problems as they don't break down quickly or reliably enough, and often break down into microplastics.
- **Light:** Baby turtles move towards the brightest light they can see, thinking it is the moon shining over the ocean. They are easily confused by artificial lights on the land that penetrate through to the beach, and may end up lost in the dunes, in drains or on roads. Nesting female turtles are discouraged from laying on lighted beaches and may also be confused by light when returning to the sea, although to a lesser degree than hatchlings.
- **Climate change:** Higher sand temperatures during incubation means that fewer males are being hatched. Sea level rise and increasing storm occurrence and intensity means that nests are more likely to be flooded or washed away. Frontal dunes are more likely to be eroded and steep, preventing turtle access and making it more likely nests are laid where they could be flooded or crushed by traffic. Climate change mitigation measures like sea walls or beach nourishment can also cause problems by preventing access, burying nests or changing the consistency of the sand.



Pandanus

Pandanus palms are an iconic local in both our natural areas and coastal open space. Pandanus leafhopper (*Jamella australiae*) first arrived in South East Queensland from North Queensland on transplanted pandanus trees for landscaping in the early 1990's.

There was a significant loss (>75%) of pandanus as leaf hopper populations exploded in the absence of their native predators, and community groups, scientists and land managers worked to discover both the cause and effective treatment.

In 1996 and 1997, and after greenhouse and laboratory-based experiments and observations, scientists, land managers and community groups field-trialled treating pandanus, by stripping dead leaves off affected pandanus, and with several different insecticides, via stem injection and foliar spray, at different concentrations and into pandanus of different sizes and condition.

Dead leaf-stripping was found to help by reducing leaf hopper load and dead, decaying tissue, reducing crown-rot.

Stem injection was found to be generally effective but can cause stem injury and dead, decaying stem tissue, with particularly significant impact on small pandanus, and is now only used as a last resort.

Foliar spray was found to be effective, but it was difficult to get good coverage of larger pandanus. Both insecticide application methods unavoidably affect other insect populations.

Several predator wasps from NQ were trialed in 1996 and 1997. This was successful, with wasp populations of one species (*Aphanomerus nr. pusillus*) widely established, although populations were observed to drop during cold winters and very wet weather, with a subsequent upsurge in leafhopper numbers. Treatment was usually on an as-needed, as-reported basis.

Since 2016, specialist contractors, funded with a combination of community grant and Council budget (later fully funded by Council) twice yearly inspect, and report on, all Noosa's natural areas pandanus for health,

leaf hopper levels and wasp levels. Trees are treated at the annual inspection if required, primarily with dead leaf-stripping (often assisted by community groups) and wasp reintroduction, with foliar spraying and stem injection reserved for advanced cases. Pandanus numbers are supplemented by pandanus planting, using locally collected and raised seed.

Invasive species

The Noosa Biosecurity Plan 2020 identifies several priority pest species that directly apply to foreshore reserves, including glory lily, asparagus fern, Singapore daisy and foxes.

Many other invasive species occurring in our foreshore reserves. Invasive plant species are a significant threat to biodiversity, displacing native species, simplifying species and structure diversity, and reducing habitat values.

Foxes are a particular threat to coastal ground egg laying species, such as sea turtles and the Eastern Ground Parrot.

Glory lily

Glory lily (*Gloriosa superba*) has been described as a significant weed that we don't know how to effectively control in the field. It is a major threat to coastal ecological values and poses a particular impact on erosion mitigation due to weak stems and absence during part of the year.

Other invasive species occur in the EBRFs, and are included in condition mapping, restoration planning and works.

Glory lily is recognised as a serious ecological weed in Queensland and northern New South Wales, especially in dunes and other sandy coastal areas. Forming dense thickets and with twining leaf tips that allows it to climb over existing vegetation, glory lily smothers and dominates vegetation, replacing structurally and species-diverse coastal vegetation with a monoculture of an introduced plant¹³.

The glory lily also poses significant risks to coastal landforms and climate change resilience. It only grows above ground during the warmer months, leaving large areas of erosion-prone sand dunes largely bare for over half of the year.

¹³ Weeds Australia. (2019). Weed profile: Glory Lily, Gloriosa, Gloriosa Lily, Flame Lily, Rhodesian Flame Lily, Climbing Lily, Gloriosa superba. L.<https://weeds.org.au/profiles/gloria-lily-gloriosa-gloriosa-lily-flame-lily-rhodesian-flame-lily-climbing-lily/>

During above-ground months, with its fine, simple stems and no fibrous or surface roots, it provides little resistance to wind and water erosion for fragile dunes.

Large, persistent tubers and fragile underground stems also mean that glory lily is hard to control, with no mechanical control found effective, and an effective and sustainable chemical control method for naturalised populations has not been confirmed.

Recent Bushland Operational Assessment (BOA) condition mapping found that many areas in our EBRFs are dominated by glory lily, with some areas found to have more than 75% glory lily in the understory.

Ideally, BOA mapping in coastal areas should only be undertaken in summer and autumn, when the glory lily is showing above ground.

Coastal fox control program

One of the primary threats to sea turtles are foxes and dogs digging up turtle nests and eating the eggs.

Council's pests and land protection officers conduct fox control in the Coastal Fox Control Program as part of Council's sea turtle conservation efforts. The Coastal Fox Control Program is currently a joint project with Coolum and North Shore Coast Care, Sunshine Coast Council, and Queensland Parks and Wildlife Service, and has been running since 2015.

It is regarded as highly successful, evidenced via a drop in observed fox predation on turtle nests and anecdotal evidence of the return of native species such as bandicoots to some sections of the dunes.

Volunteers from Coolum and North Shore Coast Care and Council officers monitor fox predation on turtle nests in Noosa and place additional dig prevention mesh on top of nests that are at particular risk of fox predation. Many other coastal and near coastal native species benefit from fox and feral animal control, including ground parrots, water mouse, small mammals and shorebirds.

Management frameworks

Bushland Operational Assessment (BOA)

The Bushland Operational Assessment (BOA) is used to gauge condition of bushland in natural areas, based on the recovery resilience of the native vegetation, percentage of weeds, other impacts.

It is visually shown by easy to interpret colours on maps and backed up by condition classes, weed percentages and management information in the attribute tables.

All the weeds and observable impacts in the area of interest, along with some in adjoining areas (like a source weed in neighbouring parkland), are included in the map and attribute tables. The BOA is used to inform the management and rehabilitation of the area.

BOA has been used by Noosa Council and other local government agencies to map condition and plan works in Council-managed bushland since 2008. It is a long-standing and standard method and approach.

Please see below for examples of a BOA map and appendix five for attribute tables for Bushland Reserves outside of the Eastern Beaches Foreshore Reserves.



Figure 11: Example BOA and Management Consideration Map

Ecological Rehabilitation Plans

The BOA maps and attribute tables are at the heart of the Ecological Rehabilitation Plans - the site-specific plans that inform and details works needed to improve the condition of the natural area. They guide on-ground and site-specific activities of Council, contractors, and community members to achieve bestpractice ecological restoration.

Information includes hydrological information, social and environmental values, surrounding land management, current condition, current weed

infestations, target regional ecosystems and restoration targets and other management considerations.

The reserves are broken into management zones, each typically containing similar weeds, and similar required work and amount of work. Works typically include weed control of all the weeds, in a manner that protects and encourages native species germination. Breaks in internal connectivity are identified in BOA mapping, and their remediation planned and implemented where possible. Potential external linkages to other bushland are identified via desktop mapping and confirmed during nearby condition mapping processes.

Saving Noosa's pandanus palms

Noosa lost more than 75% of its pandanus palms during the pandanus leaf hopper outbreak in the 1990s - and perhaps another 10-15% of these palms have been lost in subsequent years due to later leafhopper infestations, natural senescence, succumbing to earlier damage, and broader impacts such as fire and vegetation damage.

Many of the battle-scarred survivors still show missing limbs, reduced crowns, and reduced health.

Most of the current healthy pandanus in the dunes were planted later by community groups and Council.

Natural pandanus germination is significantly reduced by the reduced numbers of mature, healthy seed producing adults, and by the degradation of the understory with weeds such as glory lily, asparagus fern and Singapore daisy.

Prior to the pandanus leafhopper outbreak, Eastern Beaches natural pandanus populations were likely affected by artillery training into the dunes during WW2, anecdotally reported sandmining, and the impacts of residential and community land development.

With these losses, and subsequent protection and planting, it is estimated that Noosa's pandanus population is currently about half of that at European

colonisation, with significantly reduced natural germination rates¹⁴.

Preventing advanced leafhopper infestation and plant decline and expanding pandanus populations is the community and Council's current two-pronged approach to saving Noosa's pandanus.

Twice yearly inspections and immediate treatment if needed means that treatment occurs before significant plant decline, leafhopper numbers are kept low, and predator wasp populations are maintained at an effective level.

Planting local pandanus tube-stock and direct seeding are contributing to population increases while we wait for the numbers of mature and healthy seed producing pandanus to increase.

Planned increased regeneration will help improve natural germination as understory health is regained.

During the survey in November 2022, only seven wasp re-introductions were needed and only 12 plants needed leaf stripping. No insecticide treatment was needed¹⁵.

This shows the health of the population is significantly improving, alongside reduced impact on native insects.



¹⁴ Ecosystem Management and Biosecurity Solutions. (2018). Pandanus Preservation Project Noosa: Protecting an icon and coastal biodiversity with science, collaboration and action. Unpublished

¹⁵ Ecosystem Management and Biosecurity Solutions. (2023). Pandanus Dieback Surveys and Mitigation - Noosa Shire Council November 2022. Unpublished



EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
9.1. Update bushland condition mapping for all EBRFs - only conduct BOA condition mapping in foreshore areas during summer when glory lily is showing.	Environmental Services	Immediate Continuing
9.2. Update and implement ecological restoration plans for all EBRFs.	Environmental Services Council:	Immediate Continuing
9.3. Incorporate climate change considerations in ecological management activities.	Environmental Services	Immediate Continuing
9.4. Minimise and actively rehabilitate cleared areas to reduce fragmentation and edge effect.	Environmental Services Infrastructure Services	Immediate Continuing
9.5. Target pandanus areas for regeneration to improve understory health and contribute to improved pandanus germination. Include pandanus regeneration activities in rehabilitation plans.	Environmental Services Infrastructure Services	Immediate Continuing
9.6. Minimise plastic elements in new and upgraded coastal community infrastructure and management to reduce plastic moving into the coastal environment from community coastal infrastructure.	Environmental Services Infrastructure Services	Immediate Continuing
9.7. Incorporate relevant aspects of threatened species, scheduled species and other significant native species monitoring and management plans into planning and management activities.	Environmental Services	Immediate Continuing
9.8. Investigate post event rapid response funding for ecological restoration.	Environmental Services	Medium
9.9. Contribute to glory lily research and adopt best practise to managing this pest species.	Environmental Services Infrastructure Services	Medium
9.10. Implement litter minimisation measures with other Council branches, better support community litter collection efforts and collect coastal marine debris information.	Environmental Services Infrastructure Services Waste Services	Medium

Measures

Measure	Responsibility	Timeframe
Conduct a desktop review of the extent of EBRF vegetation and EBRF RE and HVR vegetation every two years, using remote sensing data collected under the Coastal Monitoring Plan. Vegetation % cover of available land.	Environmental Services Climate Change	Every 2 years
Monitor for any changes in the EBRFs RE mapping every five years by measuring number of mapped REs and high value regrowth, using desktop mapping, vegetation management mapping and aerial photos.	Environmental Services	Every 5 years
Undertake BOA mapping in every 5 years. Compare against management zone rehabilitation targets in ecological rehabilitation plan, aiming for 75% or better compliance.	Environmental Services	Every 5 years
Conduct a landscape ecology review of the EBRFs during the review of this plan, assessing patch size, internal connectivity and landscape connectivity. Patch size, internal connectivity and landscape connectivity is increased.	Environmental Services	Establish baseline 2024-25 Every 4 years



10. Social values

Cultural values

The Eastern Beaches Foreshore Reserves have a range of cultural values for many communities.

Objective

Identify and protect Kabi Kabi and non-indigenous cultural heritage sites and values in the Eastern Beaches Foreshore Reserves.

Outcomes

- Kabi Kabi are supported in their cultural and environmental stewardship of the EBFRs.
- Community understanding of the cultural values of the EBFRs is increased.

Ocean coasts are resource-rich and important landmarks in the landscape, meaning that they are often important to people for both practical and spiritual reasons.

Many coastal dune networks have significant First Nations cultural value as cultural landscapes, past and current resource use and archaeological sites. They also often have resource or historical value for more recent residents, visitors and communities such as recreational fishing.

During the millennia of First Nations stewardship, it is likely that Kabi Kabi (Gubbi Gubbi) conducted firestick farming, maintaining open grassy understories in Noosa's eucalyptus forests that extended into the area currently managed as the EBFRs.

Kabi Kabi (Gubbi Gubbi) trapped and harvested fish, shellfish, sea turtle, and dugong in the coastal strip and would likely have periodically lived at sites in and near the coastal strip.

In conjunction with this resource use and occupation, they undertook cultural and resource stewardship practices and maintained ceremonial and spiritual places in the Eastern Beaches coastal strip.¹⁶

In an area surrounded by significant landmarks, and with several significant view lines, the Eastern Beaches coastal strip supports Kabi Kabi (Gubbi Gubbi) cultural landscapes and story places.

Before 1960 Noosa's coastal areas were primarily used by non-Indigenous people for fishing and holidaying in basic boarding houses and camps.

Away from the sand dunes, the area was dominated by low nutrient, acidic heathland, and wetlands unsuitable for western agriculture.

The Eastern Beaches' urban areas were opened to residential development and more formalised tourism in the 1960s, with the road from Coolumb upgraded and urban blocks on sale in Peregrine Beach in 1960.

Both road and urban development extended up to Sunshine Beach the following year¹⁷.

Scenic and landscape amenity

Noosa's natural scenic amenity and natural landscapes are a key contributor to Noosa's amenity. Coastal landscapes, and bushland are an essential part of the local 'look and feel' and character.

Objective

Contribute to Noosa's liveability and scenic amenity by managing the coastal landscapes native vegetation and public access in the Eastern Beaches Foreshore Reserves.

Outcomes

- The scenic and landscape amenity of the EBFRs is improved.

Liveability

The natural elements of the EBFRs and nearby bushland play a significant part in Noosa's liveability. The value of natural areas is well recognised by Noosa's community, with 'elements of the natural environment (natural

¹⁶ Noosa Council, Sergiacomoi, Leddy & Fesl, Eve (2004), Indigenous Cultural Heritage Study of Noosa Shire, Noosa: Noosa Shire Council.

¹⁷ Centre for the Government of Queensland. (2018). Noosa Southern Beaches <https://www.queenslandplaces.com.au/noosa-southern-beaches>

features, views, vegetation, topography, water, wildlife etc.)’ identified as Noosa’s #1 Care Factor in the recent Noosa Liveability Survey 2021.

Protecting and managing natural ecosystems and elements was ranked second.

The ability to see and interact with natural landscapes as part of our day-to-day routines contributes to physiological and physical wellbeing. Even small patches of bush visually break the pattern of residential developments and improve visual diversity, which also has psychological benefits. Natural vegetation provides cooling breezes in summer and reduces urban heat by shading and evapotranspiration.¹⁸

Economy and visitor experience

Our natural areas are the backbone of Noosa’s tourism industry, and visual amenity is a significant consideration when people are choosing where they go for their holidays. Scenic values and access to beaches and bushland also influences where people want to live, which in turn influences investment attraction and the local economy.

Viewpoints

Viewpoints are existing scenic viewing areas that provide a focal point for the public to enjoy the surrounding landscape. Viewpoint types in Noosa’s Eastern Beaches include:

Vista viewpoints: Broad landscape views, often incorporating water and coastal landscapes. Often a driver for visitor attraction to specific areas, and to Noosa generally.

Near-beach viewpoints: Cleared viewing areas close to the back of the beach, often associated with public beach accesses, sometimes with community supplied furniture, and may act as an informal community hub.

Surf condition viewpoints: Where people go to look at the ocean to assess conditions, including surfers, swimmers and kite surfers.

Noosa Design Principles

The Noosa Design Principles are used to guide good design that befits Noosa’s character, style and climate. These principles emphasise the importance of protecting Noosa’s environment and biodiversity by minimising the visual and environmental impact and dominance of the built environment on the natural environment. They seek to enhance Noosa’s natural ‘look and feel’ and sense of community by integrating the natural and built environment, viewing natural elements as opportunities rather than obstacles, and involving the community. The design principles inform the development and updates to design standards for beach infrastructure, including viewing points.

EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
10.1. Invite the Kabi Kabi (Gubbi Gubbi) to work in partnership with Council and other land managers to collaboratively manage the EBFRs.	Environmental Services	Immediate
10.2. Incorporate cultural heritage values in EBFRs management and interpretation.	Environmental Services	Immediate, ongoing
10.3. Implement Noosa Design Principles in reserve management and community coastal infrastructure design, delivery, and maintenance.	Environmental Services Infrastructure Services	Immediate, ongoing
10.4. Identify existing vista, near beach and surf condition viewpoints, and assess for visitor experience and environmental sustainability. Where environmentally sustainable, incorporate existing viewpoints into infrastructure upgrades.	Environmental Services Infrastructure Services	Medium
10.5. Upgrade and make beach accesses, entrances, and other points of interface between foreshore reserves and visitors and surrounding land uses welcoming, attractive and accessible.	Environmental Services Infrastructure Services	Long

¹⁸ Mahamane S, Wan N, Porter A, Hancock AS, Campbell J, Lyon TE, & Jordan KE. (2020) Natural Categorization: Electrophysiological Responses to Viewing Natural Versus Built Environments. *Frontiers of Psychology*, 11:990.

Measures

Measure	Responsibility	Timeframe
Conduct a desktop review of the extent of EBRF Kabi Kabi involvement in EBFR planning and management has been invited in a collaborative and supportive manner.	Environmental Services Infrastructure Services	Every four years
Cultural elements included in new EBFRs management and interpretation material.	Environmental Services Infrastructure Services	Every four years
Audit beach access and community infrastructure design and outcomes for Noosa Design Principles compliance, attractiveness, and improved accessibility.	Environmental Services Infrastructure Services	Every four years



11. Public access and recreation



Noosa's coastal bushland, beaches and waters are some of the most valued in the world, and thousands of residents and visitors are drawn to them every year.

Dunes and foreshores are where we access some of our most precious and in-demand recreation places. Maintaining long-term and sustainable public access to these highly desirable locations in the face of coastal erosion, climate change impacts and high visitor numbers is a challenge that requires careful planning.

Objective

Maintain adaptive, long-term, inclusive, safe and sustainable public recreational access to beaches, foreshores, waters, and foreshore bushland.

Outcomes

- Equitable access to a range of recreational and natural areas experiences, distributed across the EBFRs, is provided.
- Attractive and sustainable beach accesses and community infrastructure in the EBFRs are provided and improved.
- Erosion and vegetation damage associated with public access and recreation, public beach accesses and community infrastructure is reduced.
- Climate change considerations are included in beach accesses and community infrastructure planning and management
- Beach dog walking is supported while reducing its social and environmental impacts

Constructed recreational access and opportunities

Most EBFR recreational access is on the 41 beach accesses to Noosa's Eastern Beaches. Thousands of reserve visitors walk along the beach accesses through the EBFRs each week.

Some interpretative signs about coastal plants, animals, ecosystems and landform, mostly installed by community partners, are alongside some of the beach accesses. Some parts of the north-south coastal bike and pedestrian path run in or near the western boundary of the EBFRs.

Commercial and organised recreational access and opportunities

On the beaches or in nearby open space many organised community or commercial recreational opportunities are offered, some regulated under a permit or lease for commercial or community activities or temporary events permits. These include markets, concerts, surf lessons and board hire, other watercraft hire and lessons, weddings and other private events, boot camps and personal trainers, yoga and wellness classes and events, and sand sculpting workshops.

Council seeks to ensure that the adjoining foreshore reserves and the leases and permit activities are managed in a way that complements each other.

Universal access

Coastal natural areas, dunes, beaches and waters are desirable for everyone to access but also present challenges to universal access – they are highly exposed to the elements and salt and are ever-changing, sometimes very rapidly.

Sloped natural landforms, soft sand surfaces and natural vegetation can be highly unfavourable for some forms of universal access.

These challenges present opportunities to consider innovative access designs and materials and events.

A mobility mat – Mobi-Mat - has been installed on nearby Noosa Main Beach, through a collaborative project between Surf Life Saving Queensland, Noosa Surf Club, Tewantin-Noosa Lions Club, Noosa MP Sandy Bolton, and Council.

It is a firm, recycled plastic mat that extends from the beach access ramp in front of the Noosa Surf Life Club, across the beach and to the water. It provides better universal access down to the water, and access to the sand for sunbathing, making sandcastles and other beach activities.

This is a quasi-permanent installation, only removed for king tides and bad storms. Considerations in locating the mat in this area included: the very high visitor attendance, the flagged swimming area, and a flat, stable beach that enables quasi-permanent installation.

Swimming and surf lifesaving

With more than 11 kilometres of beaches, ocean swimming and paddling is a drawcard for locals and visitors.

Three flagged bathing areas in the EBFRs at Sunshine Beach, Sunrise Beach and Peregian Beach, are patrolled with a mix of paid Surf Life Saving Queensland lifeguards and volunteer lifesavers from Surf Life Saving clubs at Noosa Heads, Sunshine Beach and Peregian Beach.

There are surf clubs and towers at Sunshine Beach and Peregian Beach, and lifeguards and life savers regularly patrol some beaches outside of the flagged areas. The Surf Life Saving Club buildings and associated beach accesses, towers, accesses, and patrol areas are neighbours to the EBFRs.

Council aims to ensure the adjoining foreshore reserves and Surf Life Saving Club facilities are managed in a way that complement each other.

Surfing

Surfing is one of Noosa's most notable forms of recreation. The beach break at North Sunshine Beach is at the southern end of the Noosa World Surfing Reserve, and other well renowned surf breaks are highly popular along the length of the Eastern Beaches.

Surfing is a major contributor to livability and the Noosa "culture" for many residents, and surfing opportunities and events are a major drawcard for regional, interstate and international visitors.

Surf breaks and access for surfing is one of the drivers for the current location of many of our beach accesses and should be considered if new or moved beach accesses are proposed.

Viewing water conditions can be a reason for people to go off public paths, which may cause environmental damage and pose a risk to visitors. Incorporating desired water condition view line considerations when locating and designing viewing areas, platforms and other coastal community infrastructure will help maintain and enhance these values.



Figure 15: Mobility mat on Noosa Main Beach

Beach walking

Beach walking for exercise, meditation and socialising are important daily activities for many Noosa residents and visitors. People walk regular and occasional routes along beaches and nearby walkways, and into adjoining national parks.

Outcomes

Many people walk and exercise their dogs on the beach and on nearby walkways. EBFR off-leash areas are at Sunshine Beach, north from beach access 27 to the national park boundary, and Castaways and Marcus Beach, between beach accesses 38 and 47. Other beach areas are open to on-leash dogs, except the three designated bathing areas.

Consultation highlighted dogs on beaches as a very important issue to many people. Many people highly value being able to walk their dog on the beach, leashed or unleashed, with some saying it was vital to their physical and mental health and community connectivity. They highlighted the difficulty of access to some dog exercise areas, especially those with mobility restrictions or using a wheelchair.

Others highlighted the lack of parking and other facilities at dog exercise areas. Many asked for the dog area at Sunrise Beach to be extended north to Beach Access 37 to tie in with better parking, more direct access, toilets, and cafes.

Others again, while supporting leashed and off-leash dog exercise areas, wanted dogs to stay out of dog-free zones and be leashed where required. Some said that they stayed away from dog-free and on-leash beaches because they were worried about being knocked down or injured by off-leash dogs. Others said they wanted to experience the beach without interference by introduced animals.

Many were concerned about the environmental impacts of dogs, raising concerns about dogs being encouraged to go into the dunes, impacting on wildlife (especially sea turtles and shorebirds) and pet waste being a significant source of nutrient and pathogen pollution in creeks and in-shore waters.

Others were concerned about pet waste affecting the amenity of the area or impacting on those working in the dunes. The need for consistently available pet waste bags was also raised.

Both dog owners and people concerned about dogs asked for more community education and more dog-related enforcement to improve dog and owner behavior and reduce environmental and social impacts. Better access, signage and education about where dogs or off-leash dogs are not allowed will both help prevent dog owners being fined and reduce out of area and environmental concerns.

Beach fishing

Beach fishing is popular, especially around the coastal creek mouths, targeting tailor, mullet, bream, flathead, whiting and dart. Discarded fishing gear may pose a risk to other beach users and to wildlife.

Coastal community infrastructure and climate change

Community infrastructure on foreshores is especially vulnerable to severe weather events and rising sea levels and impacts on community infrastructure may increase as climate change continues.

Climate change requires coastal community infrastructure materials, design and management to be increasingly durable and responsive to both sudden major weather events and gradual long-term changes such as sea level rise and gradual shoreline recession.

Responses may include relocating important recreational and infrastructure assets outside the projected high risk coastal erosion area or where they cannot be feasibly relocated, accommodating the risks by adapting the design of these assets to be more resilient before and after a major erosion event. The CHAP sets out the preferred adaptation outcome for each locality as listed in Appendix Two - Legislation and policy links.

Council is developing design standards for beach accesses, viewing platforms, signage fencing, seat and other community coastal infrastructure, in line with Noosa's Design Principles. Design standard elements include classification, location, use, construction and maintenance,

environmental impacts and defects. This will inform future upgrades as part of Council's asset maintenance and renewal program.

Beach accesses

There are 41 public beach accesses that cross the EBFRs, ranging from short, sandy tracks on fairly flat ground, to highly engineered sets of open stairs down very steep slopes. Some have largely unmodified natural surfaces, while others are concreted for part of their length, and many have short lengths of chained planking or boardwalk at their seaward end. Many have stairs at some point along their length and most are fenced with open post and rail fences and are closely surrounded by native vegetation. Some beach accesses tie in with tunnels and accesses under the David Low Way and other roads, or from bicycle paths, pedestrian paths, or open space parks. Many directly link the foreshore reserves and beaches from secondary or main roads, some with dedicated off-road carparks.

All beach accesses have been in place for at least 30 years, although many have been upgraded at some point during that time.

Condition and functionality

Most beach accesses are in good condition for most of their length. However, many are now not long enough - the dunes are rebuilding after the 2017 storms, and the ocean end of many now extend well past the ends of the modified surfaces and fences.

Changes to beach accesses, especially at the seaward end, can happen quickly too, after storms and floods requiring designs that provide for dune building and accretion.

Council has detailed data about beach access and associated community infrastructure, including their location, construction and condition, and is also starting to collect information about how they sit in the landscape and work with the environment. Further information from our community as part of the community consultation for this EBFRMP included how beach accesses are used, what people like about them, and any concerns they have.

Location

The current locations of most of the Eastern Beaches access points have been almost incidental to other processes.

For instance, stormwater easements and parks are often gazetted at the lowest points as the area is developed to allow for drainage and stormwater discharge into nearby creeks and natural areas.

Beach accesses have later been constructed here as they are where roads are connected to foreshore reserves. This has meant that many beach accesses are in low lying areas where stormwater and standing water present design challenges.

The location and distance between beach accesses varies widely - in some areas the accesses are often only 50 metres apart. In others, where access is restricted by David Low Way, coastal creeks and gated communities, the accesses are very widely separated. Some residential areas, particularly new developments, and some tourist hotspots may not be served well by current pedestrian accessible beach accesses.

Some beach access locations cause problems - for instance, a highly constructed beach access at Marcus Beach is regularly cut off from the beach by the natural movement of a coastal creek. At Burgess Creek where beach accesses are widely located to avoid a moving creek mouth and steep slopes, residents are walking down a steep slope near the mouth of the creek and crossing the creek to the beach. This foot traffic down a steep slope, coupled with high peak outflows from the creek, is causing creekbank erosion and needs careful planning and design of nature-based erosion management solutions including dune restoration and fencing.

Only a few beach accesses benefit from being readily observable or directly accessible from main roads, which may mean these beach accesses also have pressures from heavy visitor and tourist usage.

Signs

Each beach access is required to have a standard beach access sign at each end, with the beach access number and basic beach safety information and contacts.

Many beach accesses have other information and interpretation signs at the entrances or nearby. These have often been installed as part of a community or Council project. Sign design and location standards will be included in the new beach access and community coastal infrastructure design standards. This work is in progress.

Online information

Web based maps, reserve information and beach access information would help wayfinding and navigation and help visitors and locals access the beach.

Beach access and community coastal infrastructure design standards

There are currently no criteria for public beach accesses or many other coastal community infrastructure components. Developing design standards for beach accesses, beach access trail heads and coastal community infrastructure is needed to identify and direct beach access construction and management that allows safe and sustainable public access to the beach and water while protecting the environment it sits in.

Beach access plan

An overarching plan for beach accesses and other community coastal infrastructure could help define the best intervals and location that allows safe and sustainable public access with an acceptable walking distance. An agreed inspection and upgrade schedule would help maintain the beach accesses in a safe and environmentally sustainable condition and allow Council to respond to the changeable environment of the dunes and beach, including the slow changes of gradual dune building, and sudden changes like the erosion after Cyclone Debbie in 2017.

Beach access and community infrastructure management

Beach access management involves several branches of Council. Track, handrail and community infrastructure construction, management and upgrade is managed by Civil and Asset Operations and Infrastructure Planning, Design and Delivery in Infrastructure Services. Grass and groundcover maintenance alongside the access is managed by Parks in Infrastructure Services. Overhanging trees, surrounding bushland and coordination of Bushcare volunteers (who often work from and on beach accesses) are managed by Natural Areas in Environmental Services.

EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
11.1 Develop design standards for beach accesses and coastal community infrastructure components.	Infrastructure Services Environmental Services	Immediate Continuing
11.2. Include the preferred adaptation responses for the different localities described in the Noosa Coastal Hazards Adaptation Plan in reserve management and community coastal infrastructure design, delivery, and maintenance.	Environmental Services Infrastructure Services	Immediate Continuing
11.3. Incorporate equitable access in beach access and community infrastructure planning and implementation. Work with stakeholders to deliver equitable access events on the Eastern beaches.	Environmental Services Infrastructure Services	Medium
11.4. Provide visitor information material about EBFR recreation, including universal access, online, on-reserve and nearby.	Community Services Environmental Services	Medium
11.5. Incorporate the consideration, protection and enhancement of beach profiles and surf breaks into management planning and implementation.	Environmental Services Infrastructure Services	Medium
11.6. Work with Local Laws to explore the review of dog exercise areas, community education and information about dogs on beaches and dog related enforcement.	Infrastructure Services Environmental Services Local Laws	Medium

Action	Responsibility	Priority
<p>11.7. Conduct a review of existing beach accesses, viewing platforms, signage, fencing, seat and other community coastal infrastructure, in line with Noosa's Design Principles</p> <p>Review elements include classification, location, use, construction and maintenance, likely inaccessibility from flooding, erosion etc, environmental impacts and defects, overuse and new or moved beach accesses if needed.</p>	<p>Environmental Services Infrastructure Services</p>	Long
<p>11.8. Develop an overarching beach access plan and maintenance plan for beach accesses and coastal community infrastructure components, including new collaborative management approaches for beach accesses that accommodate the impacts of climate change, increased erosion, inundation, and fire danger.</p>	<p>Environmental Services Infrastructure Services Bushcare volunteers Surf Life Saving clubs Surf Life Saving Qld</p>	Long

Measures

Measure	Responsibility	Timeframe
Cultural elements are included in new and updated EBFR management planning, implementation, and interpretation.	Environmental Services Infrastructure Services	Every four years
Noosa Design Principles and improved accessibility are included in new and updated in beach access and community infrastructure design and outcomes.	Environmental Services Infrastructure Services	Every four years
Beach access and community infrastructure review and plan completed.	Environmental Services Infrastructure Services	Every four years



12. Coastal creeks and stormwater



The lowest reaches of several unnamed and named coastal creeks and drainage lines cross the EBFs and beaches and discharge into the Coral Sea.

Many of these receive stormwater from the surrounding developments, roads and buildings. Burgess Creek also receives treated discharge from the Unitywater Noosa Wastewater Treatment Plant, which treats the sewage from Noosa's coastal development.

Large quantities of stormwater from surrounding developments, buildings and roads also discharge directly into foreshore reserves and other reserves.

Objective

Contribute towards improved water quality and social and environmental values in the Coral Sea, Laguna Bay, Noosa River, lakes, and coastal creeks.

Outcomes

- Community understanding of the values of coastal creeks is increased.
- The water quality of coastal creeks and inshore waters is improved, working in close coordination with other partner groups.
- Erosion and landslips in and near coastal creeks are well managed and coordinated with other partner groups .
- Bushland and wetlands in and near the lowest reaches of the coastal creeks are restored.

Coastal Creeks and stormwater in the EBFMP

The plan deals with natural areas management of Council-managed bushland reserves and how they interface with coastal creeks and erosion management issues.

There are separate but related projects underway for high-risk erosion areas and the coastal creeks.

Other Council projects and programs that go to the core of many community stormwater, wastewater, and coastal erosion concerns include:

- Coastal Monitoring Plan
- Burgess Creek Monitoring
- Regular coastal creek mouth realignment
- Eastern Beaches creeks - High Risk Erosion Prioritisation and Planning project,
- Stormwater infrastructure condition mapping
- Burgess Creek Integrated Catchment Plan
- Shire-wide water quality monitoring program

For more information on these projects, please see *Section 5: Linked projects and programs*, and *Appendix One: Linked projects and programs*, and Council's foreshore and coastal creeks webpage for on-going and updated information.

Eastern Beaches Coastal Creeks

Nine coastal creeks cross the Eastern Beaches and discharge into the Coral Sea. They drain from the national parks and residential development west of the Eastern Beaches Foreshore Reserves.

Most of them are significantly affected by urban development run-off, although the northern-most unnamed creek that drains across the top end of Sunshine Beach out of the Noosa Heads section of Noosa National Park appears have a largely natural catchment and not receive urban stormwater.

This might be useful as a "control" when monitoring or measuring other coastal creeks. These creeks are generally short and have small catchments, although the Burgess Creek catchment extends up to the back of Noosa Junction and is more than 500 hectares.

Most of them are now permanent, or run year-round, but at least some of them would have been ephemeral and/or had significantly lower flow before receiving urban runoff.

For comparative purposes, their general water body classification aligns most closely with the Queensland Government's "wallum/tannin-stained freshwaters: Tannin-stained, generally low gradient, small to mid-sized streams, many with sandy substrates and low pH, tea-coloured water draining through wallum vegetation"¹⁹.

Waterways often have higher environmental values than the surrounding landscape, such as being

more biodiverse, conserving significant species and ecosystems and acting as a linkage through developed land. In a coastal landscape they may be an important source of fresh water for wildlife.

Ecosystem service benefit

Creeks and natural areas that receive stormwater and Noosa Wastewater Treatment Plant discharges from surrounding private and public properties are providing ecosystem service benefits to the community. They enable urban development by taking the increased, concentrated runoff that urban development inevitably produces.

Stormwater drains allow the rapid movement of water off roads, improving road function and safety. The natural areas that receive the stormwater can help protect the broader environment by filtering and slowing the discharge.

However, many traditional stormwater management approaches and infrastructure can impact on the environmental and social values of the receiving creeks, natural areas and the wider environment, particularly where stormwater management has not kept pace with increased urban flows from new development.

Impacts of stormwater and Noosa Wastewater Treatment Plant discharge

Stormwater inputs are more concentrated, have more volume, and are delivered more quickly than natural flows, which increase the volume, velocity and peak height of creeks after storms.

In Burgess Creek this increased and concentrated flow can cause erosion and sedimentation, deepen and widen flowlines, and increase the potential for localised landslips. Stormwater also often carries nutrients, weed seeds and other pollutants into the creek.

Where stormwater is discharged directly into natural areas, and not via creeks, it can still cause erosion, sedimentation and weed infestations from the seeds and nutrients in the stormwater.

There is community concern about creek mouths causing erosion to the frontal dunes. Other community members are concerned about stormwater, rubbish and possibly polluted water running across beaches, particularly in beach areas with pedestrian traffic.

In some places mobile creek mouths affect beach accesses and access onto, and along, the beach.

Stormwater impacts in bushland reserves, such as erosion, sedimentation, weed and nutrient plumes, are already recorded in Council's Bushland Operational Assessment (BOA), as a specific management consideration. For more information on BOA, please go to Section 9: Ecology.

Burgess Creek

Burgess Creek also receives treated discharge from the Noosa Wastewater Treatment Plant on Wallum Lane near Eenie Creek Road, managed by Unitywater.

This has significantly increased the flow of water in the creek, although recent Council water monitoring at the creek shows E. coli and enterococci at Unitywater's outflow are generally lower than at sites further downstream.

This may indicate that other influences, such as decommissioned landfills and rapid infiltration basins, night soil disposal areas, residential run-off, and stormwater, may be making a significant contribution to nutrient loads in the creek.

This is being investigated and further instream and groundwater monitoring is being conducted.

Treated effluent and untreated stormwater impacts on environmental and social values here, but the creek, wetlands and surrounding bushland still retain these values, some due to the increased flow.

The treated water and stormwater discharge into the creek has significantly changed the creek and adjacent wetlands, meaning that they have been highly disturbed and modified.

The amount, duration and consistency of flow has dramatically increased, as has the area of permanently inundated land. Nutrient levels and other pollutants have significantly increased, and water quality generally decreased.

Species composition has likely changed to be dominated by wetland and waterway species that can handle both the permanent, high inundation, nutrients and reduced water quality.

¹⁹ Queensland Water Quality Guidelines (DERM, 2009) and EHMP (2004) Ecosystem Health Monitoring Program 2003-2004 Annual Technical Report. Moreton Bay Waterways and Catchments Partnership.

Erosion

There are two erosion concerns near the mouth of Burgess Creek. Up to 270 metres of the frontal dunes to the north of the creek mouth can be eroded during high flow events. The northern bank of the creek near the mouth, east of the David Low Way, is eroding, due to a combination of uncontrolled foot traffic down, and on, a very steep creek bank, and high peak waterflow. The creek alignment at the mouth is highly mobile.

Water contact

Many people are accessing the creek mouth via the informal access off David Low Way. Contact duration and types range from brief lower limb skin contact while crossing the creek, to prolonged contacts that are likely to incur ingestion, such as adult supervised children and dogs playing in the water, and rod fishing.

Council recommends people do not put their head underwater in the creek, and provides signage and community updates during heavy rain events.

Protecting Noosa’s environment

Burgess Creek and Burgess Creek Bushland Reserve receiving treated effluent and untreated stormwater provides ecosystem benefits to the Noosa community and the wider environment.

While Burgess Creek itself is affected by treated water discharge, it helps protect Noosa River, Laguna Bay and the Coral Sea.

Since urban development and associated stormwater infrastructure built in the 1960s and the STP upgrade in 1986, the wetlands in the Burgess Creek catchment have absorbed and filtered the urban runoff and treated water.

Noosa River’s good condition and B rating reported in its lower reaches through the Healthy Land and Water Report Card²⁰ is unique in urban south-east Queensland rivers. This is due in significant part to Burgess Creek

²⁰ Healthy Land and Water (2021). Report Card 2021. <https://hlw.org.au/report-card/>

receiving the treated wastewater from the densely populated coastal areas rather than Noosa River.

The higher levels of infiltration, filtration and nutrient uptake afforded by the natural surfaces and native and weedy vegetation in the bed, banks and surrounds of Burgess Creek reduces the amount of water, sediment and nutrient entering the Coral Sea and being swept north into Laguna Bay when compared to a piped outfall, where this natural filtration would not occur.

This in turn helps improve in-shore water quality and reduces algal blooms that may affect swimming and beach resources.

Environmental and community values

Despite past and ongoing impacts, some of them highly significant, Burgess Creek Bushland Reserve contains significant site and landscape conservation biodiversity and environmental values.

Values include waterway and land-based wildlife connectivity, connecting nearby national park to the coastal foreshore strip, essential habitat, and significant plant and animal species.

It is highly valued by the local community, with dedicated Bushcare volunteers contributing to planning and rehabilitation activities in the reserve.

These activities are supported by Noosa Council’s Bushland Care program, Natural Areas team and Unitywater, the managers of the Noosa Wastewater Treatment Plant.

EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
12.1. Work with Unitywater, and community members to restore bushland and improve water quality in the lowest reaches of coastal creeks, accommodating erosion issues where required. Include the values of coastal creeks in community education and restoration planning.	Environmental Services Unitywater Infrastructure Services Bushcare	Immediate Continuing
12.2. Coordinate with Unitywater and Council departments, the collection and documentation of comprehensive water quality assessments and standards for all coastal creeks and inshore marine environments.	Environmental Services Environmental Health Unitywater	Immediate Continuing
12.3. Work with Unitywater, and community members to prioritise and develop catchment management plans for coastal creeks that: <ul style="list-style-type: none"> — consider all sources of water and influences on hydrology — rank and prioritise remediation works on land slips, slumps and other impacts — assess stormwater management requirements for the catchment — consider degraded natural and social values alongside other stormwater related impacts. 	Infrastructure Services Environmental Services Environmental Health	Medium
12.4. Work with Unitywater and Infrastructure Services to prioritise, plan, schedule and implement the management of coastal creek mouth alignment and erosion where necessary for Burgess Creek.	Infrastructure Services Environmental Services Unitywater	Medium

Measures

Measure	Responsibility	Timeframe
Creeks are recognised in ecological restoration plans and targeted for restoration.	Infrastructure Services Environmental Services	Every five years



13. Community education

Noosa's EBFRs, beaches and adjacent waters have thousands of visitors each day, hundreds of boundary-sharing neighbours, and thousands of nearby neighbours across the coastal suburbs.

How these visitors and neighbours treat the foreshore reserves they live near or visit directly affects how the reserves look and function.

Ongoing community education and targeted communication between Council, visitors and neighbours will contribute to the protection and enhancement of EBFRs. This also includes embedding clear objectives for best practice reserve management into Council's day-to-day practices and approaches.

Objective

Increase understanding of the social and environmental values of foreshores.

Outcomes

- More opportunities are provided for residents and visitors to improve their understanding of the social and environmental values of the EBFR
- Neighbour and visitor related impacts in the EBFRs are reduced
- Visitor information about visiting the Eastern Beaches is improved.

Neighbour communication

Neighbours include boundary sharing neighbours and neighbours within walking distance – where the reserve is part of their work or home neighbourhood. Like all urban bushland reserves, how neighbours interact with Noosa's foreshore reserves is crucial to achieving positive long term social and environmental outcomes.

Council's initial consultation indicated that some areas may only contain roughly 30-40% long-term rental or owner residents, with the remainder being short term lets or holiday homes. Unaddressed delivery or local notices and advertisements are unlikely to reach non-residential neighbours. In many cases the people who most interact with the public land neighbouring these properties work for private rental managers, including landscaping and maintenance companies.

Ipomea pes-caprae – goats foot

Targeted communication that includes hard to reach neighbours is important. Planned communication topics include being a 'good bushland neighbour', 'what to plant in your garden', and the 'values of dunes and foreshores'.

Visitor communication

Noosa's Eastern Beaches have a very high numbers of visitors, and how these visitors treat the reserve also influences how it functions and looks. Communicating with local visitors, (many who may visit several times a week), visitors from the broader Sunshine Coast, and from further afield, particularly short-term visitors, require different delivery avenues and perhaps different materials. Delivery should be a mix of on-reserve, online and external engagement and content.

Providing visitors with better information about visiting the Eastern Beaches will particularly help people with mobility and access considerations.

Reserve and general community information

Information about the values of naturally vegetated foreshores and the EBFRs may help the general community further appreciate the importance of natural foreshores for recreation, conserving urban biodiversity and for helping to mitigate the impacts of climate change.

Dogs

Improving communication and community understanding about where unleashed or leashed dogs can go on the beach, the important of keeping limited areas dog and off leash dog-free, and how dog owners can help protect turtles and the environment is an important priority. Clearer, more prominent, and more attractive signage about dogs is important, including more information available for short term accommodation visitors and residents online and elsewhere.

Dogs and cats in dunes

Dogs in dunes can cause erosion on steep slopes and fragile front dunes and scare or attack wildlife. Their droppings can discourage wildlife, spread disease and make working in the dunes very unpleasant for our bush regenerators and Bushcare volunteers. Cats can scare and attack wildlife and their droppings introduce and spread deadly diseases like toxoplasmosis to wildlife.



EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
13.1. Regularly deliver “be a good bushland neighbour” material to residential and non-residential neighbours, long term renters, rental managers, and landscaping and maintenance companies.	Environmental Services	Immediate
13.2. Provide general community information about the cultural and environmental values of dunes, native vegetation and foreshores, and their role in managing climate change impacts online, on-reserve and nearby.	Environmental Services	Immediate
13.3. Develop and resource an environmental communication materials package for online, signage, paper-based and other formats for a range of stakeholders.	Environmental Services	Immediate
13.4. Provide visitor information material about EBFR recreation online, on-reserve and nearby.	Environmental Services	Medium
13.5. Regularly deliver foreshore reserve management planning and activity updates to residential and non-residential neighbours.	Environmental Services	Medium
13.6. Provide neighbour, visitor, and general community information to short term let and resort properties for guests, about our beaches and reserves, how to look after them and stay safe.	Environmental Services	Medium
13.7. Develop clearer, more prominent, and more attractive signage and information about dogs, including to short term accommodation visitors.	Environmental Services Infrastructure Services Local Laws	Medium

Measures

Measure	Responsibility	Timeframe
EBFR communication program developed in conjunction with stakeholders.	Environmental Services	2 years
Reduction in neighbour and visitor related impacts observed in Bushland Operational Assessment condition mapping.	Environmental Services	Every 5 years
Environmental communication materials finalised and including social values related materials.	Environmental Services Climate Change	2 years



14. Incidents and disaster management

With thousands of visitors and neighbors, and foreshores being particularly vulnerable to weather events, EBFRs incident and disaster management is important.

Objective

Manage hazardous vegetation, bushfire, flooding, coastal erosion and pest species within the Eastern Beaches Foreshore Reserves according to State Government and Council's policies, plans, risk appetite and legislative requirements.

Outcomes

- Fire safety for emergency personnel and EBFR neighbours is increased
- Emergency access to the EBFRs and Eastern Beaches is improved
- Council and the community collaborate better to respond to local marine debris events.

Noosa Disaster Management Plan

Noosa's disaster planning, preparedness, response and recovery is primarily directed by the Noosa Local Disaster Management Plan and Noosa Local Disaster Recovery Plan.

Bushfire risk

Fire risk in Council reserves is extensively discussed in the Noosa Bushland Reserve Strategic Fire Management Plan 2021 – 2026 and Noosa Bushland Reserves Strategic Management Plan 2021 – 2026, and any fire risk management activities here should be read in conjunction with those documents. The fire management plan identified the fire risk that the bushland in the EBFRs poses to adjacent buildings as High to Medium.

Sustained periods of extreme fire weather in Queensland occurred in 2019 and 2020. It is likely that

periods of severe and extreme fire weather are going to be more common and more intense as climate change progresses.^{21, 22}

Recent fire history

During extreme fire weather in September 2019, a fire was started in Peregian Beach South Foreshore Reserve by flying embers from Emu Mountain or Peregian Springs. About two hectares of the reserve was burned, one house was lost, and others were damaged.

Contributing factors included continuous vegetation and fuel between bush and some houses, older houses predating current bushfire building codes and restricted, risky access for firefighters.

Fire management and firefighting access

Fire management and firefighting access across much of the EBFRs creates various challenges. Access to the 2019 fires was very restricted and high risk and meant firefighters needed to often walk down unknown, narrow, one-way accesses alongside private houses to access the fire, making it dangerous for them.

In some locations there is continuous vegetation and fuel between the bush and houses. Several residences and outbuildings have zero or near zero boundary clearance to the foreshore reserves.

Fire access trails and fuel reduction zones

The Noosa Bushland Reserve Strategic Fire Management Plan 2021 – 2026, wherever possible, seeks accessible through-fare fire access trails next to residential development, buildings and facilities of up to four metres, and up to three metres where the bushland strip is narrow.

Where fire access trails are not possible (due to the dimension of the bushland reserve, slope, or sensitive environmental values) the Noosa Bushland Reserve Strategic Fire Management Plan 2021 – 2026 seeks a Fuel Reduction Zone (FRZ) of up to ten metres

as a suitable Interface Zone treatment for fire risk management. A fuel reduction zone reduces fuel by reducing the middle and connecting vegetation layers while keeping the ground cover and canopy trees.

These fire risk management areas should be appropriately stabilised to prevent erosion. Outside of these areas, reserves are managed for conservation and landform stability values.

Fire risk will be considered in, and fire risk management areas will be incorporated as required, into encroachment recovery and rehabilitation areas. Where fire risk management areas are not yet established where recovery or rehabilitation works are undertaken, a buffer with the same dimensions and characteristics should be established.

These fire risk management areas are highly desirable from a fire risk management point of view and would significantly improve firefighter safety. Any fire access trails and fuel reduction zone planning, and establishment shall be initiated, planned and implemented by Council and considered with respect to the fire risk priorities of our entire bushland reserve network.

Marine debris events

As shipping up the east coast and the region's urbanisation increases, the amount of marine debris on our beaches increases. Climate change is increasing the intensity and occurrence of extreme weather, and floods and storms have the potential to deposit more marine debris after events.

Debris can include parts, rubbish and fishing gear from ships and fishing vessels, litter and rubbish delivered via stormwater, general rubbish, building materials, outside furniture, and community infrastructure from low-lying parks after floods. The Brisbane February 2022 floods deposited 18 pontoons from Brisbane River on Noosa's beaches (see the Highlight Box below).

This debris is unsightly and poses a safety risk to beach users and wildlife, particularly when it is obscured by storm foam. There is also a strong and growing body of evidence of the negative environmental impact of marine debris through ingestion, entanglement, habitat damage

²¹ Australian Bureau of Meteorology. (2019) Changes to Fire Weather in Queensland (prepared for Queensland Fire and Emergency Services). Bureau of Meteorology, Melbourne.

²² Richardson, D, Black, A.S, Monselesan, D.S, Risbey, J.S, Squire, T.S, Tozer, C.R, Canadell, J.G. (2021) Increased extreme fire weather occurrence in southeast Australia and related atmospheric drivers. Weather and Climate Extremes; 34.



and the spread of alien and invasive species.²³

Debris is removed from the beach by community members or Council workers and placed near or in the bins at the top of the beach access or removed to the Resource Recovery Centre and landfill by rubbish contractors or Council workers.

Natural marine debris, natural wood, seagrass, seaweed, pumice stone, vegetation and similar, can also be deposited in large amounts during extreme weather. Natural debris can act as a useful entrapment point, allowing the lodgment of sand and seeds that contribute to the rebuilding and revegetation of frontal dunes after disturbance. They can also be significant habitat features, especially during the early phase of dune rebuilding where little other cover occurs.

Unless the natural debris is posing a significant safety risk it is left where it is, to redistribute and decompose naturally.

Marine oil spills

With increased international and domestic shipping passing along the shipping route along our coast and increased extreme weather due to climate change, the risk of a larger marine oil spill from a ship is also increasing. Oil spills from ships or from land-based activities may also occur in the Noosa River and creeks.

Animals can be poisoned or burned by the chemicals in the oil – marine animals that come to the surface to breathe or live on the surface or in intertidal areas are particularly vulnerable. Oil prevents birds from flying or floating, and most oiled seabirds drown out at sea. Oil also prevents fur or feathers keeping the animal warm, and they can rapidly freeze to death in cold water.

Plants and animals that live on rocks, mudflats, in the sand or on the bottom of the sea can be poisoned or smothered. The effects of oil spills can be longstanding even on wildlife that survives - reproduction success and lifespans can be reduced, the populations of threatened species affected, and habitats degraded.

²³ National Oceanic and Atmospheric Agency (2022). Why is Marine Debris a Problem? Available Online: <https://marinedebris.noaa.gov/discover-marine-debris/why-marine-debris-problem>

Economies and communities can also be affected. Fisheries can be affected by a reduction in commercial species populations, contamination, or public perception about food safety. Tourism, hospitality and accommodation industries, particularly where focused on coastal access and amenity and fresh, local food can also be affected. Human health effects have been observed in cleanup personnel and communities that live or work in areas affected by large oil spills.

Oil spills have happened near Noosa's Eastern Beaches before. During Cyclone Hamish in March 2009, 230 tonnes of fuel oil, 30 tonnes of other fuel and 620 tonnes of ammonium nitrate (the latter mostly in containers) spilled into the sea along the Sunshine Coast, affecting the coast from Marcoola Beach (about 18km south of Peregian Beach) down to Brisbane River port. The spill came from cargo damaged by other unsecured cargo on the deck of the MV Pacific Adventurer during rough weather. About 155 hectares of coastal land were affected, needing about \$31 million and 1500 people to clean up.

Other effects included oiled wildlife and degraded coastal ecosystems, closed and restricted local fisheries and reduced recreation and tourism.

Marine and riverine oil spills trigger an initial joint response from Maritime Safety Queensland and Council, with Queensland Department of Environment and Science responding to oiled wildlife. Council may be the lead responder in smaller spills, while Maritime Safety Queensland is the lead responder for larger spills. Council's response is guided by the Marine and Riverine Oil Spill Response Plan.

Marine strandings

Marine strandings occur when alive or dead marine mammals, turtles or large fish wash up on beaches, triggering a Council and Department of Environment response process. Where large numbers of small fish or other animals wash up onto the beach this process may also be triggered.

Human safety, for staff, rescuers and the general public is always the first consideration, and when the animal is alive, humane and ethical considerations also come into play, triggering Department of Environment and Science and veterinarian assessment and a possible rescue response. Cultural considerations also come into play. Where a dead animal may have conservation significance, such as a humpback whale, turtle or dugong, data or the body may be collected for further assessment or preservation. Body disposal is usually undertaken by Council to minimise public health risk and replicate natural processes where possible.

Emergency access

During recent natural disasters it became clear Council could benefit from improved emergency access to Noosa's beaches. Most beach accesses are inaccessible to even small all-terrain vehicles. Access for light vehicles,

large machinery or large trucks is very problematic. Even where the accesses would otherwise be suitable, community infrastructure in nearby open spaces, road reserves, or along the beach accesses complicates, or entirely prevents, their use by large or long vehicles and machinery.

Restricted access means more machinery movements along longer lengths of beaches, with accompanying budgetary, environmental and beach user impacts.

Identifying a few simple, short beach accesses that could be modified to allow large machinery and small vehicle access could help resolve this issue. Consideration of accompanying budget, as well as environmental and beach user impacts is needed to better understand the costs and benefits of improved emergency beach access.



EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
14.1. Identify site specific fire risk interface treatments as required by the Noosa Strategic Bushfire Management Plan.	Environmental Services	Immediate Continuing
14.2. Review incident management procedures, including for marine spills, marine debris events and marine stranding, and update as required.	Environmental Services Infrastructure Services Disaster Management	Medium
14.3. Publish a case study and video about the pontoon and polystyrene removal to inform future polystyrene pontoon incidents and cleanups.	Environmental Services	Video Complete Medium
14.4. Review key beach accesses to enable improved access by large machinery and trucks for disaster response. Review and simplify nearby park, beach access and street infrastructure to ensure their location doesn't prevent the use of the key beach access by large machinery and truck for disaster response.	Environmental Services Infrastructure Services Emergency Services Surf Life Saving clubs Surf Life Saving Qld	Medium
14.5. Provide neighbours with information about bushfire risk management and Council's fire management program.	Environmental Services	Medium
14.6. Better support and collaborate with the community to prevent and respond to future local marine debris events.	Environmental Services Infrastructure Services	Medium

Measures

Measure	Responsibility	Timeframe
Emergency beach access improved	Environmental Services Infrastructure Services	Four years

February 2022 floods – grounded pontoons

During the February 2022 Queensland floods, an estimated 18 pontoons and docks washed out of Brisbane River and grounded on Noosa's beaches. Polystyrene is used as flotation in pontoons, and as the outer pontoon layers broke down it was exposed to natural elements and crumbled into small pieces that were readily spread by wind and waves.

The large pieces of pontoon were removed with large machinery. Smaller pontoon and polystyrene pieces were removed by community individuals and groups, Council officers and contractors by hand, vacuum and beach cleaner, but individual beads scattered and buried into the sand remained.

This pollution can have a devastating effect on wildlife, including sea turtles. Several months later, small beads scattered in very isolated pockets remain in the dunes and on tide lines and are likely to continue to be exposed by wind and wave action, particularly during storms. Council and community members continue to monitor and do further cleanup as required.

A polystyrene roundtable held in July 2022 brought State, local government, and community stakeholders together to review what happened during the pontoon beaching and cleanup from various perspectives.

Recommendations were developed during the meeting including better pontoon construction, maintenance and identification standards, more coastal information and hazard response capability, such as a natural disaster dashboards and community coordination by Council, and better recognition of marine debris as a pollution incident to facilitate more pollution response support from the State Government.



15. Encroachments

Encroachments into foreshore reserves include damaging vegetation, filling, dumping rubbish, yard extensions, private infrastructure and unauthorised planting. As the impact and area of encroachments continues to expand in the EBFRs, their ability to contribute to nature-based community climate change resilience under the CHAP 2021 and to improve coastal ecosystems under the Noosa Environment Strategy 2019 is compromised.

Encroachments are not isolated to Eastern Beaches and are shire-wide. They are managed on a shire-wide basis for all of Council's bushland reserves under existing Local Law No.4 (Local Government Controlled Areas, Facilities, & Roads) 2015 and supporting Encroachments Policy 2023 and Encroachment Procedures 2023.

Objective

All management objectives.

Outcomes

— Encroachments are strategically managed and prioritised on a risk management basis to reduce the area of bushland reserve impacted by encroachments to improve environmental values and manage bushfire risk.

Education and communication

Ongoing communication between Council, visitors and neighbours can contribute to the protection and enhancement of the EBFRs and minimise impacts from encroachments. Education and communication will be the first option in dealing with neighbour impacts.

Local Law No.4

Activities in Council managed reserves relating to encroachments are regulated under Local Law No.4 (Local Government Controlled Areas, Facilities, & Roads) 2015. But how these impacts are dealt with by Council can be subjective or inconsistent, which can make it difficult for Council officers to respond to them unless clear processes are put in place to help guide how best to prioritise and restore encroachments.

The new Encroachments Policy and Procedures provide for a consistent and transparent whole of

Council response to encroachments that better meets community expectations and protects the social and environmental values of the EBFRs. Council's approach for managing encroachments include education and communication as a first option, a range of non-regulatory responses, and a clear and methodical regulatory response under Local Law No.4. This is supported by a Natural Areas encroachment recovery program with a detailed risk management matrix, a dedicated officer for managing shire wide encroachments in bushland reserves and additional funding for restoration.

Encroachment descriptions

Encroachments are unauthorised improvement or use of another's land.

Private beach accesses on public reserve land

Making or using private and / or informal beach accesses clears native vegetation, causes erosion and spreads weeds. They fragment the bushland, create weak spots for severe weather impacts and open the foreshore to increased salt, wind and storm damage.

Private yard extensions into public land

As part of private yard extensions into public land, native vegetation is cleared many are planted with garden plants, and some contain small structure and retaining walls.

Replacing community bushland with a private garden is prohibited under Local Law No. 4, spreads weeds and can make firefighting access more difficult, with level changes, access along the boundary and into the bush blocked with debris, plantings, fencing and other infrastructure. Reducing the functional width of often already narrow vegetated foreshores reduces the ability of the reserve to manage extreme weather, improve water quality, reduce sediment and erosion and act as wildlife corridors and habitat.

Vegetation damage for views

Vegetation damage for views includes pruning, cutting, breaking, pulling, poisoning and clearing native vegetation – including trees, shrubs and ground covers - on the dune and foreshores for views. It also affects foreshores without a shared residential boundary.

There are a few different types of clearing - all layers cleared to bare earth or mowed grass, topping, killing, or clearing the tallest vegetation where many of the largest trees are killed, or under-scrubbing, where the understory and midstory are removed.

Vegetation damage makes the remaining vegetation more vulnerable to weeds, wind and salt damage, degrades and fragments the bushland, and can exacerbate coastal erosion risk.

Private recreation areas

Private recreation areas are cleared areas away from the boundary, often on top of the dunes or near the back of the beach and are generally accessible from private beach accesses and private property rather than public accesses. Some of them are planted with garden plants, turfed or furnished with tables and chairs. Many of the issues associated with vegetation damage and yard extensions apply.

Garden plant escapees

Most environmental weeds start out as ornamental plants, and many garden plants easily spread in bushland by seed, suckers and runners, from gardens on private property, garden rubbish dumps or are deliberately planted in bushland.

Garden rubbish dumping

Dumping garden rubbish in community bushland can introduce weeds and replace diverse mixes of native plants with infestations of just a few weeds. Rubbish dumps are an attractive ignition point for arsonists, can cause a fire to flare and block emergency and management access.

²⁴ Ballantyne, M, Gudes, O, Pickering, C.M. 2014. Recreational trails are an important cause of fragmentation in endangered urban forests: A case-study from Australia. Landscape and Urban Planning, 130, pgs 112-124. ISSN 0169-2046

Paths and edge effects

Paths into foreshore reserves fragment the bush. Each one of these path edges has accompanying 'edge-effect' area, a strip of degraded bush, which usually has more weeds and more sunlight, wind and salt intrusion, degrading the health and diversity of the ecosystems. Weeds are often carried along the paths by maintenance and users.

Having many more paths into the foreshore means that much more of the retained bush is this degraded edge effect area, with reduced environmental values and increased management costs. East-west orientated paths in the long, narrow north-south orientated foreshore reserves have a particular impact on the movement of wildlife down the length of the reserves²⁴.

Paths, especially in quieter areas, allow introduced predators to freely move across more of the dune and beaches. This appears to particularly apply to foxes accessing the quieter, darker parts of the beach that turtles are likely to use for nesting.

EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
15.1. Contribute to the implementation of a shire-wide encroachment policy for Council managed land, including: <ul style="list-style-type: none"> - targeted educative compliance as a first measure to address and remove historic and new encroachments - taking a zero tolerance and timely enforcement approach to any new encroachments - a clear direction and framework for the recovery and restoration of illegally disturbed bushland areas - clear guidance about climate mitigation measures for private property - fire risk mitigation measures incorporated into the recovery and ecological restoration of disturbed areas. - Natural Areas encroachment recovery program resourced with staff that have natural area encroachment, education, recovery and compliance skills. 	Environmental Services Infrastructure Services Local Laws	Immediate (Policy complete, implementation activities are ongoing)
15.2. Implement a broader awareness campaign and community education materials to encourage good custodianship of council managed land, including information and signage.	Environmental Services	Immediate
15.3. Incorporate fire risk mitigation measures into Natural Areas encroachment recovery	Environmental Services	Immediate Continuing

Measures

Measure	Responsibility	Timeframe
Area affected by encroachments using the BOA mapping is reduced	Environmental Services	Five years



16. Data collection and monitoring



Data from desk top investigations, research, monitoring, and observations informs the planning and management of council managed bushland, contributes to the development of strategic plans, and monitors on-ground and strategic outcomes.

Objective

All management objectives.

Outcomes

- Reserve values, management considerations, management planning and implementation are informed by good data and monitoring
- Provide data on the outcomes of management actions and inform future management
- Integrate EBFRRMP monitoring and data collection with broader monitoring programs
- Contribute data to broader monitoring, management and research

The monitoring and data collection detailed below includes those that sit primarily with Council's Environmental Services branch and Natural Areas team, and principally undertaken within the Eastern Beaches Foreshores Reserves. Monitoring undertaken as part of programs and projects that occur mostly outside of the Eastern Beaches Foreshores Reserves and / or are primarily the responsibility of another part of Council or other authorities are detailed in Section 5: Linked projects and programs and Appendix Two: Linked projects and programs. While Environmental Services branch and Natural Areas team are not the primary drivers of these projects or it occurs mostly outside the EBFR, they may be stakeholders and contribute to the project, or the project contributes to outcomes in the EBFR.

Data collection

Environmental values

The environmental values of the foreshore reserves, such as ecosystems, wetlands, significant species and habitats, and landscape values such as connectivity and wildlife corridors, are derived from environmental

reports from the Qld Department of Environment and Science and Qld Department of Resources.

Much of this mapping is primarily based on Regional Ecosystem mapping. Regional Ecosystem mapping on foreshores has, until recently, typically been very broadscale and simple, with a range of vegetation communities often grouped under RE 12.2.14: Strand and fore dune complex.

Recent improvements to this mapping by the Queensland Government can be seen in the increase in the extent and number of mapped Regional Ecosystems and the extent of High Value Regrowth discussed below. These changes are supported by a current Noosa Regional Ecosystem mapping project and on ground observations. As this mapping continues to get more detailed it is expected that more Regional Ecosystems, more High Value Regrowth and a wider range of environmental values will be reported.

Using the information in these reports is a standard approach to management plans for natural areas and has been used by Noosa Council, other local governments, and other land management agencies in many other reserve planning documents and processes. The reports for foreshore reserve and connected bushland reserves in the plan include:

- Biodiversity and Conservation Values - Biodiversity Planning Assessments and Aquatic Conservation Assessments
- WildNet Records - Conservation Significant Species List
- Regional Ecosystems - Biodiversity Status (regional ecosystems and special values)
- Queensland Wetlands
- Aquatic Ecosystem Rehabilitation Mapping
- Matters of State Environmental Significance (Threatened (endangered or vulnerable) wildlife and special least concern animals, Koala habitat area (SEQ), Wildlife habitat (sea turtle nesting areas))
- Protected Plants Flora Survey Trigger map
- Modelled potential habitat
- Vegetation management report (includes regional ecosystems, essential wildlife habitat)

These reports are available on the Eastern Beaches Foreshore Management Plan webpage.

Sea Turtle Nesting Areas

Department of Natural Resources Sea Turtle Nesting Areas²⁵ mapping identified the Eastern Beaches as a Significant Sea Turtle Nesting area.

Marine Turtle Nest Monitoring

This map from SCC Open Data²⁶ is made up of all Green Turtle (green discs) and Loggerhead Turtle (orange discs) nest and track only (turn back) (beige discs) records collected by accredited Coolum and North Shore Coast Care's Turtle Monitoring Group volunteers in Noosa Shire in the 2008/09 to 2021/22 turtle nesting seasons.

²⁵ Department of Natural Resources. (2022). Sea Turtle Nesting Areas. <https://qldglobe.information.qld.gov.au/>

²⁶ Sunshine Coast Regional Council. (2023). SCC Open Data (Biota) Marine Turtle Monitoring. <https://www.arcgis.com/home/webmap/viewer.html?panel=gallery&layers=4e379681e85d491a8439aa58be490549>

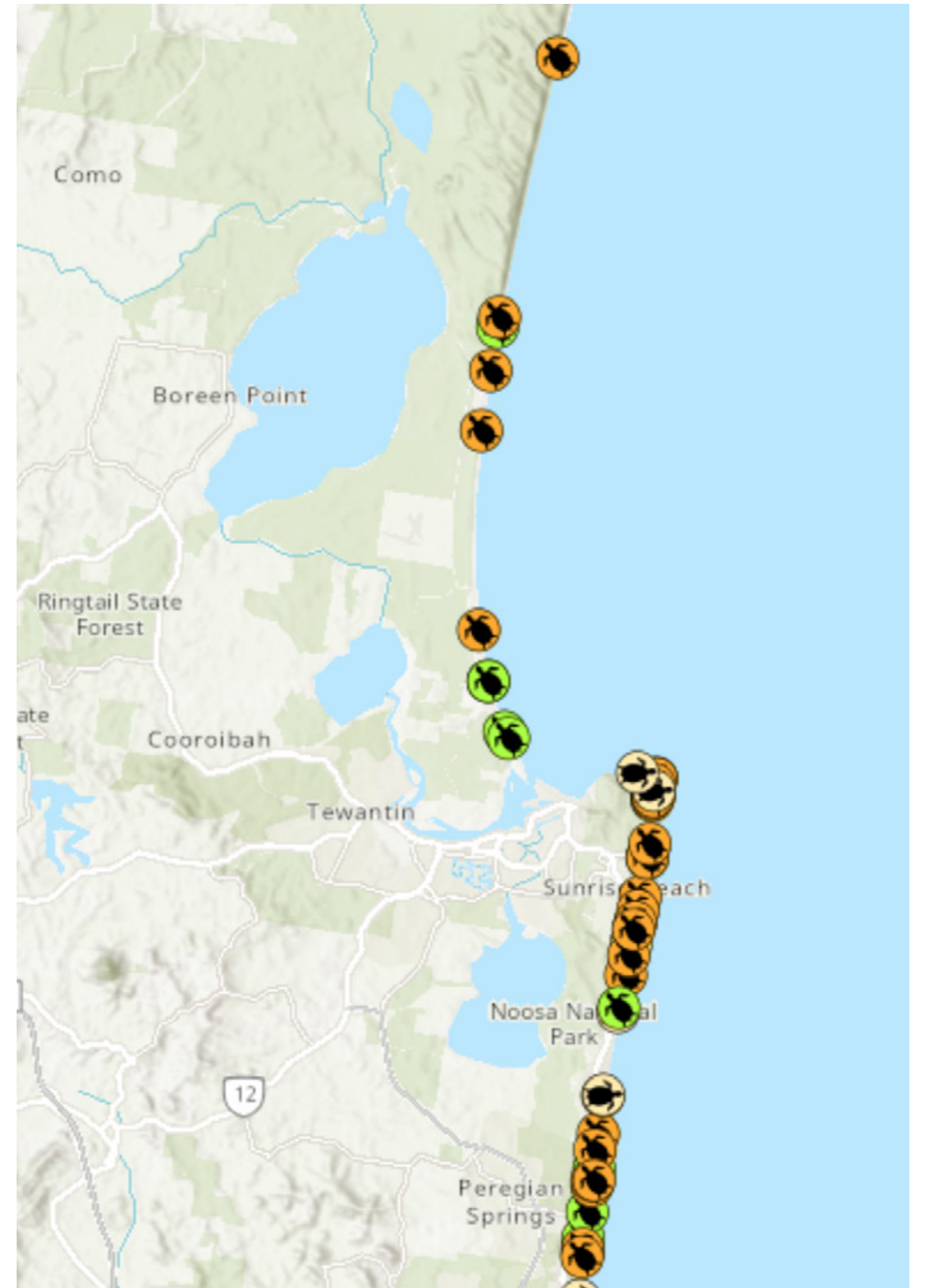


Figure 14: Marine Turtle monitoring results (SCC Open Data (Biota) Marine Turtle Monitoring)

Monitoring

Vegetation extent

The Noosa Environment Strategy 2019 requires the mapping of extent of coastal foreshore vegetation every two years. Data collection was conducted in 2022 as part of the Coastal Monitoring Plan under Coastal Hazards Adaptation Plan implementation, using two different remote sensing, drone platform methods. Repeated coastal foreshore vegetation extent mapping will contribute to our understanding of coastal changes and climate change.

Regional ecosystems

The Noosa Environment Strategy 2019 requires the review of changes to the extent and number of coastal Regional Ecosystems (RE) every five years. Detailed RE mapping was extracted from State government datasets and collated for EBFRs in 2021 and 2022, as part of the EBFMP development, and found significant expansion of mapped High Value Regrowth (HVR) and some expansion of mapped REs.

In 2021 mapped EBFR HVR and RE vegetation was 87.3 ha, increasing to 126.9 ha in 2022. Four new REs, 12.2.5, 12.2.7, 12.2.13, and 12.2.15, were also mapped in 2022. However, these increases were probably mostly due to new more detailed and more accurate mapping rather than more recovered vegetation but will act as good baseline data for future monitoring.

Bushland condition mapping (BOA)

The Noosa Bushland Reserves Strategic Management Plan 2021– 2026 requires BOAs of significant reserves every five years. The Bushland Operational Assessment (BOA) is used to gauge condition of bushland in natural areas, based on the resilience (ability of native indigenous species to recruit and progress towards a representative vegetation community), percentage of weeds. It is visually shown by easy-to-interpret colours on maps and backed up by weed percentages and notes.

BOA has been used in Council's conservation estate network since 2008, across many of the 148 Bushland Reserves. Its primary function is to inform and assess planning and on-ground management of natural areas. It identifies the priority and strategic areas for works, the needed activities, and monitors works effectiveness. It can guide operational service levels, resource gap analysis, contract management and work plan development.

The boundaries and attributes of each condition area and management considerations points are collected and mapped using a GPS enabled device, with ARCPAD software and creates shape files. These shapefiles are edited in GIS mapping application to produce coloured maps and attribute tables. BOA and associated desktop editing, with particular attention to mapping the boundaries and attributes of each encroachment and private beach access, have been conducted across the Eastern Beaches Foreshore Reserves since December 2021.

These are a repeat of mapping completed in 2017, although that previous mapping did not display the private beach accesses or detail each encroachment. The maps and attribute tables collected so far inform the Eastern Beaches Foreshore Management Plan and will inform the ecological restoration plans and encroachment recovery for each reserve.

EBRFMP Management actions

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

Action	Responsibility	Priority
16.1. Conduct a desktop review of the extent of EBFR vegetation every two years, using remote sensing data collected under the Coastal Monitoring Plan.	Environmental Services Climate Change	Baseline data collected 21-22 Re-collection 23-24
16.2. Monitor for any changes in the EBFRs RE mapping every five years by measuring the extent of mapped REs and high value regrowth and the extent of all vegetation using desktop mapping, vegetation management mapping and aerial photos.	Environmental Services Strategic Planning	Baseline data collected 21-22 Re-collection 27-28
16.3. Undertake BOA mapping every 5 years. Compare against management zone rehabilitation targets in ecological rehabilitation plan, aiming for 75% or better compliance.	Environmental Services	Baseline data collected 22-23 Re-collection 28-29
16.4. Contribute as a stakeholder to coastal and coastal creek monitoring and other relevant projects and programs as required. Make relevant Environmental Services, Natural Areas Eastern Beaches Foreshores Reserves and other data as freely available as possible to these and other projects and programs.	Environmental Services	Continuing



17. Management Actions



EBRFMP Management activities

The following actions are identified for implementation:

Prioritisation:

- Immediate: < 1 year
- Medium: 1 year – 3 years
- Long: 3 years – 5 years
- Continuing: Commenced and ongoing.

7. Partnerships

Action	Responsibility	Priority
7.1. In collaboration with existing and new partners, develop one-off and alternate volunteer opportunities for locals and visitors.	Environmental Services	Immediate
7.2. Identify gaps and potential partners, actively seek and develop partnership opportunities, and be open to new project and partner proposals that contribute to management vision and objectives.	Environmental Services	Immediate Continuing
7.3. Identify, review and document partner projects and collaborations and make information accessible for others to read about and learn from.	Environmental Services	Medium
7.4. In collaboration with partners, publicise events and volunteer opportunities and host open days to encourage new members and partnerships.	Environmental Services	Medium

8. Climate Change

Action	Responsibility	Priority
8.1. Update and implement ecological restoration plans for all EBRFs.	Environmental Services	Immediate Continuing
8.2. Provide general community information about the values of vegetated foreshores and natural processes for community climate change resilience online, on-reserve and nearby.	Climate Change Environmental Services	Immediate
8.3. Experiment with accelerated assisted natural bush regeneration, vegetation rehabilitation and dune rebuilding, especially at the seaward edge of dunes and foreshores.	Environmental Services Bushcare groups	Immediate Continuing
8.4. Develop design standards for beach accesses and coastal community infrastructure components.	Infrastructure Services	Immediate Continuing
8.5. Allocate emergency contingent ecology funds and resources as part of annual budget process to more readily deploy bush regeneration and recovery activities after severe weather and disaster events.	Environmental Services	Medium
8.6. Develop an overarching beach access plan and maintenance plan for beach accesses and coastal community infrastructure components.	Environmental Services Infrastructure Services	Medium
8.7. Conduct a review of existing beach accesses, viewing platforms, signage, fencing, seat and other community coastal infrastructure, in line with Noosa's Design Principles. Review elements include classification, location, use, construction and maintenance, environmental impacts and defects, overuse and new or moved beach accesses where needed.	Environmental Services Infrastructure Services	Long

9. Ecology

Action	Responsibility	Priority
9.1. Update bushland condition mapping for all EBRFs - only conduct BOA condition mapping in foreshore areas during summer when glory lily is showing.	Environmental Services	Immediate Continuing
9.2. Update and implement ecological restoration plans for all EBRFs.	Environmental Services Council:	Immediate Continuing
9.3. Incorporate climate change considerations in ecological management activities.	Environmental Services	Immediate Continuing
9.4. Minimise and actively rehabilitate cleared areas to reduce fragmentation and edge effect.	Environmental Services Infrastructure Services	Immediate Continuing
9.5. Target pandanus areas for regeneration to improve understory health and contribute to improved pandanus germination. Include pandanus regeneration activities in rehabilitation plans.	Environmental Services Infrastructure Services	Immediate Continuing
9.6. Minimise plastic elements in new and upgraded coastal community infrastructure and management to reduce plastic moving into the coastal environment from community coastal infrastructure.	Environmental Services Infrastructure Services	Immediate Continuing
9.7. Incorporate relevant aspects of threatened species, scheduled species and other significant native species monitoring and management plans into planning and management activities.	Environmental Services	Immediate Continuing
9.8. Investigate post event rapid response funding for ecological restoration.	Environmental Services	Medium
9.9. Contribute to glory lily research and adopt best practise to managing this pest species.	Environmental Services Infrastructure Services	Medium
9.10. Implement litter minimisation measures with other Council branches, better support community litter collection efforts and collect coastal marine debris information.	Environmental Services Infrastructure Services Waste Services	Medium

10. Social Values

Action	Responsibility	Priority
10.1. Invite the Kabi Kabi (Gubbi Gubbi) to work in partnership with Council and other land managers to collaboratively manage the EBFRs.	Environmental Services	Immediate
10.2. Incorporate cultural heritage values in EBFRs management and interpretation.	Environmental Services	Immediate, ongoing
10.3. Implement Noosa Design Principles in reserve management and community coastal infrastructure design, delivery, and maintenance.	Environmental Services Infrastructure Services	Immediate, ongoing
10.4. Identify existing vista, near beach and surf condition viewpoints, and assess for visitor experience and environmental sustainability. Where environmentally sustainable, incorporate existing viewpoints into infrastructure upgrades.	Environmental Services Infrastructure Services	Medium
10.5. Upgrade and make beach accesses, entrances, and other points of interface between foreshore reserves and visitors and surrounding land uses welcoming, attractive and accessible.	Environmental Services Infrastructure Services	Long

11. Public access and recreation

Action	Responsibility	Priority
11.1. Develop design standards for beach accesses and coastal community infrastructure components.	Infrastructure Services Environmental Services	Immediate Continuing
11.2. Include the preferred adaptation responses for the different localities described in the Noosa Coastal Hazards Adaptation Plan in reserve management and community coastal infrastructure design, delivery, and maintenance.	Environmental Services Infrastructure Services	Immediate Continuing
11.3. Incorporate equitable access in beach access and community infrastructure planning and implementation. Work with stakeholders to deliver equitable access events on the Eastern beaches.	Environmental Services Infrastructure Services	Medium
11.4. Provide visitor information material about EBFR recreation, including universal access, online, on-reserve and nearby.	Community Services Environmental Services	Medium
11.5. Incorporate the consideration, protection and enhancement of beach profiles and surf breaks into management planning and implementation.	Environmental Services Infrastructure Services	Medium
11.6. Work with Local Laws to explore the review of dog exercise areas, community education and information about dogs on beaches and dog related enforcement.	Infrastructure Services Environmental Services Local Laws	Medium

12. Coastal creeks and stormwater

Action	Responsibility	Priority
12.1. Work with Unitywater, and community members to restore bushland and improve water quality in the lowest reaches of coastal creeks, accommodating erosion issues where required. Include the values of coastal creeks in community education and restoration planning.	Environmental Services Unitywater Infrastructure Services Bushcare	Immediate Continuing
12.2. Coordinate with Unitywater and Council departments, the collection and documentation of comprehensive water quality assessments and standards for all coastal creeks and inshore marine environments.	Environmental Services Environmental Health Unitywater	Immediate Continuing
12.3. Work with Unitywater, and community members to prioritise and develop catchment management plans for coastal creeks that: <ul style="list-style-type: none"> — consider all sources of water and influences on hydrology — rank and prioritise remediation works on land slips, slumps and other impacts — assess stormwater management requirements for the catchment — consider degraded natural and social values alongside other stormwater related impacts. 	Infrastructure Services Environmental Services Environmental Health	Medium
12.4. Work with Unitywater and Infrastructure Services to prioritise, plan, schedule and implement the management of coastal creek mouth alignment and erosion where necessary for Burgess Creek.	Infrastructure Services Environmental Services Unitywater	Medium

13. Community Education

Action	Responsibility	Priority
13.1. Regularly deliver “be a good bushland neighbour” material to residential and non-residential neighbours, long term renters, rental managers, and landscaping and maintenance companies.	Environmental Services	Immediate
13.2. Provide general community information about the cultural and environmental values of dunes, native vegetation and foreshores, and their role in managing climate change impacts online, on-reserve and nearby.	Environmental Services	Immediate
13.3. Develop and resource an environmental communication materials package for online, signage, paper-based and other formats for a range of stakeholders.	Environmental Services	Immediate
13.4. Provide visitor information material about EBFR recreation online, on-reserve and nearby.	Environmental Services	Medium
13.5. Regularly deliver foreshore reserve management planning and activity updates to residential and non-residential neighbours.	Environmental Services	Medium
13.6. Provide neighbour, visitor, and general community information to short term let and resort properties for guests, about our beaches and reserves, how to look after them and stay safe.	Environmental Services	Medium
13.7. Develop clearer, more prominent, and more attractive signage and information about dogs, including to short term accommodation visitors.	Environmental Services Infrastructure Services Local Laws	Medium

14. Incidents and disaster management

Action	Responsibility	Priority
14.1. Identify site specific fire risk interface treatments as required by the Noosa Strategic Bushfire Management Plan.	Environmental Services	Immediate Continuing
14.2. Review incident management procedures, including for marine spills, marine debris events and marine stranding, and update as required.	Environmental Services Infrastructure Services Disaster Management	Medium
14.3. Publish a case study and video about the pontoon and polystyrene removal to inform future polystyrene pontoon incidents and cleanups.	Environmental Services	Video Complete Medium
14.4. Review key beach accesses to enable improved access by large machinery and trucks for disaster response. Review and simplify nearby park, beach access and street infrastructure to ensure their location doesn't prevent the use of the key beach access by large machinery and truck for disaster response.	Environmental Services Infrastructure Services Emergency Services Surf Life Saving clubs Surf Life Saving Qld	Medium
14.5. Provide neighbours with information about bushfire risk management and Council's fire management program.	Environmental Services	Medium
14.6. Better support and collaborate with the community to prevent and respond to future local marine debris events.	Environmental Services Infrastructure Services	Medium

15. Encroachments

Action	Responsibility	Priority
15.1. Contribute to the implementation of a shire-wide encroachment policy for Council managed land, including: - targeted educative compliance as a first measure to address and remove historic and new encroachments - taking a zero tolerance and timely enforcement approach to any new encroachments - a clear direction and framework for the recovery and restoration of illegally disturbed bushland areas - clear guidance about climate mitigation measures for private property - fire risk mitigation measures incorporated into the recovery and ecological restoration of disturbed areas. - Natural Areas encroachment recovery program resourced with staff that have natural area encroachment, education, recovery and compliance skills.	Environmental Services Infrastructure Services Local Laws	Immediate (Policy complete, implementation activities are ongoing)
15.2. Implement a broader awareness campaign and community education materials to encourage good custodianship of council managed land, including information and signage.	Environmental Services	Immediate
15.3. Incorporate fire risk mitigation measures into Natural Areas encroachment recovery	Environmental Services	Immediate Continuing

16. Data collection and monitoring

Action	Responsibility	Priority
16.1. Conduct a desktop review of the extent of EBFR vegetation every two years, using remote sensing data collected under the Coastal Monitoring Plan.	Environmental Services Climate Change	Baseline data collected 21-22 Re-collection 23-24
16.2. Monitor for any changes in the EBFRs RE mapping every five years by measuring the extent of mapped REs and high value regrowth and the extent of all vegetation using desktop mapping, vegetation management mapping and aerial photos.	Environmental Services Strategic Planning	Baseline data collected 21-22 Re-collection 27-28
16.3. Undertake BOA mapping every 5 years. Compare against management zone rehabilitation targets in ecological rehabilitation plan, aiming for 75% or better compliance.	Environmental Services	Baseline data collected 22-23 Re-collection 28-29
16.4. Contribute as a stakeholder to coastal and coastal creek monitoring and other relevant projects and programs as required. Make relevant Environmental Services, Natural Areas Eastern Beaches Foreshores Reserves and other data as freely available as possible to these and other projects and programs.	Environmental Services	Continuing



18. Appendices



Appendix One

Legislation and policy linkages

Level	Legislation
Commonwealth	Environment Protection and Biodiversity Conservation Act 1999
State	Aboriginal Cultural Heritage Act 2003
	Agricultural Chemicals Distribution Control Act 1998
	Biosecurity Act 2014
	Coastal Protection and Management Act 1995
	Environmental Offset Act 2014
	Fire and Rescue Service Act 1990
	Nature Conservation Act 1992
	Land Act 1994
	Local Government Act 2009 (QLD)
	SEQ Regional Plan 2009 – 2031
	Planning Act 2016 & Planning Regulation 2017 (Schedule 10)
	Public Health Act 2005 & Regulation 2018
	State Planning Policy July 2017 & State Interest Guidelines
	Vegetation Management Act 2009
Water Act 2000	
State Planning Policy 2/10 Koala Conservation in SEQ	
Local Laws and planning instruments	Noosa Council Planning Scheme 2020
	Priority Infrastructure Plan (Local Government Infrastructure Plan)
	Local Law No.2 (Animal Management) 2015
	Local Law No.3 (Community & Environmental Management) 2015
	Local Law No.4 (Local Government Controlled Areas, Facilities, & Roads) 2015
	Local Law No.6 (Bathing Reserves) 2015

Appendix One

Local strategic and planning drivers

Document	Relevance
Noosa 2.0 Corporate Plan 2023-2028 Operational Plan (annually reviewed)	An objective under the Environment Theme is “Fund and implement Coastal Foreshores and Coastal Hazard Management Plans to protect and enhance coastal and foreshore areas.” Signature projects include “Implementation of Coastal and Foreshore Management Plans”.
Noosa Council Environment Strategy 2019	The social and environmental values of coastal ecosystems are recognised and several targets and outcomes require them to be protected and enhanced.
Noosa Biodiversity Plan: Biodiversity Assessment Report 2016	Outlines the current and likely future state of biodiversity in Noosa Shire and identifies dune ecosystems as being both at risk and having significant values.
Noosa Cultural Plan 2019 – 2023	Identifies working with Kabi Kabi (Gubbi Gubbi) to collaboratively manage Bushland environmental and cultural values.
Noosa Biosecurity Plan 2020	Several of the management actions and priority pest species (including broad leaf pepper, Singapore daisy and foxes) directly apply to the Eastern Beaches foreshore reserves.
Noosa Climate Change Response Plan	Identifies healthy and resilient natural systems as a strategic priority, and specifically identifies the need to develop a coastal management plan for dune management and ecological restoration and other management aspects.
Noosa Bushland Reserve Strategic Fire Management Plan 2021 - 2026	Determines the level of fire threat, fire risk, and related interface management required for bushland reserves and foreshore reserves.
Noosa Bushland Reserves Strategic Management Plan 2021 – 2026	Outlines the values and management issues in Council's bushland reserve network, to help prioritise management responses.
Noosa Coastal Hazards Adaptation Plan 2021	Describes risks from coastal hazards including erosion, storm tide and gradual sea level rise and identifies nature-based solutions as the preferred adaptation response to likely impacts. Includes a biodiversity vulnerability assessment and a cost-benefit analysis for the Eastern Beaches. These assessments identified the importance of dune revegetation, augmentation and management to maximise benefits of coastal foreshores for both human and natural systems.
Noosa Walking and Cycling Strategy and Implementation Plan 2020-2040	Some of the existing walking and cycle paths pass through or alongside EBFRs. The plan guides the prioritisation of pathway improvements.

Appendix One

Links to Noosa Environment Strategy 2019

Theme 1 - Biodiversity

Goal: By 2030 the condition and extent of our natural ecosystems has improved.

Strategy 1.1 Protect and enhance existing ecosystems, vegetation networks and habitats		
Target	Measure	Implementation in EBFRs
By 2030, there is no net loss of ecosystem values across the shire, and the condition of Council's priority bushland reserves are enhanced.	Bushland Operational Assessments (BOAs) will be undertaken every 5 years across priority Council managed Bushland Reserves.	BOAs were undertaken in some EBFRs in 2012, and across all EBFRs in 2017. BOAs are being repeated in all EBFRs from 2022-23.

Strategy 1.3: Improve long-term survival for threatened species and ecological communities		
Target	Measure	Implementation in EBFRs
By 2030, populations of key threatened indicator species remain viable.	Monitored as part of the Threatened Species Plan and reported in the Environment Strategy's Monitoring Program.	The new Threatened Fauna Recovery Roadmap identifies key threatened species and provides a framework for ongoing monitoring. The EBFRMP identifies relevant significant species for active management. Turtles are identified as priority species to focus on in 2023-2024.

Activity/project	Council's role	Strategies	Status in EBFRs in 2022
Undertake environmental restoration activities throughout Council's conservation reserves. Prepare BOAs for Council reserves to monitor the success of work.	Provider, facilitator, funder	1.1, 1.3, 2.1, 2.2, 4.3	BOAs undertaken as required. Completed in 2022-23. Ecological restoration grant (\$75,000 / yr over three years FY20-23) funded by Environment Levy grant, delivered by community volunteer directed contractors and volunteers. In 2022, Council provides 3 labour days contractor support per reserve per year.
Reduce the threat of priority biosecurity risks, such as pest plants and animals, on Council land and support private landholders to do the same.	Partner, educator, provider, regulator	1.1, 1.3, 2.2, 4.3	See above. Glory lily continues to expand - areas of most other weeds are reducing.
Identify priority land parcels that enhance landscape connectivity and seek to have them managed for environmental outcomes, either through direct purchase by Council, or utilising other appropriate protective mechanisms.	Planner, provider	1.1, 1.2, 2.2, 4.1	The EBFRMP identifies east west connectivity and collaboration opportunities to work with other areas of Council to achieve better connectivity through adjacent land not currently managed for conservation.
Undertake detailed biodiversity assessments across different Broad Vegetation Groups, with a view to understanding and monitoring the health of biodiversity across the Shire.	Partner, researcher, funder	1.1, 1.3	The biodiversity values of the EBFRs need to be assessed in a fine-scale manner to update State regional ecosystem mapping. BOAs need to be prepared as 5 yearly condition maps with updated rehabilitation plans to direct restoration activities.
Scope and undertake monitoring programs on populations of 6-8 key representative threatened species, to mitigate against local extinctions.	Partner, researcher, funder	1.1, 1.3	The EBFRMP identifies relevant significant species and provides the management framework for directing management actions for key species.

Appendix One

Links to Noosa Environment Strategy 2019

Theme 2 - Waterways, Wetlands and Coasts

Goal: By 2030 waterways, wetlands and coasts are healthy, resilient to change and valued by the community.

Strategy 2.2: Protect and enhance coastal environments and vegetated buffers to coastal foreshores		
Target	Measure	Implementation in EBFRs
By 2030, maintain the extent of vegetated buffers and improve diversity of coastal ecosystems.	<p>Review mapping of vegetation extent of coastal foreshores every 2 years.</p> <p>Every 5 years updated regional ecosystem mapping will be used to identify changes in the number and extent of coastal regional ecosystems.</p>	Detailed regional ecosystem mapping was prepared in EBFRs in 2021-22, with significant expansion of mapped high value regrowth and some expansion of mapped Regional Ecosystems (RE). In 2021 mapped High Value Regrowth (HVR) and RE was 87.3 ha, increasing to 126.9 ha in 2022 and four new REs, 12.2.5, 12.2.7, 12.2.13, and 12.2.15, were mapped, probably due to the more detailed mapping rather than more recovered vegetation.

Activity/project	Council's role	Strategies	Status in EBFRs in 2022
Develop an integrated water monitoring network for Council, community and other agencies, including event monitoring of sediments, nutrients and litter for Noosa and Mary Catchments, and a Mary River sub-catchment baseline and report card.	Partner, enabler, funder	2.1, 2.2, 4.3	The Rivers and Coast team will use baseline water quality data to develop sub-catchment report cards for coastal creeks (Marcus, Peregrin and Castaways) to determine water quality and management actions, with the potential to expand the monitoring of coastal creeks in future. Work with the Environmental Health team is underway to ensure data collected through the recreational water quality monitoring program more publicly accessible.
Implement an Eastern Beaches dune rehabilitation program to improve the condition, species diversity and stability of dune ecosystems and enhance resilience to climate change.	Partner, funder	1.1, 1.3, 2.2, 4.3	The development of a EBFRMP is a direct result of this activity. Updating condition mapping and ecological restoration plans is ongoing.
Undertake a stormwater quality improvement program, that includes an audit of stormwater quality improvement devices, analysing current infrastructure, current best practice and options to improve infrastructure as it is due for replacement.	Provider, researcher	2.1, 2.2, 4.3	<p>Stormwater infrastructure audits and condition assessments are ongoing and help inform Council's capital works renewal programs. The Burgess Creek sub-catchment requires the development of a catchment management plan to inform future planning and improvements. This work is underway.</p> <p>The Environmental Health and Environmental Services branches are working on a coordinated approach to stormwater quality monitoring to help inform future management.</p>

Appendix One

Links to Noosa Environment Strategy 2019

Theme 4 - Climate change adaptation and resilience

Goal: By 2030 the resilience of the Noosa community and environment has increased.

Strategy 4.3: Manage the natural environment in a way that improves resilience to climate change		
Target	Measure	Implementation in EBFRs
Ecosystem health of wetlands and riparian areas is improved.	A baseline will be developed to measure the ecosystem health of coastal wetlands. Mapping of vegetation will be reviewed every three years.	BOA mapping for the whole of the EBFRs, including coastal wetlands, is ongoing.

Activity/project	Council's role	Strategies	Status in EBFRs in 2022
Implement energy efficiencies throughout Council-owned facilities and operations, such as the installation of solar PV systems and use of lower-emission transport options.	Provider, leader, funder	3.2, 4.1, 4.2	Energy efficient, renewable and otherwise sustainable technologies, materials and methods are identified as criteria and objectives in community infrastructure projects such as the Beach Access Design Standards project.

Appendix One

Links to principles and strategies in Noosaa Coastal Hazards Adaptation Plan 2021

The management of the EBFRs as natural areas, conserving the natural dunes, beaches and plants and animals in the long-term, is clearly supported in Noosa's Adaptation Principles, created during the development of the CHAP. A selection of key principles is provided below:

Guiding principles - the Noosa Environment

1. Adaptation does not adversely impact upon the natural assets of Noosa.
2. Adaptation supports the resilience of native flora and fauna, natural dune systems and beaches.
3. Adaptation maintains the natural landscape character of places and provides for attractive natural solutions that harmonise with local environmental features.

Other relevant aspects of Council's Adaptation Principles relating to community, economy, long-term planning and excellence, particularly supporting the preservation of beach accesses and community and visitor recreation assets include:

- Increasing community safety and resilience to risks from climate change,
- Maintaining or enhancing public accessibility into coastal landscapes without impeding on natural values,
- Minimising community disruption from climate hazards,
- Maintaining economic functionality and minimising future climate-related damage costs,
- Embedding flexibility and adaptability,
- Ensuring intergenerational and intragenerational equity,
- Prioritising community consultation and involvement in early planning,
- Driving science-driven decision-making,
- Minimising future costs to Council and creating co-benefits wherever possible.

Two of the most prominent messages received from the Noosa community during the CHAP's development align with this sentiment as they specifically emphasise the use of nature-based solutions to protect human and natural systems from the impacts of coastal hazards: "... there is a strong preference for nature-based solutions that fit with the look and feel of Noosa, and that minimise impacts to natural environments" and "natural and scenic

amenity assets are considered to have the highest intrinsic value to the community" (Noosa Council CHAP, 2021:18). Dune revegetation and management, which improves coastal protection while also contributing to biodiversity conservation, is widely recognised as a nature-based solution.²⁷

Sentiments shared through community input were further corroborated through technical studies performed throughout Phase 2 to Phase 7 of the CHAP. The cost-benefit analysis²⁸ undertaken in 2020 clearly demonstrated that dune revegetation, augmentation and management provide the greatest economic net present benefit for managing coastal hazards along the Eastern Beaches. Likewise, the CHAP Biodiversity Assessment²⁹ found that increasing vegetation protection and connectivity, protecting refugia and reducing existing threats can assist biodiversity in adapting to climate change. Specifically:

- "Expanding protected areas within and directly landwards of the coastal hazard zone, including public reserves and supporting private land conservation initiatives. Protection of more habitat within the coastal zone will help biodiversity assets adapt to coastal hazards and other climate change factors."
- "Regulating vegetation clearing within and directly landwards of the coastal hazard zone as protection of remnant and regrowth native vegetation will be vital in increasing the capacity of biodiversity to adapt and persist in a changing climate. Maintaining and improving the condition of existing native vegetation is also likely to be more productive than restoring land that has been substantially modified."
- "Managing biodiversity threats within the coastal hazard area, particularly invasive species, fire, disease, reduced water quality and environmental flows to enhance adaptive capacity of biodiversity assets over the short to medium term."
- "Restoring habitats within and directly landwards of the coastal hazard area to improve landscape connectivity for climate change adaptation."

²⁷ Morris et al. (2021). The Australian Nature-Based Methods for Reducing Risk from Coastal Hazards. Earth Systems and Climate Change Hub Report No. 26. NESP Earth Systems and Climate Change Hub, Australia.

²⁸ Aither (2020). Noosa Shire Council - Coastal Hazard Adaptation Plan Cost benefit analysis: Final report prepared for Noosa Shire Council.

²⁹ MBMT (2019:47). Noosa Shire Council CHAP Biodiversity Assessment.

Appendix One

Links to principles and strategies in Noosa Coastal Hazards Adaptation Plan 2021

In consideration of these findings, revegetation and management within the foreshore reserves and dune area, have been identified as high priorities in the CHAP in response to increasing coastal hazards:

“Pursue dune management and revegetation in high-risk erosion areas as a critical and immediate priority for Council and the community in helping to build coastal resilience and management of erosion risks” (Noosa Coastal Hazards Adaptation Plan, 2021:40).

For beach locations, including the Eastern Beaches, developing a Coastal Foreshores Management Plan was listed as a key shire-wide action alongside a selection of other priorities relevant to the EBFRs and EBFRMP as noted below:

- Implement relevant actions from Coastal Foreshores Management Plan once developed
- Improve the awareness and understanding of coastal hazard risks and adaptation measures amongst the Noosa community and other key stakeholders
- Ensure disaster management plans and procedures are considering changes to coastal hazard risks where necessary
- Pursue dune management and revegetation in high-risk erosion areas as a critical and immediate priority for Council and the community in helping to build coastal resilience and management erosion risks.

The CHAP goes further to detail locality-specific outcomes and adaptation actions that link back to the Adaptation Principles, community preference, and the technical studies. Those that relate directly to this Plan are outlined below:

Peregian Beach

- Preferred adaptation outcomes identified in the CHAP:
 - Implement measures that support and enhance dunes, beach health and natural coastal processes as soon as possible.
 - Prevent the construction of hard protective structures where possible that are likely to exacerbate erosion risk, impact on preferred outcomes for dune and beach health, impair natural coastal processes, and lead to adverse impacts on neighbouring areas.

- Re-locate important recreational and infrastructure assets outside the projected high-risk coastal erosion prone area by 2070
- Where important recreational and infrastructure assets cannot be feasibly re-located, seek to accommodate the risks by adapting the design of these assets to be more resilient during and after a major erosion event.

– 5-year Actions identified in the CHAP:

- Investigate alternative designs for beach accesses so as to accommodate coastal processes of erosion and accretion
- Expand native vegetation coverage to support frontal dune stabilisation
- Re-design beach accesses to deter foot traffic across nearby dunes
- Install signage for increasing beach user understanding of importance of healthy dune systems
- Assess options for relocating fencing on seaward boundary of Peregian Park to permit dune movement
- Investigate options of managed alignment of coastal creeks and other natural drainage locations
- Investigate impact of illegal encroachment by private asset owners into publicly owned dune areas on dune health and natural coastal processes.”

Marcus & Castaways Beaches

– Preferred adaptation outcomes identified in the CHAP:

- Implement measures that support and enhance dunes, beach health and natural coastal processes as soon as possible.
- Prevent the construction of hard protective structures where possible that are likely to exacerbate erosion risk, impact on preferred outcomes for dune and beach health, impair natural coastal processes, and lead to adverse impacts on neighbouring areas.

– 5-year Actions identified in the CHAP:

- Expand native vegetation coverage to support frontal dune stabilisation
- Re-design beach accesses to deter foot traffic across nearby dunes
- Install signage for increasing beach user understanding of importance of healthy dune systems

Appendix One

Links to principles and strategies in Noosa Coastal Hazards Adaptation Plan 2021

- Investigate options of managed alignment of coastal creeks and other natural drainage locations.”

- Investigate impact of illegal encroachment by private asset owners into publicly owned dune areas on dune health and natural coastal processes.”

Sunrise and Sunshine Beaches

– Preferred adaptation outcomes identified in the CHAP:

- Implement measures that support and enhance dunes, beach health and natural coastal processes as soon as possible.
- Prevent the construction of hard protective structures where possible that are likely to exacerbate erosion risk, impact on preferred outcomes for dune and beach health, impair natural coastal processes, and lead to adverse impacts on neighbouring areas
- Begin re-locating recreational assets outside the projected high risk coastal erosion prone area by 2040, such as seating and footpaths
- Re-locate service infrastructure assets to areas outside the high-risk area by 2070
- Where important recreational and service infrastructure assets cannot be feasibly re-located, seek to accommodate the risks by adapting the design of these assets to be more resilient during and after a major erosion event.
- Ensure development in erosion prone areas mitigates the risk to people and property to an acceptable or tolerable level, consistent with the State Planning Policy: natural hazards risk and resilience

– 5-year Actions identified in the CHAP:

- Investigate alternative designs for beach accesses so as to accommodate coastal processes of erosion and accretion
- Expand native vegetation coverage to support frontal dune stabilisation
- Re-design beach accesses to deter foot traffic across nearby dunes
- Investigate options for managing foot traffic within frontal dune areas, including fencing design
- Install signage for increasing beach user understanding of importance of healthy dune systems
- Investigate options of managed alignment of coastal creeks and other natural drainage locations where creeks consistently erode incipient dunes

The two methods identified in the CHAP for mitigating present day risks in Peregian Beach, Marcus Beach, Castaways Beach, Sunrise Beach, and Sunshine Beach include:

- Maintaining and enhancing vegetated dune areas, which act as a natural buffer to erosion by dispersing wave energy during storm events;
- Planning controls on coastal development that prevent encroachment into the vegetated dune areas, thereby preserving natural coastal processes of erosion and accretion.”

Appendix Two

Linked projects and programs

Coastal Hazards Adaptation Plan – Implementation (Commenced)

The CHAP implementation program lists and prioritises actions and tasks associated with the CHAP's five-year plan and adaptation pathway response for each locality. The Eastern Beaches Foreshore Reserves Management Plan has been identified as a priority addressing risks identified as 'Very High' through the CHAP process.

Coastal Monitoring Plan (Commenced)

As part of its strategy to manage climate change impacts along the coastline, Council developed a long-term Coastal Monitoring Plan in 2022 which sets out annual monitoring activities to:

1. Better inform coastal management measures;
2. Identify key areas requiring future management; and
3. Provide data for future coastal hazard studies.

This work responds to a key message received from the community during the development of Council's endorsed Coastal Hazards Adaptation Plan (CHAP): that localised data collection and monitoring of the coastal system should be prioritised to better understand and model the impact of coastal hazards driven by climate change.

The monitoring plan includes a range of data collection methods including remote sensing techniques to capture shoreline position, beach levels, beach volume, seafloor levels, vegetation extent and density, seafloor sediment volumes, and the movement of creek outlets. The data collection methods include upper beach surveying, photogrammetry and LiDAR topography from drones, fixed cameras, CoastSnap citizen science sites, water-based surveys using single beam echo sounders, and satellite-derived bathymetry. The coastal monitoring program is scheduled to be undertaken annually, before and after the storm season.

Coastal monitoring programs under the Coastal Hazards Adaptation Plan include:

- CoastSnap Citizen Science Site with UNSW/UniSC at Sunshine Beach Lookout
- Burgess Creek Monitoring Project with UniSC

- Nearshore Coral Reef Monitoring with Reef Check Australia
- Coast4D Citizen Science Monitoring with UniSC

Other ongoing implementation projects under the CHAP include:

- COASTS Project with University of the Sunshine Coast/ UQ/EOMAP
- Living Foreshores Noosa Phase 1 – Designing for Resilience
 - Noosaville Foreshore Resilience Project
 - Designing Dynamic Dunescapes
 - Coastal Wetland Prioritisation Study with UQ
- Regional Coastal Process Model with Sunshine Coast Council
- Offshore Sand Supply Investigation

For further information on these projects please refer to the project page.

Burgess Creek monitoring (Commenced)

Council's Infrastructure, Environment Services and Climate Change branches are working with UniSC on a monitoring project at Burgess Creek. The research aim is to investigate the reasons behind Burgess Creek's channel migration at event time scales (decades). The objectives of the study are to: 1) monitor water quality, 2) monitor the 2D and 3D morphological change of the creek; 3) relate the observed changes in water quality and morphology to boundary conditions (e.g., waves, the creek's water surface level, rainfall, and discharge), and 4) develop an empirical model to predict triggers forcing changes in water quality and the creek's morphology.

Morphology: The creek's planform change, channel depth and beach/dune volumetric changes will be surveyed using drone photogrammetry and satellite profiles on a monthly and/or event-driven basis (e.g., before/after significant swell or rainfall events). Nearshore hydrodynamics (waves and currents) will be modelled using a calibrated wave simulation model. An XBeach model will be used to model beach/dune volumetric changes and tested using observed data.

Water levels and flows: The creek's water surface level will be monitored using a pressure sensor at the mouth

Appendix Two

Linked projects and programs

(west side of the bridge) based on significant events (e.g. during significant weather). The creek's flow velocity will be continuously monitored (every 30 seconds) using a water flow meter at a fixed site (west side of bridge). Flow data will be uploaded daily and will be accessible to Noosa Council via UniSC's online data account. The channel's morphology will be surveyed to estimate the creek's discharge based on monitored flow.

Water Quality: Water quality samples will be collected at the same site west of the bridge, and the outflow site (Wallum Lane – Rotary Way, Noosa Sewerage Treatment Plant) monthly or after significant events (>20mm rainfall), and tested for concentrations of E.coli, total nitrogen, total phosphorus and total suspended solids.

Decision making tool: A stage/discharge relationship or rating curve will be developed for the creek, and data will be collated and analysed to develop an empirical model that will explain the main triggers and predict thresholds that force the creek's morphological and water quality changes.

The practical and easy to use decision support tool based on the empirical model developed from this project will benefit the management of Burgess Creek by determining the thresholds best suited for actions. For example, the tool could be used to determine when is best/necessary to open the creek's mouth to mitigate dune erosion or when the creek's water quality could be expected to be a health hazard.

Burgess Creek Integrated Catchment Management Plan (Future projects)

An Integrated Catchment Management Plan (ICMP) for Burgess Creek project is being developed by the Infrastructure and Environment Services branches. It will establish a framework for its sustainable management and facilitate investigation of the catchment.

The Burgess Creek ICMP will

- Investigate current hydrology, stream flow behaviour, groundwater flows, 3rd party flows and bank stability
- Collate the ecological values of Burgess Creek and how these are being impacted
- Undertake water quality investigations to determine:
- Impacts of point and diffuse sources water quality issues

within Burgess Creek

- Compliance with Department of Environment & Science water quality objectives
- Impact of historical landfills, rapid infiltration basins and night soil disposal areas on groundwater
- Compliance with the Recreational Health Guidelines

Coastal creek mouth realignment (Ongoing)

The lowest reach of some coastal creeks, where they cross the beach, are periodically realigned, dependant on the extent of creek mouth movement and impact on adjacent dunes or beach access infrastructure. Burgess Creek mouth has been realigned four times in the last two financial years. This is completed by Council under an ongoing permit for coastal works.

Data about creek mouth movement is being collected as part of current and planned coastal and creek monitoring projects. Future creek mouth management will be better informed by this data.

Noosa Eastern Beaches Creeks - High Risk Erosion Prioritisation and Planning

Infrastructure Services is developing a High-Risk Erosion Prioritisation and Planning project for the Eastern Beaches coastal creeks. Since Noosa coastal residential development in the early 1960's, there have been issues with bank stability and sand slips along Eastern Beaches coastal creeks ranging from the minor movement of sand to drastic slip failure. Sand slips have the potential to impact public and private assets, and the natural assets that the shire is known for. Presently Council is undertaking bank stability works in public land at two of the Eastern Beaches coastal creeks to protect private, public and natural assets.

Traditionally Council has undertaken these works as a reactive action when sand slips happen, but this project proposed that Council adopts a process of assessing and prioritising works in the Eastern Beaches creeks to enable proactive management. With this proactive approach, it is anticipated that potential slips stability issues will be identified early, reducing the cost of prevention, containment and rectification work, along with reducing social, environmental and water quality impacts.

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Linked projects and programs

Integrated Water Quality Monitoring Program (Commenced)

Noosa Council's Rivers & Coast team has developed and rolled out a three-part Integrated Water Quality Monitoring Program and database. The following are details of the aspects of this program that are near the Eastern Beaches Foreshores Reserves.

Coastal creek water quality monitoring: The Coastal Connect Bushland Care Waterwatch volunteers are undertaking water quality sampling at Marcus Beach, Peregrin Creek and Castaways Creek, including pH, turbidity, temperature, dissolved oxygen, conductivity, and salinity are measured on a monthly schedule using a water quality meter. The baseline data is used to inform water quality at a sub-catchment spatial extent and to understand the impact of restoration works in the area.

Noosa Sewerage Treatment Plant monitoring: The Rivers & Coast team have recently begun monthly water quality monitoring at several locations in Burgess Creek catchment. This includes pH, turbidity, temperature, dissolved oxygen, conductivity and salinity laboratory analysis for chlorophyll-a, nutrients and total suspended solids. Noosa Council is also investigating the feasibility of developing a citizen science monitoring program in the Burgess Creek catchment.

Recreational Water Monitoring Program: The program aims to monitor recognised recreational water sites (specifically targeting primary contact recreation (the whole body or face is frequently immersed in water) to mitigate potential risks to human health while educating the public on water quality issues. In the Eastern Beaches, the wave zone at the mouth of Burgess Creek and the swimming area near Sunshine Beach Surf Club are sampled for enterococci, an indicator bacterium used to detect faecal contamination in waterways.

The program is conducted by Council's Environmental Health Team in accordance with the National Health and Medical Research Council (NHMRC) Guidelines for Managing Risks in Recreational Water (2008), using a set of 'trigger values' published by Healthy Land & Waters. Elevated levels of enterococci will initiate either: a warning trigger - prompting daily re-sampling of a site; or an action

trigger - prompting signage, public awareness, and further site investigation. For more information: environment@noosa.qld.gov.au

Bushfire risk management (Commenced)

Since the 2019-2020 Black Summer, Noosa Council has significantly increased its capacity to prepare for, and respond to, bushfire risk and bushfire emergencies in Council managed bushland.

Noosa Bushland Reserve Strategic Fire Management Plan 2021: Identifies priority reserves for fire management actions based on a comprehensive bushfire risk assessment across nearly 180 reserves. Actions include reserve fire management plans, fire trail and other fire risk mitigation measures works, planned burns and collaborative working arrangements with neighbours and other government agencies. The updated fire management plan considers the longer and more intense bushfire seasons we are likely to experience as a result of climate change.

Fire Management Officer – 2021 - ongoing: A new position to implement the updated fire management plan was filled and resourced in late 2021. While elements of reserve bushfire management were implemented prior to late 2021, having a full time, resourced officer dedicated to reserve fire management significantly increased Council's capacity to plan for and respond to bushfire risk across our conservation estate.

Reserve fire management program 2021 - ongoing: Since the Fire Management Officer position was filled, 140 hectares of planned burns have been conducted on Council managed bushland in collaboration with RFS and QPWS, more than 70km of fire trails and other fire risk mitigation measures have been installed, upgraded, or maintained, working relationships have been strengthened with other land management agencies, and 16 council officers have been trained in firefighting.

Appendix Three

Regional Ecosystem short descriptions

RE 12.2.14: Strand and fore dune complex comprising *Spinifex sericeus* grassland *Casuarina equisetifolia* subsp. *incana* low woodland/open forest and with *Acacia leiocalyx*, *A. disparrima* subsp. *disparrima*, *Banksia integrifolia* subsp. *integrifolia*, *Pandanus tectorius*, *Corymbia tessellaris*, *Cupaniopsis anacardioides*, *Acronychia imperforata* and *Hibiscus tiliaceus*. Occurs mostly on frontal dunes and beaches but can occur on exposed parts of dunes further inland.

VMA Status: Least Concern
Biodiversity Status: No concern at present

Small pockets of other mapped remnant Regional Ecosystems and High Value Regrowth occur, including;

12.2.5 *Corymbia intermedia* +/- *Lophostemon confertus* +/- *Banksia* spp. +/- *Callitris columellaris* open forest on beach ridges usually in southern half of bioregion

VMA Status: Least Concern
Biodiversity Status: Of Concern

12.2.7 *Melaleuca quinquenervia* or rarely *M. dealbata* open forest. Other species include *Eucalyptus tereticornis*, *Corymbia intermedia*, *E. bancroftii*, *E. latisinensis*, *E. robusta*, *Lophostemon suaveolens* and *Livistona decora*. A shrub layer may occur with frequent species including *Melastoma malabathricum* subsp. *malabathricum* or *Banksia robur*. The ground layer is sparse to dense and comprised of species including the ferns *Pteridium esculentum* and *Blechnum indicum* the sedges *Schoenus brevifolius*, *Baloskion tetraphyllum* subsp. *meiostachyum*, *Machaerina rubiginosa* and *Gahnia sieberiana* and the grass *Imperata cylindrica*. Occurs on Quaternary coastal dunes and seasonally waterlogged sandplains usually fringing drainage system behind beach ridge plains or on old dunes, swales and sandy coastal creek levees.

VMA Status: Least Concern
Biodiversity Status: No concern at present

12.2.13 Open or dry heath. Characteristic shrubs include stunted *Banksia aemula* and *Allocasuarina littoralis* as well as *Xanthorrhoea johnsonii*, *Leptospermum semibaccatum*, *Phebalium woombye*, *Dillwynia retorta* and *Caustis recurvata*. Usually occurs on Pleistocene dunes and beach ridges.

VMA Status: Of Concern
Biodiversity Status: Endangered

12.2.15 Closed sedgeland in coastal swamps and associated water bodies. Characteristic species include *Gahnia sieberiana*, *Empodisma minus*, *Gleichenia* spp., *Blechnum indicum*, *Lepironia articulata*, *Baumea* spp., *Juncus* spp., and *Eleocharis* spp. Occurs on Quaternary coastal dunes and beaches. Low part of coastal landscape where water collects from both overland flow and infiltration from adjoining sand dunes.

VMA Status: Least Concern
Biodiversity Status: No concern at present

Appendix Four

Significant species management documents

Relevant management documents include;

Recovery Plan for Marine Turtles in Australia

<https://www.awe.gov.au/sites/default/files/documents/recovery-plan-marine-turtles-2017.pdf>

Threat Abatement Plan for the impacts of marine debris on the vertebrate wildlife of Australia's coasts and oceans (2018)

<https://www.awe.gov.au/sites/default/files/documents/tap-marine-debris-2018.pdf>

Threat abatement plan for predation by European red fox

<https://www.awe.gov.au/environment/biodiversity/threatened/publications/tap/predation-european-red-fox>

National Light Pollution Guidelines for Wildlife Including Marine Turtles, Seabirds and Migratory Shorebirds

<https://www.awe.gov.au/sites/default/files/documents/national-light-pollution-guidelines-wildlife.pdf>

National recovery plan for the wallum sedgefrog and other wallum-dependent frog species

<https://www.awe.gov.au/sites/default/files/documents/wallum-frogs.pdf>

Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act

<https://www.awe.gov.au/sites/default/files/documents/survey-guidelines-frogs.pdf>

Draft referral guidelines

<https://www.awe.gov.au/sites/default/files/documents/draft-referral-guidelines-comment-litoria-olongburensis.pdf>

South East Queensland Natural Resource Management (SEQ NRM) Plan 2014 —2031

The plan aims to maintain or enhance dune values by undertaking ecological restoration, managing access, recreation, light pollution on dunes.

Appendix Five

Tables for Bushland Reserves outside of the Eastern Beaches Foreshore Reserves.

Example BOA condition mapping attribute table

OBJECTID	BOAClass	WEED1	WEED1 COV	WEED2	WEED2 COV	WEED3	WEED3 COV	RESILIENCE	RECRUITMENT	STRUCTURE	NOTES	INSP_DATE
161	Poor	Senna pendula var. glabrata - easter cassia	5 - 25%	Paspalum mandiocanum - broad leaf paspalum	5 - 25%	Bromeliad sp.	5 - 25%	Poor	Poor	Poor	Yard extension with clearing, fill pushed into mangroves. Filled areas, with mowed lawns and gardens replacing casuarina fringing vegetation and natural slope down to mangroves.	Mar 2017
162	Moderate	Archontophoenix alexandrae - alex palm	5 - 25%					Moderate	Moderate	Moderate	Underscrubbed, some non local natives. Fill and concrete slabs pushed into mangroves.	Mar 2017
163	Moderate	Paspalum mandiocanum - broad leaf paspalum	50 - 75%	Sphagneticola trilobata - Singapore daisy	5 - 25%	Archontophoenix alexandrae - alex palm	5 - 25%	Moderate	Moderate	Moderate	Edge of melaleuca forest with little understory. Looks like lots of work going on, but boundary into reserve very weedy and there are lots of gaps in understory. Quite a bit of ornamental natives planting. Also annuals, cocas palm, corky passionfruit.	Mar 2017
164	Very Good	Baccharis halimifolia - groundsel bush	5 - 25%					Very Good	Very Good	Good	Casuarina forest with mangrove fern and sedge understory. Scattered weed.	Mar 2017
165	Moderate	Hedychium gardenianum - kahili ginger	5 - 25%	Agrostis sp. - bent grass	5 - 25%	Ardisia crenata Ardisia humilis Ardisia crispa - coral berry	5 - 25%	Moderate	Moderate	Moderate	Yard extension with plantings and dumping. Also bananas, cassia, alexander palms.	Mar 2017
167	Moderate							Moderate	Moderate	Moderate	Spraying into edge and lots of garden rubbish dumping. Several large parsonia vines, larger than my arm, cut and left in trees.	Mar 2017
169	Good	Ardisia crenata Ardisia humilis Ardisia crispa	5 - 25%	Senna pendula var. glabrata - easter cassia	5 - 25%			Good	Excellent	Good	Regrowth dense melaleuca forest, scattered significant weeds.	Mar 2017
170	Moderate	Ardisia crenata Ardisia humilis Ardisia crispa - coral berry	5 - 25%	Ravenala madagascariensis - travelers palm	25 - 50%	Archontophoenix alexandrae - alex palm	5 - 25%	Moderate	Moderate	Moderate	With elements good. Lots of dumping, underscrubbing, vines being cut, planting and significant weeds. Also corky passionfruit, lantana, cocas palm, camphor laurel, broad leaf pepper, brazilian cherry, anousis, cassia.	Mar 2017
173	Moderate	Nephrolepis cordifolia - fishbone fern	5 - 25%	Senna pendula var. glabrata - easter cassia	25 - 50%	Ardisia crenata Ardisia humilis Ardisia crispa - coral berry	5 - 25%	Moderate	Moderate	Good	Fishbone fern treated, very little understory left. Also camphor laurel, cocas palm, camphor laurel, lantana.	Mar 2017

Example BOA management considerations attribute table

OBJECTID	CONSIDER	WEEDTYPE	PRIORITY	EXTENT	NOTES	INSP_DATE
142	Yard Extension		Urgent	250m2	Paddock fenced well across boundary and very near creek, electric fence, wheel barrow, horse trailer. Suspected source of horsepoo.	Mar 2017
143	Weed Infestation - Strategic	Tradescantia zebrina - zebrina	Urgent	80m2		Mar 2017
146	Yard Extension		Urgent	100m2	Most veg cleared down to edge of mangroves, planting, filled, retaining wall.	Mar 2017
148	Weed Source Plant - Strategic		Urgent		Very weedy garden on road reserve.	Mar 2017
149	Hard Rubbish Vegetation		Urgent		Fill and concrete slabs pushed into mangroves.	Mar 2017
151	Damage		Urgent		Enormous old parsonia vine cut, left in tree.	Mar 2017
152	Garden Rubbish Vegetation		Urgent	100m2	Big piles all through bush behind this property.	Mar 2017
153	Damage		Urgent		Several large parsonia vines, larger than my arm, cut and left in trees.	Mar 2017



