Nambucca Coastline and Estuaries

Coastal Management Program

Stage 1: Scoping Study

Final Report

Nambucca Valley Council has prepared this document with financial assistance from the NSW Government through the Department of Planning, Industry and Environment (DPIE). This document does not necessarily represent the opinions of the NSW Government or DPIE.

Hydrosphere Consulting Pty Ltd
Suite 6, 26-54 River Street
PO Box 7059, BALLINA NSW 2478
www.hydrosphere.com.au

18-019 – NAMBUCCA COASTLINE AND ESTUARIES CMP – STAGE 1 SCOPING STUDY

REV	DESCRIPTION	AUTHORS	REVIEW	APPROVAL	DATE
0	Draft for client review	O. Seccull	M. Howland	M. Howland	18 Feb 2019
1	Final draft	O. Seccull	R. Campbell	M. Howland	25 June 2019
2	Updated final draft for client review	K.Pratt, R. Campbell	R. Campbell	M. Howland	3 Sept 2020
3	Final Report	K.Pratt	R. Campbell	M. Howland	17 Sept 2020

EXECUTIVE SUMMARY

Introduction

The Nambucca coastline and estuaries are dynamic and diverse encompassing a broad range of natural features including sandy beaches, coastal dunes, rocky headlands, marine areas, Intermittently Open and Closed Lakes or Lagoons (ICOLLs), estuary entrances, littoral rainforest, wetlands/heathlands and estuarine environments. It is known as a pristine coastal location and both locals and visitors place a high value on the abundance of natural resources, uncrowded areas for nature-based recreation and stunning scenic amenity. However, the coastline and estuaries are facing threats from coastal and catchment processes and human uses, many of which are predicted to increase over time.

Nambucca Valley Council (NVC) received funding through the NSW Government Coastal and Estuary Grants Program to prepare the Nambucca Coastline and Estuaries Coastal Management Program (Nambucca CMP) to set the long-term strategy for coordinated management of the coastline and estuaries of the Nambucca Valley Local Government Area (LGA).

This Scoping Study represents the first (of five) stages for preparing the Nambucca CMP. It reviews the status of current issues and management and sets the scene for the new CMP. This study was prepared in consultation with the local community and local and state government stakeholders. The CMP will update and replace the 2012 Coastal Zone Management Plan for the Nambucca Coastline and the 2008 Nambucca River Estuary Management Plan.

The CMP process represents an opportunity to develop a suite of coastal management actions across the LGA with a focus on prioritised, practical management actions. The CMP also represents an opportunity to improve the funding and resources available for estuary management through the Council's Integrated Planning and Reporting Framework, the NSW Coastal and Estuary Grants Program and other available funding and grant programs.

Study Area Features and Values

The study area comprises the entire Nambucca Valley LGA coastline stretching 25 km from North Valla Beach southwards to Scotts Head and including the Nambucca River estuary and several ICOLLs including Deep Creek, Swimming Creek and Oyster Creek.

The Nambucca coastline is the traditional land of the Gumbayngirr people and the land within the study area was traditionally occupied by the Dunghutti people. The estuaries, beaches and headlands are of great significance to the local Aboriginal people who are committed to the sustainable management of these areas.

The area remains relatively undeveloped with small coastal towns and villages home to a small local population including Nambucca Heads, Macksville, Scotts Head and Valla Beach. The core community and environmental values of the study area are associated with its landscape amenity (i.e. geographical features, scenic amenity, views), healthy and diverse natural environments and biodiversity values. The Nambucca Valley LGA is home to a variety of businesses and industries including tourism, oyster aquaculture, commercial fishing, agriculture (e.g. dairying, grazing, horticulture, tree crops), construction, manufacturing, timber processing, and aged care and health services. The population increases significantly during holiday periods and the area is facing increasing pressures due to population growth and tourism.

The long-term vision for the Nambucca coastline and estuaries is:

"The coastline and estuaries of the Nambucca Valley LGA are healthy, adaptable natural environments supporting abundant wildlife, diverse habitats, a sustainable local economy and significant cultural values. They are safe, peaceful and accessible places for our community and future generations to learn, enjoy and prosper."

Pressures and Threats

A first-pass risk assessment has been undertaken as part of this Scoping Study which has identified that the coastline and estuaries are facing several threats and pressures that affect the community and environmental values. Over time, many of these pressures are likely to increase due to increasing population, potential land use changes, development within the catchments and the impacts of climate change. Threats were prioritised to assist in determining the priority management actions for the CMP. High priority threats were identified as those presenting a high present-day risk to values and uses of the Nambucca coastline and estuaries (Table 1, grouped by issue category, in no particular order). A summary discussion of key threats provided below.

Table 1: High priority threats identified by the first-pass risk assessment

Issue	ID	High priority threats
Coastal hazards	T1	Coastal long-term shoreline recession
	T3	Increased risk of slope instability/ landslip
	T5	Tidal inundation
	T6	Disrepair of, or inadequate design of coastal protection structures and infrastructure
Estuarine bank erosion	T12	Flooding
	T15	Historic clearing of riparian vegetation and adjacent habitat
	T16	Uncontrolled stock access to and grazing within the riparian zone
Riparian vegetation and weed management	T19	Dominance of invasive weeds
	T16	Uncontrolled stock access to and grazing within the riparian zone
	T15	Historic clearing of riparian vegetation and adjacent habitat
Entrance management, shoaling and estuary hydraulics	T40	Siltation affecting navigation, water quality (reduced flushing) and aesthetics
	T41	Shoaling of marine sands affecting navigation and marine safety
	T44	Dangerous currents
Threats to biodiversity	T45	Removal, fragmentation and degradation of riparian and adjacent habitat
	T46	Removal of instream (e.g. dead wood) and reef habitat
	T47	Predation and invasion by introduced animals and exotic plants
	T49	Overgrazing by stock resulting in reduction in groundcover, enabling erosion and compaction of soil
	T55	Fire/ altered and inappropriate fire regimes/ frequent burning
Water Quality	T65	Agricultural diffuse source runoff (runoff from large areas of agricultural land with no specific point source)
	T66	Urban stormwater pollution and lack of maintenance of existing controls
	T67	Sewer surcharge and STP overflows

Coastal hazards such as storm bite erosion, coastline recession, coastal inundation, landslip and the migration of creek and river entrances are key threats impacting the study area today. Due to the relatively undeveloped nature of much of the Nambucca coastline, the coastal hazard risk is comparatively low compared to other more populated coastal areas in NSW. However, these threats are projected to increase over time as the gradual impacts of sea level rise result in the landward migration of the coastline and increased risk of extreme storm events impacting the coastal zone. Key impacts are predicted to include

damage or loss of assets, infrastructure and foreshore access, loss of dune vegetation, decreased amenity, public safety risks and tourism impacts.

Entrance management, shoaling and estuary hydraulics are also key threats affecting values and uses of the Nambucca coastal zone. Shoaling of the Nambucca River entrance is often raised as a community concern due to restriction of boating navigation and maritime safety issues. ICOLL entrance management is also an ongoing management consideration related to water quality and flooding issues. This is particularly a concern for the estuaries containing low-lying built assets and private property such as Deep Creek, where an entrance management policy is in place. Projected sea level rise and climate change are expected to impact estuary entrances and increase the frequency and severity of catchment and coastal flooding/inundation. Adaptive management approaches will be required to cater for this.

Climate change impacts will also result in a number of additional or emerging risks across the study area, including altered estuary water temperatures, salinity profiles, habitat migration and modified storm frequency and severity.

Bank instability and erosion within the estuaries contributes to loss of land, estuarine vegetation and riparian habitat loss, increased sedimentation and water quality issues. The health of riparian zones also strongly influences estuarine geomorphic condition, biodiversity and the quality of water resources. The main threats to riparian condition within the study area are the dominance of invasive weeds, livestock access and the legacy of historic broad-scale riparian vegetation clearing. A number of other threats to biodiversity have also been identified including increasing development, overgrazing, rubbish dumping and litter, invasive animals and pesticide spray drift.

Water quality is one of the prime estuarine “health” indicators and a key value to the community, many of whom are concerned about ongoing degradation of water quality from both point and diffuse sources and the perception that water quality affects tourism in the area. Results of monitoring undertaken in 2018 indicated that overall, water quality in the Nambucca catchments is of poor quality (D grade), although the study was completed during below average rainfall and low stream discharge conditions which may have contributed to this result. Key issues included high turbidity, high nutrient concentrations and low dissolved oxygen. Oyster leases are particularly susceptible to sedimentation and bacterial contamination after rainfall and bacterial contamination is also a human health risk for primary and secondary contact recreation.

Other threats and community concerns include:

- The potential for increased hydrological stress in the catchment areas (particularly in the Deep Creek catchment) due to increased water extraction associated with expanding horticulture in the region.
- There are a range of views in the community regarding declines in fish stocks within the Nambucca River estuary over many years. While there is currently a lack of definitive information regarding the proportional impact of various factors, key contributors include commercial and recreational fishing, local-scale habitat destruction and the decline in estuary health.
- There are a number of highly valued public access assets within the study area including beach access tracks and viewing platforms, lookouts, iconic footbridges, walkways and seawalls. Public access issues identified are associated with overcrowding during peak summer use (e.g. parking), accessibility for those with limited mobility and regular maintenance and repair of access ways including following coastal erosion events.

Whilst some sectors of the community have a high level of understanding and engagement regarding the key threats to estuarine and coastal values, there remains a proportion of the general community who are uninformed, mis-informed and/or disengaged as to the appropriate management of the study area. This threat is exacerbated by high tourism/visitation rates, a lack of coordination between land managers and limited resources for community education and engagement. Lack of compliance with regulations has also been identified as an issue for management. Examples include unauthorised foreshore structures, breach of

development consent conditions, camping/vegetation damage in dunes, excessive or inappropriate boating speed and usage, illegal fishing, littering, dogs off-lead in prohibited areas and unauthorised four-wheel drive access on beaches.

The Forward Plan

The following key recommendations are provided for Council's coastal management planning:

- Prepare the Nambucca CMP (Stages 2, 3 and 4). It is expected that limited technical input to Stages 2 and 3 will be needed due to the recent preparation of a number of coastal management studies and plans which provide extensive useful information.
- Undertake appropriate community consultation through the CMP process. A Stakeholder Engagement Strategy has been developed.

This Scoping Study presents a business case and forward plan for the remaining stages of the CMP development. The forward plan is summarised in Table 2 with indicative timeframes.

Table 2: Summary of Nambucca CMP Forward Plan

CMP Stage	Task	Indicative timing	Indicative timing for Stage
Stage 2: Risks, vulnerabilities, and opportunities	Bank Condition Assessment	1 month	October 2020
	Stage 2 Vulnerabilities and Opportunities Report	1 month	
Stage 3: Identify and evaluate options	Collate and evaluate options	3 weeks	November 2020
	Stage 3 Management Options Report	1 month	
Stage 4: Finalise, certify and adopt the CMP	Development and mapping of CMP actions	1 month	March 2021
	Business Plan	1 week	
	Update Emergency Action Sub-Plan	1 week	
	Stage 4 Draft CMP	1 month	
	Stage 4 Community and Stakeholder Engagement	1 month	
	Stage 4 Final CMP	1 month	

The CMP will be implemented through Council's Integrated Planning and Reporting Framework. Monitoring of the progress of the CMP implementation will be also undertaken through this framework.

CONTENTS

1. INTRODUCTION 1
1.1 Coastal Management Framework in NSW 2
1.2 Study Area 4
2. PURPOSE, VISION AND OBJECTIVES 10
2.1 Purpose 10
2.2 Vision 10
2.3 CMP Objectives 10
3. COMMUNITY AND STAKEHOLDER CONSULTATION 12
3.1 Stage 1 Consultation Activities 12
3.2 Engagement Strategy 12
4. STRATEGIC CONTEXT 13
4.1 Statutory and Planning Context 13
4.2 Environmental Context 14
4.2.1 Environmental Values 14
4.2.2 Climate 15
4.2.3 Geomorphology, Geology and Soils 15
4.2.4 Water Quality 17
4.2.5 Riparian Vegetation Condition 22
4.2.6 Threats to Biodiversity 23
4.3 Hydrology and Catchment Modifications 25
4.4 Coastal Processes, Hazards and Management Strategies 27
4.4.1 Coastal Processes 27
4.4.2 Coastal Hazards 29
4.4.3 Coastal Management Strategies 34
4.5 Erosion 37
4.5.1 Stormwater erosion 37
4.5.2 Estuarine Bank Erosion 37
4.6 Social Context 41
4.6.1 Land Use 41
4.6.2 Population and Demographics 42
4.6.3 Culture and Heritage 43
4.6.4 Community Uses and Values 43
4.6.5 Community Assets 45

4.7 Socio-Economic Context 45
4.7.1 Commercial Fishing and Aquaculture 46
4.7.2 Tourism 46
4.8 Management Context 47
4.8.1 Governance, roles and responsibilities 47
4.8.2 Lack of awareness, education and engagement 47
4.8.3 Compliance 48
4.8.4 Political Risk 48
4.9 Future Context 48
4.9.1 Population Growth 48
4.9.2 Climate Change and Sea Level Rise 49
5. CURRENT COASTAL MANAGEMENT ARRANGEMENTS 55
5.1 Coastal Management Areas 55
5.2 Land Tenure 55
5.3 Management Roles and Responsibilities 58
5.4 Status of Previous Management Actions 60
6. SCOPE OF THE CMP 61
6.1 Issues and Threats 61
6.2 First-Pass Risk Assessment and Gap Analysis 61
6.2.1 Methodology 61
6.2.2 Results 62
7. PRELIMINARY BUSINESS CASE 68
8. FORWARD PLAN 70
8.1 Stage 2 – Determine Risks, Vulnerabilities and Opportunities 70
8.2 Stage 3 – Response Identification and Evaluation 70
8.3 Stage 4 – Finalise, Exhibit and Certify the CMP 70
8.4 Stage 5 – Implementation, Monitoring and Reporting 71
8.5 Timeframe 71
REFERENCES AND FURTHER READING 72
GLOSSARY AND ABBREVIATIONS 79
APPENDIX A. STATUTORY AND PLANNING FRAMEWORK 83
A1. LEGISLATION 85
A2. NSW PLANS AND STRATEGIES 89
A3. REGIONAL PLANS 90

A4. LOCAL PLANS....90
A5. INTEGRATED PLANNING AND REPORTING....95
A6. OTHER PLANS OF MANAGEMENT....101
APPENDIX B. STAGE 1 COMMUNITY CONSULTATION OUTCOMES....103
B1. RESULTS OF THE COMMUNITY SURVEY....105
APPENDIX C. STAKEHOLDER ENGAGEMENT STRATEGY....113
C1. OVERVIEW....115
C2. TARGET STAKEHOLDERS....115
C3. PROPOSED ENGAGEMENT ACTIVITIES....117
APPENDIX D. STATUS OF MANAGEMENT ACTIONS....123
APPENDIX E. RISK ASSESSMENT AND GAP ANALYSIS....125
E1. METHODOLOGY....127
E2. ASSESSMENT AND ANALYSIS....132

FIGURES

Figure 1: Coastal management framework....2
Figure 2: Five stage process for developing a coastal management program....3
Figure 3: Components of the Scoping Study for Nambucca CMP....4
Figure 4: CMP study area....5
Figure 5: Coastal Management SEPP Coastal Management Areas within the study area....8
Figure 6: CMP study area and catchments of the estuaries and coastal creeks....9
Figure 7: Relationship between regional and local strategies and management plans for Nambucca coastal and estuarine management....13
Figure 8: Secondary coastal sediment compartments relevant to the study area....16
Figure 9: Left: Gross Pollutant Trap at Bellwood Park; Right: damaged floodgate at East Street, Macksville (July, 2018)....22
Figure 10: Slope instability sites including priority sites investigated for Council's Natural Disaster Risk Management Plan and un-investigated site at lot 7016/1056524....32
Figure 11: Conservative first-pass mapping of present-day risk from tidal inundation at Macksville....33
Figure 12: Nambucca River estuary riverbank instability, riparian condition and bank protection works. 39
Figure 13: Land use of the Nambucca River catchment....41
Figure 14: Land use of the Deep Creek catchment....42
Figure 15: Urban growth area map for the Nambucca Local Government Area....49
Figure 16: Existing catchment land management responsibility....57
Figure 17: Nambucca Valley Council's IP&R Framework....96

PLATES

Plate 1: Nambucca headland aerial view 1

Plate 2: Nambucca coastline, Wellington Rock 6

Plate 3: Nambucca River entrance at Nambucca Heads 7

Plate 4: Left: The endangered population of Twining Glycine (*Glycine clandestina*) at Scotts Head (NSC, 2016); Right: Endangered Pied Oystercatcher and chicks (duadepaton.com) 14

Plate 5: Deep Creek upper extent of estuarine lagoon looking upstream 20

Plate 6: Left: Parrots Feather and Hymenachne in the Nambucca River at East Bowraville (July, 2018); Right: Riparian revegetation on Stuart Island 23

Plate 7: Coastal vegetation die-off, North Valla Beach 25

Plate 8: Left: Aerial view of mangrove die-off in tributary to Deep Creek; Right: mangrove die-off in Deep Creek estuary 25

Plate 9: North Arm Fishway, Bowraville 26

Plate 10: Left: Oyster Creek; Right: Deep Creek 28

Plate 11: Nambucca River Estuary 29

Plate 12: Left: Nambucca Main Beach Surf Club access stairs damaged by storm events (NSC, 2012); Right: Main Beach Surf Club after replacement of access stairs (NSC, 2016) 30

Plate 13: Left: Vegetation debris on receding shoreline north of Swimming Creek entrance (Dec, 2018); Right: recession of beach at Ulrick Drive carpark (north end of Beilby's Beach) causing undercutting and collapse of the road surface (July, 2018) 30

Plate 14: Left: Tidal inundation of Stuarts Island causeway (Dec, 2012); Right: Inundation of the foreshore of Bellwood Park (Dec, 2012) 34

Plate 15: Informal erosion control at Swimming Creek entrance (September 2018) 35

Plate 16: Poor design of seawall at South Valla Beach car park (February 2018) 36

Plate 17: Left: Failed rock revetment at the entrance to Swimming Creek (July, 2018); Right: Undercutting of the V-wall carpark (July, 2018), which has now been addressed in recent works. 36

Plate 18: Left: Unstable unconsolidated sand banks in Warrell Creek (July, 2018); Right: Severe bank instability and undercutting on the South Arm, upstream of Bowraville (July, 2018) 37

Plate 19: Left: Slumping of the bank adjacent to Gumma Road (July, 2018); Right: Unlicensed foreshore protection structures, Macksville (July, 2018) 38

Plate 20: Left: Appropriate treatment of unconsolidated banks using geofabric and coir log combination, Warrell Creek (July, 2018); Right: Rock gabions used to remediate bank erosion under Deep Creek footbridge (July, 2018) 40

Plate 21: Left: Bank stabilisation at Wirrimbi (2017); Right: Recycled stumps used in bank stabilisation works (Landcare, 2019) 40

Plate 22: Left: The V-Wall, a popular, easily accessible fishing spot with deep-water access. Right: 4WD beach access at South Beach 44

Plate 23: 'Coastal squeeze' under sea level rise: impact of development 53

TABLES

Table 1: High priority threats identified by the first-pass risk assessment II

Table 2: Summary of Nambucca CMP Forward Plan IV

Table 3: Coastal sediment compartments relevant to the study area 17

Table 4: Summary of significant storm history at Coffs Harbour waverider buoy 2009 – 2020 (MHL, 2020) 27

Table 5: Range of predicted overall recession and erosion for each area with sea level rise modelled on the 2009 NSW Sea Level Rise Policy levels 51

Table 6: Projected change in NSW mean sea level (MSL) rise under RCP8.5 for the mid- and late 21st century, relative to the 1986-2005 period 52

Table 7: Qualitative risk estimation 62

Table 8: Importance of knowledge to effectively manage the coastal zone and estuaries 62

Table 9: High priority threats identified by the first-pass risk assessment. 63

Table 10: First-Pass Risk Assessment results for Nambucca coastline and estuaries 64

Table 11: Funding requirements to complete Stages 2, 3 and 4 of the Nambucca CMP 68

Table 12: Recommended detailed studies and associated tasks to be completed during Stage 2 70

Table 13: Objectives of the Nambucca River Estuary Management Plan (2008) 92

Table 14: Delivery Program strategies and actions relevant to Nambucca CMP 99

Table 15: CMP Stakeholder engagement strategy 118

Table 16: Qualitative Measures of Likelihood under Current Management Practices 128

Table 17: Qualitative Measures of Consequence or Impact 129

Table 18: Qualitative Risk Estimation 131

Table 19: Importance of knowledge to management of the coastal zone and estuaries 131

Table 20: Risk assessment and information gaps analysis 132

1. INTRODUCTION

Nambucca Valley Council (NVC) has received funding through the NSW Government Coastal and Estuary Grants Program to prepare the Nambucca Coastal Management Program (CMP) which will document the integrated and sustainable management of the coastline and estuaries of the Nambucca Valley LGA.

Stage 1 (this document) is a Scoping Study which sets the scene for the remainder of the coastal planning process for all areas of the open coast and all coastal creeks and estuaries in the Nambucca Valley LGA including Nambucca River, Deep Creek, Swimming Creek and Oyster Creek estuaries. The Scoping Study:

- Identifies issues and opportunities affecting the area now, and those that are considered likely in the future.
- Includes review of the existing Coastal Zone Management Plan and Estuary Management Plan and other relevant plans and documents to identify actions and strategies which have been completed, and outstanding actions that will align with the CMP.
- Assesses the adequacy of existing management arrangements including current and planned actions.
- Sets out the strategic, environmental, social, cultural and management context for the CMP.
- Includes a first-pass risk assessment and an analysis of knowledge gaps to inform decisions specified in a Preliminary Business Plan about the need for and scope of detailed studies to be undertaken.
- Includes a forward program for subsequent stages of the CMP.

Plate 1: Nambucca headland aerial view

Source: NSC (2018)

1.1 Coastal Management Framework in NSW

The *Coastal Management Act 2016* establishes the framework and overarching objects for coastal management in NSW and supports the aims of the *Marine Estate Management Act 2014* to provide for strategic and integrated management of the whole marine estate – marine waters, coasts and estuaries. The *Coastal Management Act 2016* communicates the NSW Government's vision for coastal management and reflects the vital natural, social, cultural and economic values of our coastal areas and promotes the principles of ecologically sustainable development in managing these values. The legislative and policy framework introduced by recent coastal reforms recognises natural coastal processes and the local and regional dynamic character of the coast and promotes land use planning decisions that accommodate them. The reforms ensure coordinated planning and management of the coast and support public participation in these activities (Figure 1). Further detail on the NSW Coastal Management Framework is provided in Appendix A.

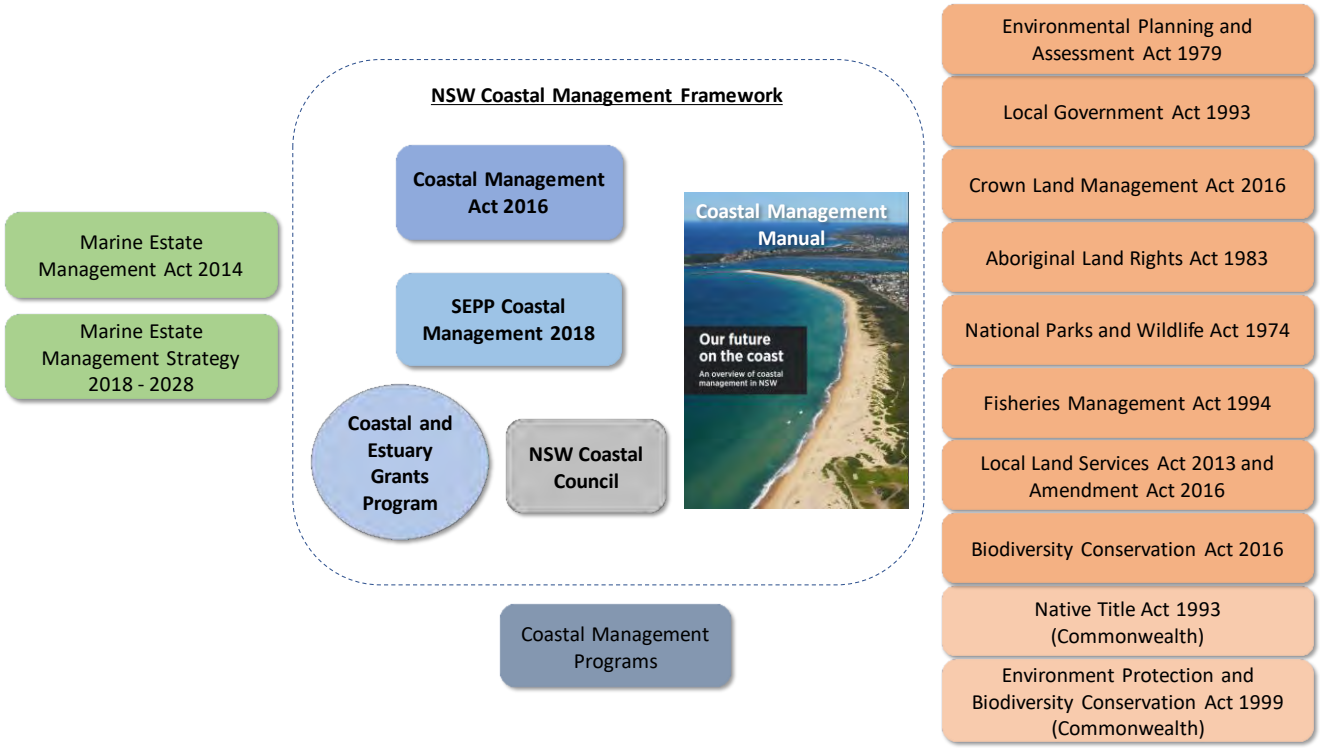


Figure 1: Coastal management framework

The *NSW Coastal Management Manual* (OEH, 2018, the Manual) provides guidance for developing a CMP and assists councils in addressing the requirements of the *Coastal Management Act, 2016*. The manual outlines the mandatory requirements and provides guidance on the preparation, development, adoption and content of a CMP. It includes a process for councils to follow when identifying and assessing the vulnerability of coastal environmental, social and economic values and evaluating management actions. It also contains guidance on the integration of a CMP into Council's Integrated Planning and Reporting (IP&R) framework and land use planning. The manual outlines a five-stage process for developing and implementing a CMP (Figure 2). This report addresses Stage 1 of the CMP process for the Nambucca coastline and estuaries.

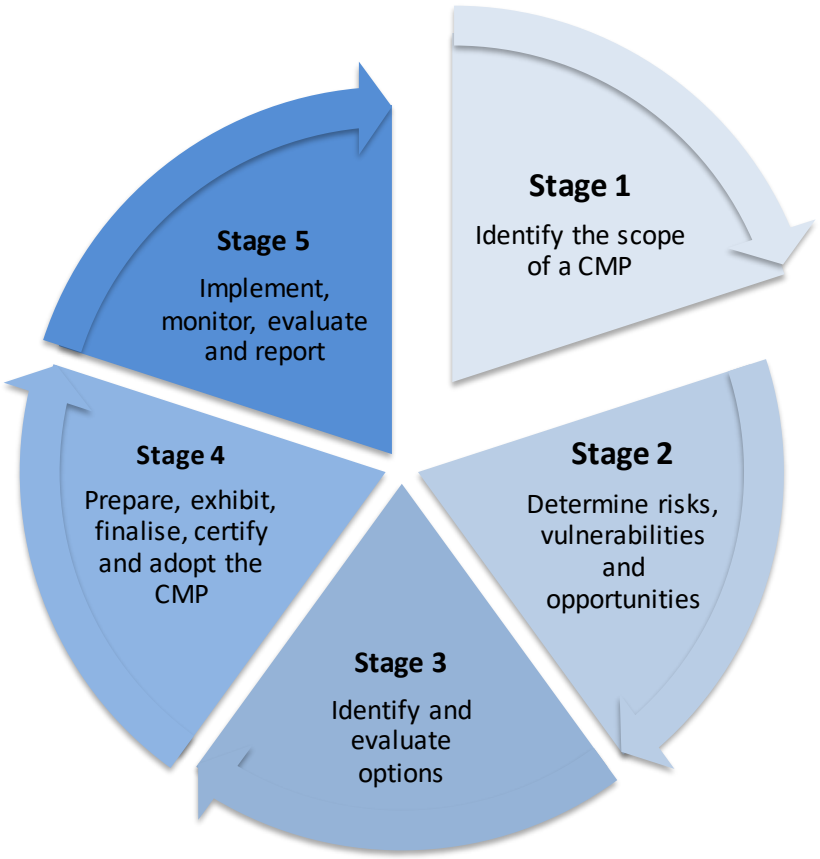


Figure 2: Five stage process for developing a coastal management program

Source: Adapted from OEH (2018b)

The key components of a Scoping Study (as required by the Manual) are shown in Figure 3 with the relevant section of this document.

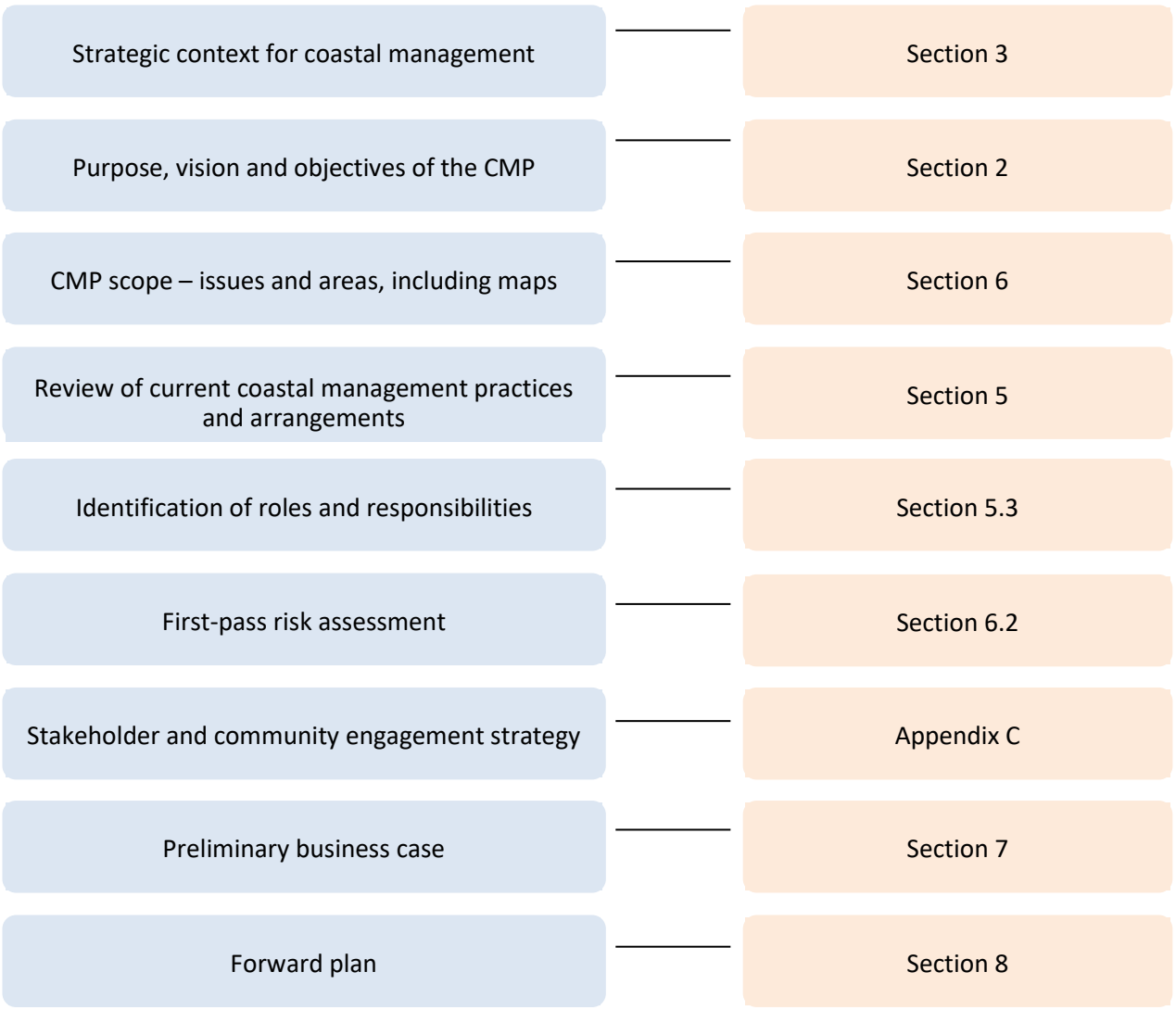


Figure 3: Components of the Scoping Study for Nambucca CMP

1.2 Study Area

Nambucca Valley LGA is located on the Mid North Coast of NSW, approximately halfway between Brisbane and Sydney and 45 km south of Coffs Harbour. The study area for this Scoping Study (Figure 4) comprises the coastal areas, tidal waterways, foreshores and adjacent lands within the Nambucca Valley LGA. Key locations and features of the study area are described below.

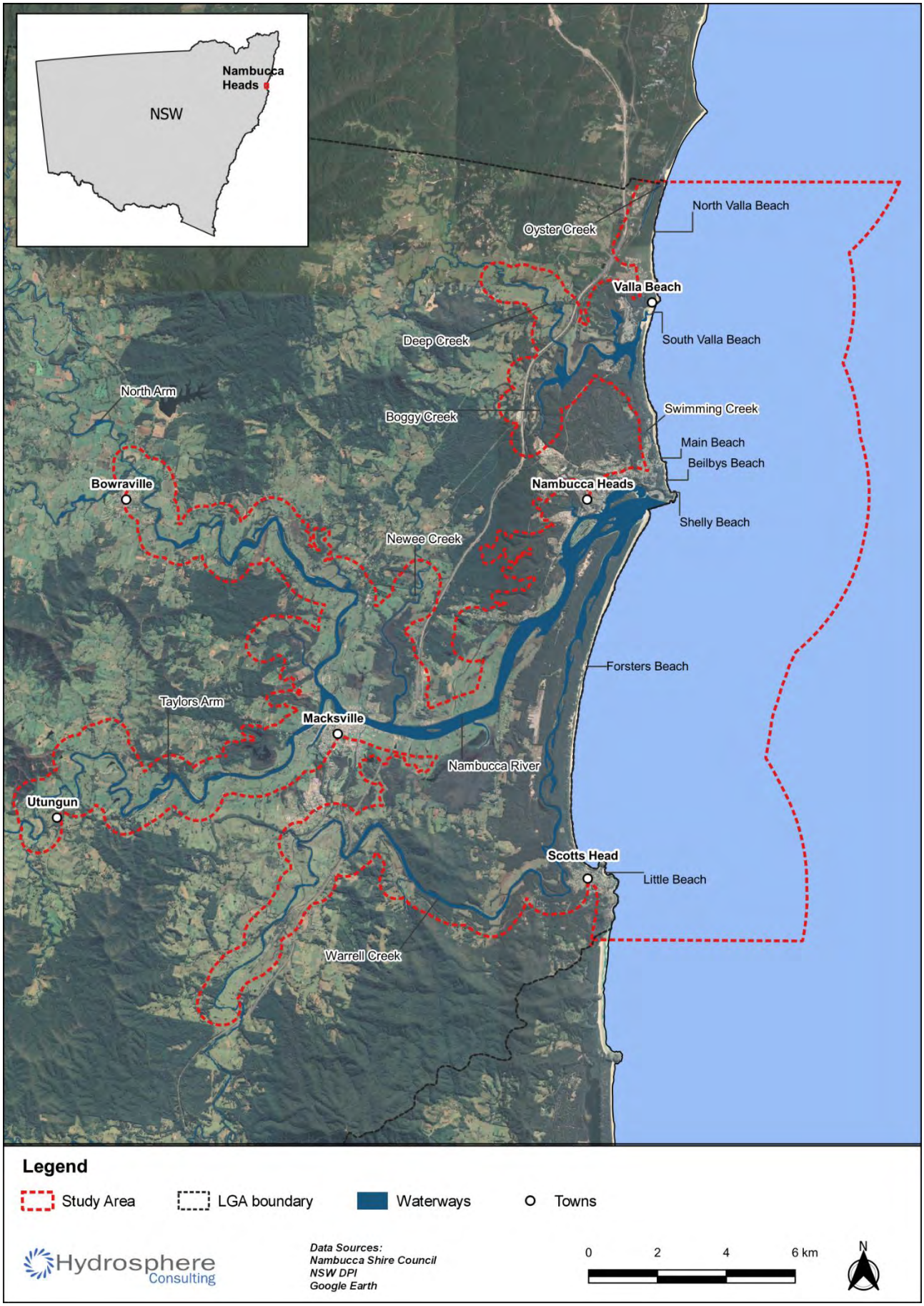


Figure 4: CMP study area

The Nambucca open coast includes 25 km of open coastal beaches, dunes, headlands, rock platforms and bluffs from North Valla Beach (immediately south of the entrance to Oyster Creek), southwards to Scotts Head.

Plate 2: Nambucca coastline, Wellington Rock

Source: NSC (2018)

The study area includes the Intermittently Closed and Open Coastal Lake/ Lagoon (ICOLLs) of:

- Oyster Creek - located partially within the study area at the northern boundary of the study area. The creek is bisected by the Nambucca Valley LGA boundary, immediately to the south of the current alignment of the creek entrance.
- Deep Creek - a larger ICOLL at the northern end of the study area. Tributaries of Deep Creek within the study area include Cow Creek, Boggy Creek, Cedar Creek and Buchanans Creek.
- Swimming Creek - a small ICOLL which exits across Main Beach approximately 1.8 km north of the Nambucca River estuary entrance at Nambucca Heads.

The Nambucca River estuary includes three main waterways:

- Nambucca River main arm from the entrance at Nambucca Heads, beyond Macksville to just upstream of Bowraville.
- Taylors Arm extending from Macksville to Utungun (ending approximately 1.6 km upstream from Boat Harbour Bridge).
- Warrell Creek, from the entrance to Warrell Creek hamlet (ending 600 m downstream from Pacific Highway Bridge).

Other minor tributaries include Welshes Creek, Blackbutt Creek, Tilly Willy Creek, Newee Creek, Gumma Gumma Creek, Watt Creek, Teagues Creek, Bellwood/ Swampy Creek, Rhones Creek and Way Way Creek.

Plate 3: Nambucca River entrance at Nambucca Heads

The four management areas that make up the coastal zone as defined by the *Coastal Management Act 2016* and the *Coastal Management State Environmental Planning Policy* (SEPP*,* refer Appendix A) are included in the study area. A map of the study area including the Coastal Wetland and Littoral Rainforest Area, Coastal Environment Area and Coastal Use Area is provided in Figure 5. There is no current mapping for the Coastal Vulnerability Area within the SEPP.

The boundaries of the study area do not preclude consideration of known issues and threats from the upper catchments that have the potential to impact on downstream values (e.g. bank erosion and diffuse source agricultural runoff in the upper catchments affecting estuary ecohealth). Figure 6: CMP study area and catchments of the estuaries and coastal creeks shows the study area in relation to the broader catchments of the estuaries and coastal creeks. The majority of the waterway catchments of the study area are located within the Nambucca LGA with the exception of Oyster Creek with approximately half of its catchment area and waterway with Bellingen LGA as well as small areas of the upper Nambucca River estuary catchment, also located in Bellingen LGA.

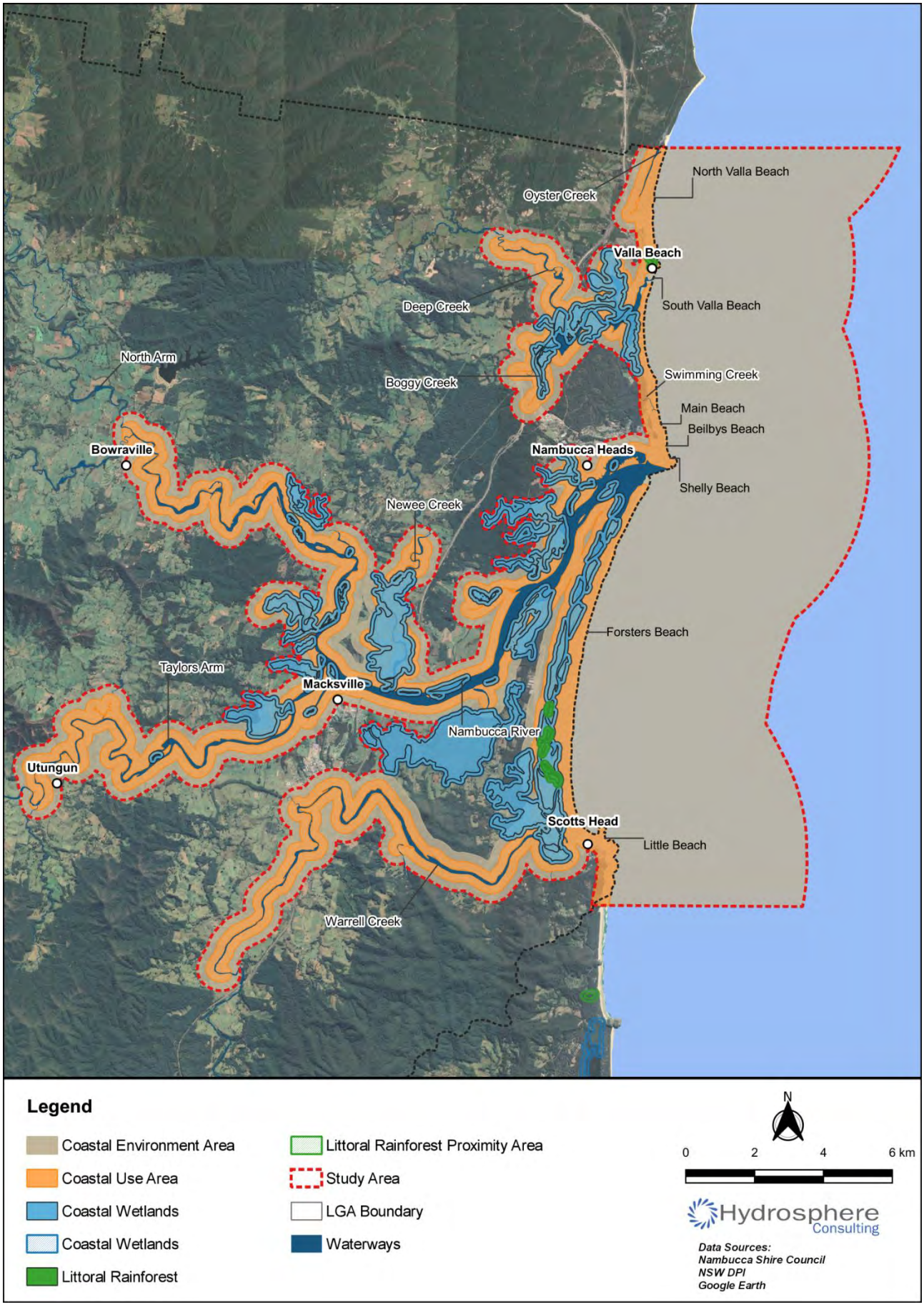


Figure 5: Coastal Management SEPP Coastal Management Areas within the study area

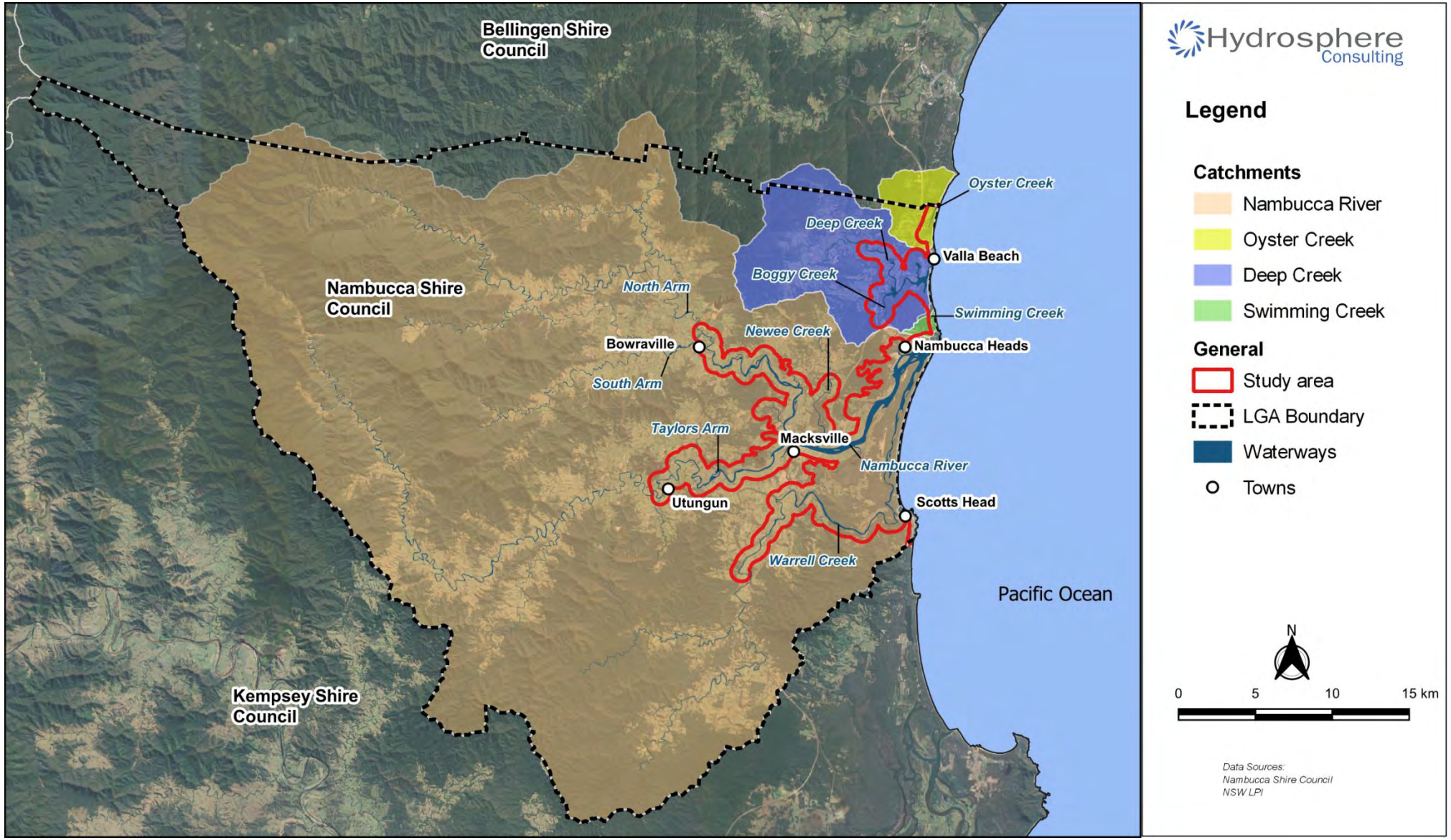


Figure 6: CMP study area and catchments of the estuaries and coastal creeks

2. PURPOSE, VISION AND OBJECTIVES

2.1 Purpose

The purpose of the Nambucca CMP is to set the long-term strategy for the coordinated management of the Nambucca coastline and estuaries with a focus on achieving the objects of the CM Act.

The CMP will incorporate management actions and strategies to address key threats and support a diversity of natural values and human uses into the future. The CMP will consider the range of timeframes (immediate, 20 years, 50 years, 100 years) where appropriate as required by the CM Act. Recommended management actions will be developed to balance and manage uses so that they are compatible with the environmental, social and economic values of the study area with reference to a ten-year management timeframe reflecting the implementation phase of the CMP. Longer-term pressures such as climate change and sea level rise will be considered in the formulation of management actions to ensure resilience against future threats and the conservation of the values for future generations.

This Scoping Study presents the scope of the CMP and the forward program and costs to implement the Stages 2 to 5 of the CMP.

2.2 Vision

The existing vision statements relevant to the Nambucca coastline and estuaries are:

NSW Coastal Management Vision

"The NSW Government has a vision of thriving and resilient communities that live and work on a healthy coast, now and into the future".

Vision from the Community Strategic Plan 2017-2027

The Community Strategic Plan focuses on achieving the community's vision: *"Nambucca Valley – Living at its Best",* and Council's Mission Statement: *"The Nambucca Valley will value and protect its natural environment, maintain its assets and infrastructure and develop opportunities for its people."*

Vision for this CMP

The vision statement developed for the Nambucca CMP, consistent with the state's vision and Council's overall strategic direction and community input is as follows:

"The coastline and estuaries of the Nambucca Valley LGA are healthy, adaptable natural environments supporting abundant wildlife, diverse habitats, a sustainable local economy and significant cultural values. They are safe, peaceful and accessible places for our community and future generations to learn, enjoy and prosper."

2.3 CMP Objectives

Section 12 of the CM Act states that: "*The purpose of a coastal management program is to set the long-term strategy for the coordinated management of land within the coastal zone with a focus on achieving the objects of this Act*."

The objects of the CM Act are to manage the coastal environment of New South Wales in a manner consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the State, and in particular:

(a) to protect and enhance natural coastal processes and coastal environmental values including natural character, scenic value, biological diversity and ecosystem integrity and resilience, and

(b) to support the social and cultural values of the coastal zone and maintain public access, amenity, use and safety, and

(c) to acknowledge Aboriginal peoples' spiritual, social, customary and economic use of the coastal zone, and

(d) to recognise the coastal zone as a vital economic zone and to support sustainable coastal economies, and

(e) to facilitate ecologically sustainable development in the coastal zone and promote sustainable land use planning decision-making, and

(f) to mitigate current and future risks from coastal hazards, taking into account the effects of climate change, and

(g) to recognise that the local and regional scale effects of coastal processes, and the inherently ambulatory and dynamic nature of the shoreline, may result in the loss of coastal land to the sea (including estuaries and other arms of the sea), and to manage coastal use and development accordingly, and

(h) to promote integrated and co-ordinated coastal planning, management and reporting, and

(i) to encourage and promote plans and strategies to improve the resilience of coastal assets to the impacts of an uncertain climate future including impacts of extreme storm events, and

(j) to ensure co-ordination of the policies and activities of government and public authorities relating to the coastal zone and to facilitate the proper integration of their management activities, and

(k) to support public participation in coastal management and planning and greater public awareness, education and understanding of coastal processes and management actions, and

(l) to facilitate the identification of land in the coastal zone for acquisition by public or local authorities in order to promote the protection, enhancement, maintenance and restoration of the environment of the coastal zone, and

(m) to support the objects of the Marine Estate Management Act 2014.

The stakeholder and community values identified through consultation are consistent with above objectives. The CMP will also ensure that the objectives for the four coastal management areas as described in Appendix A are achieved.

The CMP objectives may be refined as the CMP is developed to reflect local issues and values and remain consistent with state government objectives and will include the development of performance indicators where relevant, for inclusion in the CMP Monitoring, Evaluation and Reporting (MER) framework.

3. COMMUNITY AND STAKEHOLDER CONSULTATION

3.1 Stage 1 Consultation Activities

An online community survey was conducted over a nine-week period with paper-based copies available at key locations. Submissions were received from community members during the Scoping Study, either via mail, email or via the web contact form from the dedicated project webpage.

Submissions submitted by key stakeholders on the requirements of the Scoping Study and CMP development were received from RMS (Maritime Infrastructure Delivery Office), DPI Fisheries, NSW Forestry Corporation and DPIE - NPWS Landforms and Rehabilitation Unit.

Feedback from the community and other stakeholders has been used to identify values and coastal management issues. Outcomes of the consultation activities are provided in Appendix B.

3.2 Engagement Strategy

A shared understanding of the risks and opportunities and stakeholder and community support for resulting actions included in the CMP will be beneficial during implementation phases. A stakeholder engagement strategy for the preparation of the CMP has been developed and is provided in Appendix C. This strategy was developed taking into account the previous stakeholder consultation strategies and their outcomes/ findings. The aim of this strategy is to inform all key stakeholders of the project and provide them with the opportunity to contribute to the development of the CMP through a variety of activities/ methods including a project website, targeted correspondence to state government agencies and key stakeholders, meetings, teleconferences, information brochures, media releases, a community questionnaire, and drop-in/ information sessions. The key stakeholders targeted as part of this strategy include relevant agencies responsible for the implementation of management actions, committees, Council, businesses, special interest groups and local residences. The stakeholder engagement strategy lists each activity to be undertaken as well as the aim/ objective of the activity, content to be delivered, target stakeholders, delivery method, timing, frequency and who is responsible for delivering the activity.

4. STRATEGIC CONTEXT

4.1 Statutory and Planning Context

The study area is currently managed in accordance with various regional and local level planning instruments, strategies and management plans implemented by Council and other stakeholders as shown in Figure 7. The two core local management plans are the *Nambucca Coastal Zone Management Plan* (Umwelt, 2012) (certified document) and the *Nambucca River Estuary Management Plan* (BMT WBM, 2008). No specific estuary management plan is presently in place for the Deep Creek estuary however the entrance is managed in accordance with the *Deep Creek Entrance Management Policy* (NSW, 2013). More recently, the report for the *Nambucca EcoHealth Project 2016-2017* (Mika *et al*., 2018) provides management recommendations for the Nambucca and Deep Creek estuaries relating to hydrology, water quality, riparian vegetation and geomorphic condition. Management of Swimming Creek was previously provided for in the *Swimming Creek Plan of Management* (NSC, 1995).

Figure 7 provides an outline of the relevant legislation as well as management plans and documents relevant to this Scoping Study. The status of the recommended actions in the current plans is detailed in Appendix D.

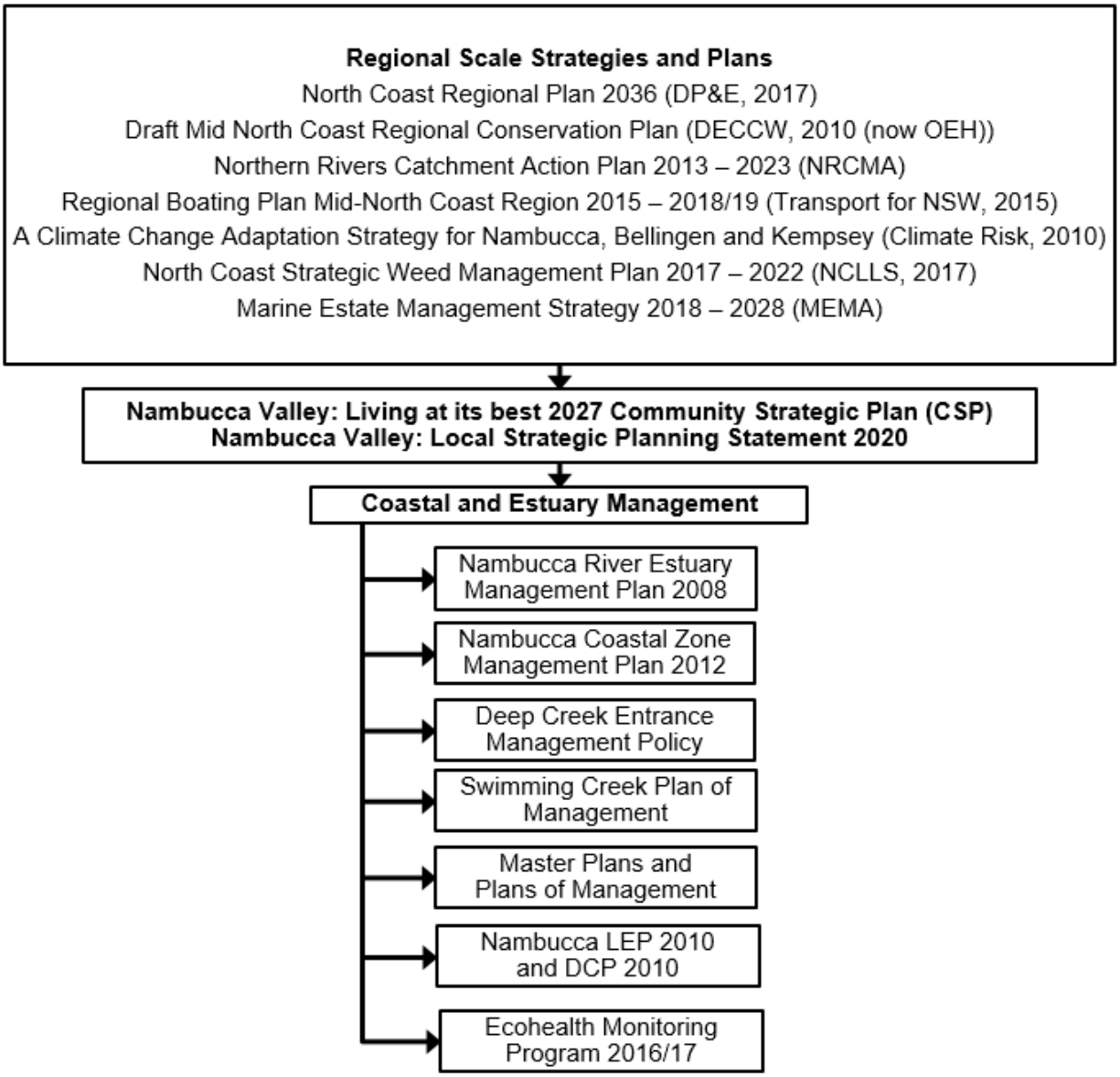


Figure 7: Relationship between regional and local strategies and management plans for Nambucca coastal and estuarine management

4.2 Environmental Context

4.2.1 Environmental Values

The many environmental values of the study area have been documented in previous assessments (e.g. WBM BMT, 2006 and 2008; Umwelt, 2012; Claire Ellis Consulting, 2018). Previous findings have been confirmed by community consultation undertaken as part of this study (refer Appendix B). The core environmental values of the study area are associated with its landscape amenity (i.e. geographical features, scenic amenity, views), healthy and diverse natural environments and biodiversity values.

The Nambucca region's natural beauty is highlighted in its National Parks and Nature Reserves. The region's topography largely reflects steep gradients and extensive waterways. The Nambucca coastline and estuaries are dynamic and diverse encompassing a broad range of natural features including sandy beaches, coastal dunes, rocky headlands, marine areas, ICOLLs, estuary entrances, littoral rainforest, wetlands/heathlands and estuarine environments. It is known as a pristine coastal location and both locals and visitors place a high value on the abundance of natural resources, uncrowded areas for nature-based recreation and stunning scenic amenity. Beaches, headlands and waterways provide a place for recreation and social interaction and results of the community survey undertaken during this Scoping Study indicate that for many community members, interaction with the coast and estuaries is a daily part of life, as echoed by (Umwelt, 2012).

The study area comprises a variety of significant habitats and vegetation communities. Many of these habitats are listed as either important fish habitat under the *Fisheries Management Act 1994*, or as threatened ecological communities under either the *Commonwealth Environment Protection Biodiversity Conservation* (EPBC) Act, or under the *NSW Biodiversity Conservation Act 2014*. The Nambucca River estuary contains saltmarsh and other wetland habitats including the 100 Acre Swamp, the Warrell Creek system, Gumma Gumma wetland, Newee Creek and Bellwood Creek. The Warrell Creek and Gumma Gumma wetland areas are recognised as key habitats within the state, being regional ecological corridors for key or indicator species. Warrell Creek has been recognised as one of the least impacted sub-catchments of the major estuaries in the Manning Shelf marine bioregion (i.e. from Stockton to north of Nambucca Heads) (Breen *et al.*, 2004 cited in BMT WBM, 2006). Gumma Gumma wetland is particularly important comprising a large contiguous melaleuca swamp (approximately 165 ha) and the largest individual freshwater swamp (approximately 74 ha) in the study area (BMT WBM, 2006). Nambucca sits within a region that is one of the most significant and productive areas for shorebirds on the NSW coast in particular for the Pied Oystercatcher, Beach Stone Curlew, and Little Terns (Markell, 2016; BMT WBM, 2006). Scotts Head contains the only two known locations of the endangered population of the twining climber, *Glycine clandestina* (broad leaf form) (Plate 4).

Plate 4: Left: The endangered population of Twining Glycine (*Glycine clandestina*) at Scotts Head (NSC, 2016); Right: Endangered Pied Oystercatcher and chicks (duadepaton.com)

4.2.2 Climate

The study area experiences a sub-tropical climate. The average annual rainfall is approximately 1,500 mm and is distinctly seasonal with highest rainfall in summer and lowest rainfall in winter- early spring. High intensity rainfall of 200 mm over a 24-hour period is not uncommon in the upper catchments which can result in extensive runoff and flooding (Eddie, 2018). Long term average discharge in the Nambucca River catchment peaks in late summer. There have been 28 significant floods (i.e. exceeding 5.5 m at Bowraville) since records began (Mika *et al.*, 2019).

Climatic processes driving large-scale rapid coastal changes include (CoastAdapt, 2017a; 2017b):

- East coast lows (extra-tropical cyclones).
- Mid-latitude cyclones (depressions).
- Storm surges (<1m).

4.2.3 Geomorphology, Geology and Soils

The coastal geomorphology of the region is influenced by the following processes (CoastAdapt, 2017a; 2017b):

- Humid warm to cool temperate climate.
- Micro-tides.
- South-easterly Tasman Sea swells.
- Easterly seas.
- Dominantly quartz (terrigenous) sediments.
- Northerly longshore transport.
- El Nino Southern Oscillation (driving beach erosion/accretion cycles, cyclone frequency).

The geology of the region is characterised by the hard metamorphic rocks of the New England Fold Belt (DLWC, 2000). Soil management units in the study area include estuarine sediments, North Coast Floodplains, North Coast acid sulfate soils and Granite Borderlands. All soil types are in fair to very good condition but erosion and soil carbon loss issues are present (SOE, 2016). In particular, the steep headwaters of the upper catchment are dominated by Nambucca Beds geology which has been identified as having “especially severe erosion and mass movement hazards” (Eddie, 2018).

The Nambucca coastline sits across two secondary coastal sediment compartments, the Bellinger River and the Macleay (South West Rocks) compartments (refer Figure 8) which Nambucca LGA shares with adjacent LGAs. These secondary sediment compartments represent regional sediment processes which are useful for consideration of present-day exposure and vulnerability to erosion (e.g. from wave action and storm surge) and hence important in considering future sea level rise (NCCARF, 2016). Further information on each coastal sediment compartment is summarised in Table 3.

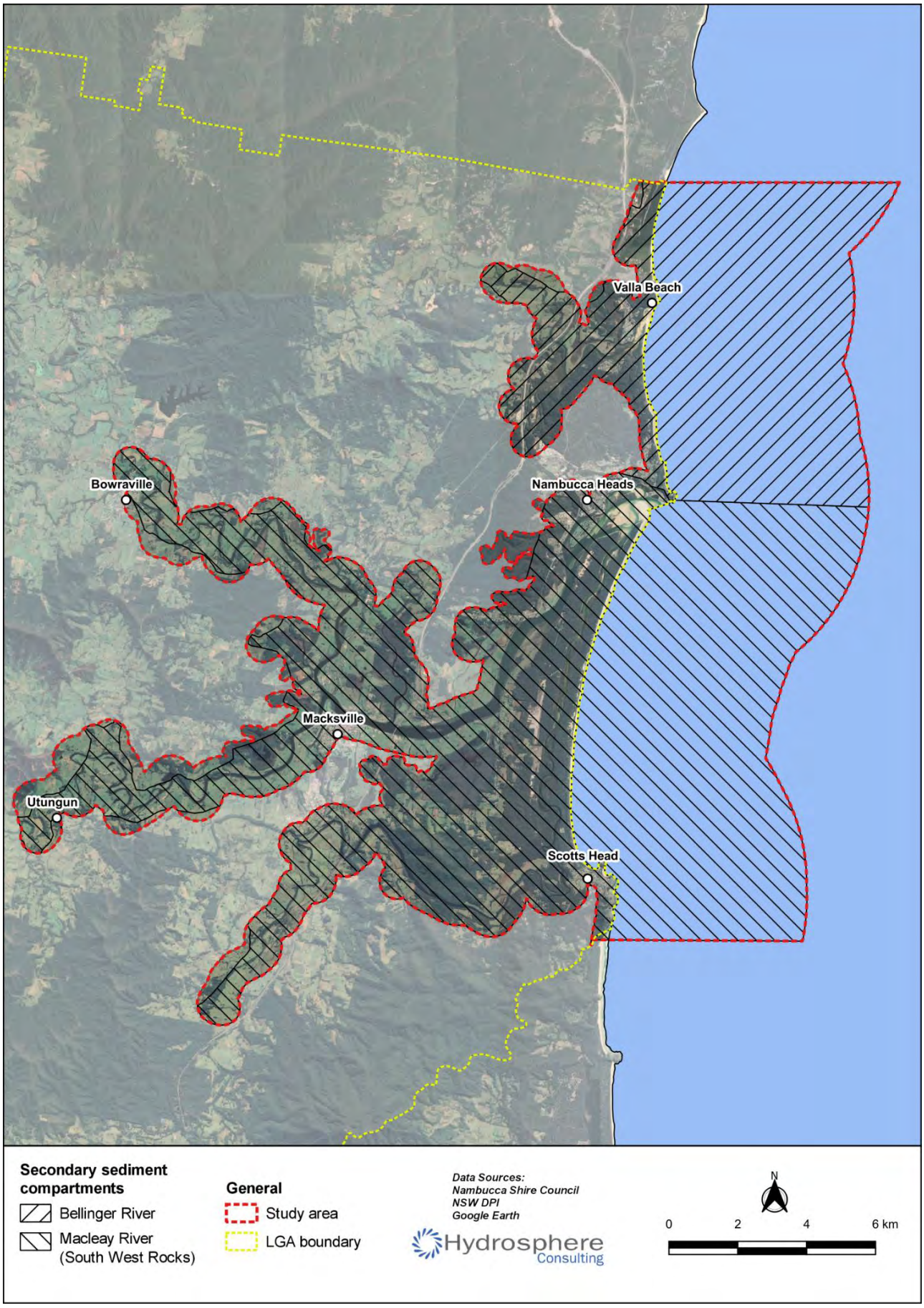


Figure 8: Secondary coastal sediment compartments relevant to the study area

Table 3: Coastal sediment compartments relevant to the study area

Compartment name	Bellinger River	Macleay (South West Rocks)
Compartment ID	NSW01.02.04	NSW01.02.05
Extent	Coffs Harbour to Nambucca Heads	Nambucca Heads to Lagger Point (South West Rocks)
Shared LGA	Bellingen and Coffs Harbour LGAs	Kempsey LGA
Geomorphology	Rocky headlands, prograded barriers, stationary barriers, beaches and foredunes, Bellinger River mouth and estuary.	Rocky headlands, stationary barrier and beaches, backbarrier flats, estuarine plains
Sensitivity rating[1]	Sensitivity rating is a 3 (stable and likely to stay stable), but likely to become a 4 (stable but likely to start eroding) in future. Erosion likely for some beaches in this compartment as there appears to be little sediment available offshore.	Sensitivity rating is a 3 as the shoreline is stable and likely to remain stable.
Confidence rating[2]	Low	Low

1. Relevant sensitivity rating from 1 (low) to 5 (high): 3 - Relatively stable shorelines which may be subject to periodic erosion followed by recovery (accretion), but no long-term recession expected in the next few decades since the sediment budget remains sufficiently balanced over time from offshore, alongshore or terrestrial sources. 4 - Shorelines that currently do not show evidence of long-term recession but are likely to begin receding with continuing sea-level rise (based on sediment availability onshore and offshore).
2. Confidence rating: Low: There is limited or no information describing landforms or coastal landform change over the historical period.
Source: Thom *et al*., 2018; NCCARF, 2020; CoastAdapt, 2017a; 2017b

4.2.4 Water Quality

Water quality is one of the prime estuarine “health” indicators and a key value to the community. Many of the key economic industries in the local area are impacted by poor water quality including tourism, aquaculture (oyster production) and commercial fishing. Many community members are concerned about ongoing degradation of water quality from both point and diffuse sources.

Up until recently, collection of water quality data in the study area has been sporadic, site/ project based and there has been little or no integration between sampling efforts, or of data storage and analysis. A recent compilation of results from a comprehensive water quality monitoring program over the 2016/17 period is provided in the Nambucca Ecohealth Project 2016/18 (Mika *et al*., 2018). Sampling was undertaken in the Nambucca River and Deep Creek estuaries though Swimming Creek and Oyster Creek were excluded locations. Ecohealth monitoring results (Mika *et al*., 2018) indicated that overall, water quality in the Nambucca catchments is of poor quality (D grade). Specifically, water quality was poorest in Newee Creek estuary and Taylors Arm estuary, both receiving a grade of F (very poor) due to concentrations of nutrients several times the DPIE trigger thresholds. The Nambucca River, Deep Creek and Warrell Creek estuaries all reported poor water quality (D, D and D+ grades respectively).

Key findings identified during relevant monitoring programs include:

- Frequently low DO, most likely corresponding to low rainfall and smaller stream discharge during the study period (Mika *et al*., 2018).
- Frequent or persistently high nutrient concentrations, total nitrogen (TN) in particular but also total phosphorous (TP), and bioavailable nutrients (NOx and SRP) (Mika *et al*., 2018). High concentrations of elevated nutrients have been reported in Watt Creek (specifically Lumsdens Lane and Wrights Corner) with moderate concentrations reported in Beer Creek, Tilly Willy Creek and East Street Drain (GECO Environmental, 2009).

- ICOLLs such as Deep Creek and Swimming Creek are particularly sensitive to catchment inputs and land uses as their limited connections to the sea result in poor flushing and retainment of a relatively large portion of nutrient loads (Dela-Cruz *et al*., 2017).
- Algal biomass measured as chlorophyll a (Chl-a) rarely exceeded guidelines indicating some resilience to high nutrient concentrations.
- Consistent exceedances in turbidity guideline levels in some locations (i.e. Newee Creek, the lower Taylors Arm, the confluence with Watts Creek, downstream of Wirrimbi, and the southern arm of Deep Creek) (Mika *et al*., 2018). GECO Environmental (2009) reported high levels of suspended sediment in Beer Creek and moderate levels in Tilly Willy Creek.
- Faecal contamination was investigated in Newee Creek in 2009 to determine potential sources. Faecal sterol analysis concluded that the faecal contamination was almost all herbivore-derived (93-100% at different sites) with a very small percentage originating from human sources (0-7%) (Newcastle Innovation, 2009). This was consistent with grazing and dairying land uses in the catchment and the observed presence of cow manure beside the creek at a number of sites. The highest percentage of human derived faecal contamination occurred at a site downstream of a rural residential area served predominantly by septic tanks. The study attributed the higher values to failing septic tanks during high flow events in this area.
- Previous reports in the Nambucca estuary (cited in BMT WBM, 2006) indicated regular exceedances of faecal coliform guideline values and a notable link between high rainfall and reduced water quality was identified, primarily from faecal coliforms, suspended solids and nutrients. High levels of bacterial contamination in Watt Creek (particularly Lumsdens Lane) and Beer Creek, and moderate bacterial concentrations in Tilly Willy Creek, Bellwood Creek and East Street Drain (GECO Environmental, 2009).
- There was been marked improvement in faecal coliforms since the early 2000s as a result of STP upgrades, land based effluent reuse strategies and upgrades of on-site sewage management systems. However, incidents do occur from time to time such as the sewer surcharge to Bellwood Creek in October 2018 which resulted in a 21-day oyster harvest closure period, a temporary swimming closure, air quality impacts to nearby residents and businesses (Davis, 2018), and potential impacts to protected estuarine vegetation (NSC, 2018).
- Historically high levels of acidity and associated heavy metal export from Gumma Gumma Creek (GECO Environmental, 2009). Significant wetland restoration has recently been undertaken at Gumma Gumma Swamp which has resulted in maintenance of higher and more stable water levels in the wetland, reduction of saline water ingress, and typically improved water quality during wet events although additional management actions are recommended (ASM, 2019). Moderate levels of acidity have been recorded in waters from Watt Creek (specifically Wrights Corner and Lumsdens Lane) (GECO Environmental, 2009).
- No consistent trend of poor water quality at the tidal limits indicating that estuarine water quality likely responds quickly to improvements from inflowing freshwater systems (Mika *et al*., 2018).
- Poor water quality, and in particular, sedimentation, is a major threat to seagrass condition and distribution which forms an important component of local fisheries habitat.
- Oyster leases are particularly susceptible to sedimentation and faecal contamination after rainfall, defined as 25 mm of rainfall within the catchment over a 24-hour period (BMT, WBM, 2006).
- Whilst water clarity and turbidity impact on the visual aesthetics of a waterway, faecal contamination is also a human health risk for primary and secondary contact recreation.
- Community consultation has also identified potential water quality issues as evidenced by red-spot disease and fish kills (BMT WBM, 2008).

Estuary Health Risk Dataset

DPIE - EES developed an estuary health risk dataset for each estuarine catchment in NSW (Dela-Crus *et al.,* 2019) to support development of CMP Scoping Studies. The dataset identifies land use pressures and the consequent risks of impacts based on sub-catchment scaled attributes such as land use, soil type and climate, and modelled estimates of surface flows and the nutrient and total suspended solids loads.

The DPIE - EES dataset is a tool that can be interrogated in a GIS and used to spatially prioritise where further studies and/ or management actions in the catchment would contribute to achieving outcomes. Results of the dataset mapping of indicative risk within the Nambucca Valley LGA indicate:

- Likely very high loads of total nitrogen (TN) (kg) from the North Arm and Buckra Bendinni Creek sub-catchments and high loads from the very upper reaches of the Taylors Arm sub-catchment and from the mid Warrell Creek sub-catchment (in the vicinity of Donneyville).
- Likely very high loads of total phosphorous (TP) (kg) from the North Arm and Buckra Bendinni Creek sub-catchments and high loads from the Newee Creek sub-catchment and the mid Warrell Creek sub-catchment.
- Likely very high TSS loads (kg) in the Buckra Bendinni Creek sub-catchment and lower North Arm sub-catchment, the Newee Creek sub-catchment and the mid Warrell Creek sub-catchment. Likely high TSS export was identified in the upper Nambucca River estuary sub-catchment (immediately to the west of the Newee Creek sub-catchment).
- The likely highest TP, TN and TSS loads per hectare per year (kg/ha/y) were associated with horticultural activities in the Deep Creek and Oyster Creek catchments.

The results presented by the DPIE - EES dataset significantly differ from field-based results presented in the Ecohealth Monitoring report (Mika *et al*., 2018) although it is acknowledged that the later includes additional parameters (e.g. pH, dissolved oxygen, and Chlorophyll-a) and broader sub-catchment boundaries than the DPIE - EES dataset.

For the purposes of this Scoping Study, it is considered that the recently completed, field-based water quality data and management actions as present in the Ecohealth Monitoring Report is the most suitable data for use in this CMP. The findings of the estuary health risk dataset will be taken into consideration in the design of any future ecohealth monitoring programs.

Plate 5: Deep Creek upper extent of estuarine lagoon looking upstream

Source: Mika *et al.,* 2018

Sources of water quality decline

The following causes of poor water quality have been identified.

Key point sources include:

- Sewage effluent and on-site wastewater management (MEMA TARA (BMT WBM, 2017) regional priority threat.
- Wastewater discharges reduced by 25% in the 5 years to 2016 (NSC, 2016c). Council has also recently installed supervisory control and data acquisition (SCADA) systems on pump stations and other important parts of the reticulation system to monitor for discrepancies and reduce incident response times which can assist in the prevention of untreated sewage overflows and pump station spills.
- Council has prepared an On-site Sewage Management Plan (NSW, 2013) to drive community implementation of appropriate operation of these systems. In the 2016/16 year, 93.4% of on-site sewerage management systems in Nambucca were compliant (NCRSOE Working Group, 2016). Council also recently installed a pressure sewerage system to service properties in South Nambucca Heads between Florence Wilmont Drive and Teagues Creek including a caravan park and several motels (previously on septic) with a likely improvement in water quality in the lower estuary. Potential remaining issues including:
    - Overflows from manholes, sewers, pumping stations and STPs due to a variety of circumstances (e.g. root intrusion, human error, infrastructure damage, poor maintenance/ aging assets, infiltration, power outages, mechanical failures etc.). Each STP has a Pollution Incident Response Management Plan to address such incidents.
    - Community perception of impacts to fisheries and aquaculture from discharge of treated effluent from Macksville STP to the Nambucca River (which occurs via diffuser on the

riverbed). In particular, East Street drain outlet in Macksville has been identified as a source of poor water contamination contributing to oyster harvest zone closures.

- Whilst effluent from Bowraville STP is beneficially reused for irrigation, excess water can be discharged direct to the Nambucca River. Council is in the process of upgrading the treatment process to improve the quality of treated effluent discharged from Bowraville STP.
- The unknown adequacy of the sand dune exfiltration system at Scotts Head STP, adjacent to Warrell Creek.
- Frequent complaints of odour and poor water quality and associated community perception that this is caused by Nambucca STP when Deep Creek entrance is closed. The Nambucca STP discharges to swamp forest draining to Deep Creek.

- Other industrial sources which have current Environment Protection Licences regulating pollution of waters include the Nambucca Waste Management Facility and Landfill, Aggregate and road construction industries for the Pacific Highway upgrade, sand and gravel extraction industries (e.g. Austone); a quarry; a concrete casting facility. Past operations (e.g. extractive industry operations in the Nambucca River estuary and at Deep Creek) may have had ongoing environmental impacts on water quality and geomorphology.

Key diffuse sources include:

- Agricultural diffuse source runoff (MEMA TARA (BMT WBM, 2017) key state-wide threat and regional priority threat) including bank erosion, insufficient riparian buffering and banks directly impacted by stock access and grazing (BMT WBM, 2006).
- Urban stormwater (MEMA TARA (BMT WBM, 2017) key state-wide threat and regional priority threat) discharged from the four major urban centres, lack of WSUD strategies and lack of management of the few existing gross pollutant traps (GPTs) within the LGA (NSC, 2018) (Figure 9).
- Sediment laden runoff from steep slopes in the highly erodible Nambucca Beds geology of the upper catchments. Particular concerns include forestry operations and road works in these areas (Eddie, 2018).
- Poor erosion and sediment controls from construction sites resulting in sediment plumes (e.g. in Warrell Creek in 2004) as well as Hyland Park (Gadd, 2000).
- Poor geomorphic condition (i.e. bed instability) of the waterways in the upper catchment as mapped by NCLLS (2014).
- Loss of riparian vegetation and instream macrophytes which otherwise protect banks and can contribute to significant nutrient removal.
- Hydrological modification of wetlands including drainage ((MEMA TARA (BMT WBM, 2017) key state-wide threat and regional priority threat) and installation of levees, floodgates and weirs resulting in export of acidity, metals including iron and aluminium, nutrients and bacterial contamination either by groundwater flow or surface runoff, e.g. from Gumma Gumma Swamp (Tefler and Birch, 2014).
- Damaged and/or inoperable floodgates, and lack of understanding of management responsibilities and management regimes for floodgates (Figure 9).
- Urban development resulting in large increases in TSS, and moderate increases in TN (based on modelling undertaken by Letcher *et al*. (2007)).
- Pet and wild fauna faeces, e.g. within Beer Creek catchment (Telfer and Birch, 2009).
- Pesticide use in horticulture areas (predominantly in the Deep Creek catchment) and in roadside weed management (NSC, 2018).
- Fertiliser use in areas of pasture improved grazing lands within Watts Creek catchment (Telfer and Birch, 2009).

- Amplification of effects through poor flushing. The entrance condition of estuaries, ICOLLs in particular can contribute to reduced flushing times and eutrophication. The condition of the entrance of the Nambucca River estuary does not appear to have any significant effect on water quality in the estuary (BMT WBM, 2006) however notable deterioration of water quality in Deep Creek and Swimming Creek is observed during closure of these ICOLLs.

Figure 9: Left: Gross Pollutant Trap at Bellwood Park; Right: damaged floodgate at East Street, Macksville (July 2018)

4.2.5 Riparian Vegetation Condition

Condition assessments of riparian zones at sites throughout the study area were undertaken in the recent Ecohealth monitoring project (Mika *et al.*, 2018) based on occurrence of weeds, structure of riparian vegetation (e.g. logs) and management regimes. The Ecohealth Project report cards identified the Nambucca River estuary to have the poorest (D+ grade) riparian condition rating out of all estuary sub-catchments with the poorest condition sites located at the estuary entrance and upstream of Macksville on the North Arm. This supports previous mapping of riparian condition by GECO Environmental (2005) which identified the worst riparian condition in North Arm followed by Taylors Arm and the Nambucca River. Upper catchment sites with poor riparian condition contributing to water quality, sedimentation and biodiversity impacts in the estuary proper include the Buckra Bendinni Creek (D- grade), South Creek (D grade), tributaries to Taylors Arm and Freshwater Deep Creek (D+ grade). Conversely, estuaries with very good to good riparian condition included Newee Creek (B+ grade), Warrell Creek estuary (B grade) and Deep Creek estuary (B- grade) (Mika *et al.*, 2018).

The main stressors to riparian condition at all sites are invasive weeds, livestock access and past riparian vegetation clearing resulting in reduced riparian continuity and fragmentation (GECO Environmental, 2005).

Plate 6: Left: Parrots Feather and Hymenachne in the Nambucca River at East Bowraville (July, 2018); Right: Riparian revegetation on Stuart Island

Source: NSC (2018)

The influence of past vegetation clearing and physical stressors such as trampling and grazing were noted to be affecting recruitment of native riparian vegetation (Mika *et al*., 2018). Stock access was specifically an issue identified in the upper Nambucca River estuary sites, on Taylors Arm and Newee Creek (Mika *et al*., 2018). Stock impacts have previously been identified impacting on mangroves in the North Arm and affecting saltmarsh areas along the main arm of the Nambucca River and south of Watts Creek. Inappropriate riparian clearing has also previously been observed in the rural residential reaches of Warrell Creek and in road reserves downstream of the Macksville Pacific Highway bridge (BMT WBM, 2006).

Many landholders have adopted strategies for improving riparian vegetation either through direct planting efforts or changed management approaches but wide-scale restoration practices are hampered by funding and labour resources, complex approval processes, difficulties associated with fencing on river banks, introduces species outcompeting natives during regeneration efforts and the impact of increasing boat traffic on existing vegetation (GECO Environmental, 2005). Riparian vegetation management efforts have typically focussed on protection and restoration of high value reaches in good condition, as appropriate from a biodiversity perspective.

4.2.6 Threats to Biodiversity

Key threats to biodiversity in the estuaries and coastal zone are discussed in BMT WBM (2006), Umwelt (2012), NSC (2018) as follows:

- Loss of habitat through extensive riparian and adjacent habitat clearing (MEMA TARA (BMT WBM, 2017) regional priority threat), modification and fragmentation including clearing on private land (e.g. for forestry and agriculture) and foreshores, clearing of understorey, loss of nest trees, and historic dredging and reclamation.
- Removal of aquatic (e.g. dead wood) and reef habitat.
- Inconsistencies between Council's planning framework and mapping of protected habitats (e.g. SEPP Coastal Wetlands and EEC including swamp oak floodplain forest, swamp sclerophyll forest and freshwater wetlands). It is desirable that the Nambucca LEP and DCP fully reflects the conservation status of these protected communities.
- Predation and invasion by introduced animals (e.g. feral cats, Indian mynas (*Acridotheres tristis*), mosquito fish (*Gambusia holbrooki*), cane toads (*Rhinella marina*), dogs, foxes).
- Introduced plants (MEMA TARA (BMT WBM, 2017) regional priority threat) (e.g. Bitou Bush).

- Soil disturbance (uncontrolled stock access / erosion/ nutrient and pathogen introduction). For example, the pathogen Myrtle rust (*Austropuccinia psidii*) may cause plant deformity and death of bottle brush, tea tree and eucalypts.
- Overgrazing resulting in reduction in groundcover, enabling erosion and compaction of soil.
- Foreshore development (MEMA TARA (BMT WBM, 2017) regional priority threat), urban and industrial development and inadequate planning controls.
- A lack of knowledge/ mapping of the ecosystems present in urban creeks and drains (for example, Tilly Willy Creek and Bellwood Creek (NSC, 2018).
- Reduction of food resources to higher order predators (e.g. marine mammals and birds of prey).
- Unrestricted pedestrian access in sensitive habitats such as dunes and riparian zones.
- Hydrological stress and pesticides spray drift from horticultural activities, in particular, blueberry growing and spraying in the Deep Creek catchment.
- Dumping of rubbish and green waste.
- Illegal plant collection (e.g. of epiphytes).
- Illegal removal/vandalism of coastal vegetation (e.g. to preserve private property views).
- Fire/ altered and inappropriate fire regimes/ frequent burning (particular to Swamp Oak wetlands, Littoral rainforest and Twining Glycine).
- Barriers to migration of estuarine communities (in particular, salt marsh) with sea level rise.

In some instances, natural processes can induce perceived ecosystem health decline. Examples include vegetation die-off due to coastal exposure and/or borer attack in the vicinity of the North Valla Beach access track (Plate 7). In other cases, a combination of natural processes and human intervention can result in undesirable impacts on ecosystem health. One example is the observed mangrove die-off in a tributary of the Deep Creek estuary to the east of Hyland Park (Plate 8). This is believed to be related to the forward migration and retreat of the mangroves as a result of entrance conditions and subsequent salinity regimes. Flooding and drying are natural components of the hydrological and ecological processes operating within ICOLLs. Coastal lakes and the life they support have evolved in response to these forces and to maintain a “healthy" lake ideally it should be left to operate as close to natural as possible (NSC, 2013a) while balancing the need for protection of public access, assets and water quality.

Plate 7: Coastal vegetation die-off, North Valla Beach

Source: NSC (April 2018)

Plate 8: Left: Aerial view of mangrove die-off in tributary to Deep Creek; Right: mangrove die-off in Deep Creek estuary

Source: B. George (2018)

4.3 Hydrology and Catchment Modifications

Wetland and floodplain modifications have been made in several areas, primarily in the Nambucca River estuary including Gumma Creek, Watt Creek and Congarinni (BMT WBM, 2006). These modifications include installation of levees, weirs, floodgates, culverts, agricultural and stormwater drains (Williams *et al*., 1996). Most floodplain modifications were installed for flood and inundation protection to increase agricultural productivity. The installation of floodgates and other drainage modifications in the study area have historically resulted in modified freshwater and tidal flows, reduced hydraulic connectivity and fish passage,

drainage and lowering of the ground surface elevation, subsequent soil salinity and acidity changes and changes to vegetation regimes (and subsequent biodiversity impacts) such as the localised expansion of *Casuarina glauca* into areas that previously supported saltmarsh or mangroves (BMT WBM, 2006).

Floodgates have recently been removed and/ or modified at 100 Acre Swamp to improve hydraulic connectivity, water quality and fish passage. Tidal flow was reinstated through the Stuarts Island causeway in 2007 at the request of Aboriginal elders to reinstate flow in this part of the river. This work increased waterway connectivity and was a component of the "Bringing Back the Fish" project, reducing siltation in the back channel and associated impacts to an Aboriginal sacred place to the south of the causeway. Gumma Swamp has a complex history of extensive drainage, historic floodgate installation and floodgate removal and modification. Floodgates and weirs were recently modified and installed at Gumma Swamp as part of a wet acid containment strategy to improve the quality of wet weather discharges from the swamp. Ten floodgates at Gumma Gumma Creek entrance were removed in 2006 as part of bridge replacement works to improve fish passage at this location.

Several man-made barriers within the study area (floodgates, town drains, weirs and fishways) provide varying degrees of fish passage. The two priority barriers for removal or modification as identified by DPI Fisheries (Scott Nicholls and Matthew Gordos, pers. comm., 13 March 2019) are:

- North Arm fishway upstream of Bowraville (approximately 1.4 km upstream of the confluence with the South Arm): high priority (Plate 9).
- Sullivans Road causeway in the vicinity of the tidal limit of Deep Creek: medium priority.

Plate 9: North Arm Fishway, Bowraville

Source: DPI Fisheries (2019)

Siltation of the estuaries primarily occurs in the upper reaches from deposition of fluvial sediments, subsequently affecting water quality, navigability, biodiversity and amenity. For example, siltation is evident at East Bowraville and immediately downstream of Deep Creek tidal limit near Sullivans Road (NSC, 2018). Siltation may contribute to shallowing of lower energy environments in the lower estuaries, such as in the Stuart Island back channel and in Deep Creek estuary when the entrance is closed although the deposited fines are typically remobilised during flood flows.

4.4 Coastal Processes, Hazards and Management Strategies

4.4.1 Coastal Processes

The Nambucca coast and estuaries are subject to the typical hydrodynamics and coastal processes that affect much of the east coast of NSW.

Open Coast

The open coast typically comprises sandy embayments with no or very limited rocky reef, apart from a large rocky reef offshore of Shelly Beach, Beilbys Beach and Main Beach adjacent to Nambucca Heads. Forster Beach/South Beach and South Valla Beach are classified as long, sandy barrier beaches. Several small pocket beaches located between two headlands are also present including Little Beach, Scotts Head, and Entrance Beach (located between Wellington Rock and the breakwall). Shelly Beach, Beilbys Beach, Nambucca Main Beach and North Valla Beach are all narrow, sand mantle beaches which can erode during storms to reveal exposed bedrock (Umwelt, 2012). Bedrock cliffs and bluffs are located primarily at Scotts Head, Nambucca Heads and Valla Beach and are subject to rock falls and undercutting by wave action.

The coastal zone of the study area is affected by storm surges resulting in estuarine flooding, wind induced localised coastal currents, rip currents and a predominate south to south easterly wave climate (Umwelt, 2012). Wave heights in the study area usually exceed 1.1 m for 80% of the time, 1.5 m for 50% of the time, and 2.2 m for 20% of the time with a tidal range between 2 m in spring tides to <1 m in neap tides (DLWC, 2000). The wave climate is heavily influenced by tropical cyclones and east coast lows with wave heights of up to 10 m experienced on several occasions over the past 80 years resulting in severe coastal erosion (Umwelt, 2012). In May 2009, a significant east coast low storm resulted in peak significant wave heights of 6.5 m (Coffs Harbour offshore wave data) (MHL, 2018) resulting in widespread erosion of coastal beaches and damage to the sea wall at Main Beach Nambucca Heads. Recovery from the storm bite had not occurred by the time of preparation of the CZMP in 2012 (Umwelt, 2012). There have been several other large storms with long durations and large significant wave heights over recent years as summarised in Table 4.

Table 4: Summary of significant storm history at Coffs Harbour waverider buoy 2009 – 2020 (MHL, 2020)

Storm Date	Peak Hsig (m)	Mean power (kW/m)	Deepwater wave direction	Storm type
20 – 25 May 2009	6.5	141.5	E	Easterly trough low
6 – 7 June 2012	6.2	140.3	SSE	Southern Secondary Low/ Tropical Low
27 – 30 January 2013	7	110.69	ENE	Tropical Low
20 – 23 February 2013	6.9	95.4	SSE	Tropical Low
4 – 7 June 2016	6.5	113.7	ENE	Easterly trough low
3 – 5 August 2016	6.6	118.6	SSE	Southern Secondary Low
22 – 24 August 2019	6.1	128.6	S	Southern Tasman Low

Source: Wave data collected under the NSW Coastal Data Network Program managed by the DPIE Climate Change and Sustainability Division

Slope instability, long term shoreline recession and beach rotation are also experienced on the open beaches.

ICOLLs

Oyster Creek is a small shallow ICOLL with an estuary area of just 0.1 km^2 and average depth of 0.4 m (DPIE, 2020). It has a relatively small catchment of 16 km^2 is surrounded by nature reserve and typically remains closed for long periods (Luffman, 1999 in OEH, 2008) resulting in poor flushing (Plate 10).

Deep Creek displays characteristics of both a barrier estuary and a saline coastal lake (Plate 10). It has an estuary area of 1.7 km^2 located within a relatively narrow bedrock valley (DLWC, 2000). The relatively large catchment size of the ICOLL (94 km^2) results in an entrance that is typically open although the shallow entrance results in limited tidal exchange (NSC, 2013). Wave deposited sand gradually infills the entrance area and increases the berm height and can result in closure of the ICOLL particularly during prolonged dry periods. The lower creek is situated parallel to the Holocene sand barrier of Hylands Beach/ South Valla Beach and exists at the northern end of the beach. Entrance morphology is highly variable with the position of breakout varying up to 600 m across the beach, the most common position being approximately 450 m south of Valla Headland (DLWC, 2000).

When open, Swimming Creek exits across the beach approximately 500 m to the north of the main surf beach. The creek is essentially a very low energy and often stagnant channel incorporating aspects of both ephemeral entrance lagoons and coastal intermittent streams. The majority of the estuarine area is located immediately behind and parallel to the hind dune with a series of deep pools retaining water in the lower section (Redman and Greenaway, 1995). The entrance is located immediately adjacent to the 4WD beach access track which is fringed by a damaged rock revetment and debris. Whether this material is impacting on the entrance alignment and opening behaviour of the creek is unknown (NSC, 2018).

Plate 10: Left: Oyster Creek; Right: Deep Creek

Source: DPIE (2020)

Nambucca River Estuary

The Nambucca River estuary is a mature, wave dominated inter-barrier estuary with an open, trained entrance. Training works were constructed along the northern shoreline at Nambucca Heads during the late 1890s and early 1900s with various historical large-scale dredging undertaken up until the 1940s. The estuary was last dredged in 1977 with works undertaken west of the V-wall which subsequently infilled rapidly.

The lower Nambucca River estuary is shallow with a continually changing regime. Normal tidal and wave conditions result in an increasing constriction of the entrance and flood tide shoals resulting in elevated flood

levels, reduced storm tide penetration, smaller tidal ranges and shorter flushing time, whereas flooding removes large amounts of sediment and deposited material (including entire islands) and reverses the hydrodynamic impacts (BMT WBM, 2006). Shoaling of Warrell Creek is also compounded by bank instability and dunal slips (BMT WBM, 2006) which add to the tidal flushing time in excess of 60 days (WBM 2000 in GECO Environmental, 2005).

Plate 11: Nambucca River Estuary

Source: DPIE (2020)

4.4.2 Coastal Hazards

Coastal hazard vulnerability has been mapped by SMEC (2009) for infrastructure at risk. Coastal hazards are also discussed in the *Nambucca Shire CZMP* (Umwelt, 2012). The status of actions contained within the CZMP are provided in Appendix D. There are existing provisions for consideration of coastal hazards in the Nambucca LEP and DCP for currently mapped coastal hazard areas.

Storm bite erosion

Storm bite erosion of the sandy shoreline has been occurring in the central and southern areas of Nambucca Valley LGA resulting in undermining and collapse of some beach access points, inaccessibility to and from the beach and amenities (e.g. surf club, car park), public safety risks presented by a steep scarp face, loss of long established dune vegetation and loss of amenity. The threat has already eventuated at Nambucca Heads Surf Club impacting on the access stairs in 2012 (Plate 12) and similarly, Forster Beach (Scotts Head) Surf Club access way in 2016. The key areas at risk of extreme storm events, as identified through a risk assessment in the CZMP (Umwelt, 2012) are at Shelly Beach, Beilbys Beach and Nambucca Heads Main Beach. A less extreme, but high risk also exists for South Valla and North Valla beaches.

Plate 12: Left: Nambucca Main Beach Surf Club access stairs damaged by storm events; Right: Main Beach Surf Club after replacement of access stairs

Source: NSW (2012), NSW (2016

Beach recession

Over the past few years, significant shoreline recession has been observed at Scotts Head, as well as immediately to the north of Swimming Creek (Plate 13) including loss of dune volume and vegetation. The current erosion scarp at Swimming Creek is within but approaching the SMEC (2009a) mapped immediate hazard line at Swimming Creek. At Scotts Head, the shoreline at the eastern end of Reflections Holiday Park appears to have breached the 2009 mapped "immediate zone of wave impact and slope adjustment" (based on comparison of December 2017 Google Earth imagery). Losses at Beilby's Beach (Plate 13), Nambucca Heads (near the river entrance) and losses at Valla Beach have previously been noted by Umwelt (2012).

Plate 13: Left: Vegetation debris on receding shoreline north of Swimming Creek entrance (December 2018); Right: recession of beach at Ulrick Drive carpark (north end of Beilby's Beach) causing undercutting and collapse of the road surface (July 2018)

Landslip

The rocky headlands and bluffs experience rock falls and undercutting by wave action which present a public safety risk and a low risk to property and infrastructure. As part of a Natural Disaster Risk Management Study, Council commissioned Douglas Partners to undertake an assessment of the slope instability risk in the Nambucca Coastal strip. Ten high priority landslip areas (Figure 10) were identified at Main Beach, Wellington Drive and Riverside Drive within the lower Nambucca River estuary and at Scotts Head and North

Valla as mapped by SMEC (2009b). The results were incorporated in the SMEC (2009a) *Coastal Processes and Hazard Definition Study* and subsequently the Umwelt (2012) CZMP.

The cliff behind the White Albatross Holiday Park at Nambucca Heads (lot 7016/1056524) has a history of subsidence and/or instability (C. Knight, pers. comm., 2019) and was not included in the previous studies. This site, shown on Figure 10 is under the management of Council. This cliff has subsequently been mapped as within the coastal zone (coastal use and coastal environment areas). Whilst not subject to wave action, undercutting or significant wetting and drying processes from tides, the cliff is still likely to experience weathering from chemical changes associated with frequent salt spray, weathering from high winds, and may be subject to structural failure.

Figure 10: Slope instability sites including priority sites investigated for Council's Natural Disaster Risk Management Plan and un-investigated site at lot 7016/1056524

Source: Adapted from SMEC (2009a)

Coastal inundation

A present-day risk of overwash and overtopping exists for the berm at the Nambucca River entrance and whilst overwash is likely to be frequent, no infrastructure is at risk in this location (SMEC, 2009a). Coastal inundation at Deep Creek is presently only likely across the entrance berm if the frontal dune is low enough to allow overtopping during a major storm. Overtopping would potentially affect the existing carpark, picnic area and toilet block immediately behind the entrance (SMEC, 2009a) at South Valla Beach.

Tidal inundation

A present day highest astronomical tide (HAT) of 1.22 m MSL is estimated by MHL (2016) for nearby Coffs Harbour for the recent (1994-2014) epoch. No detailed local mapping for tidal inundation alone is currently available for the study area. However, the Federal government's online tidal inundation model, Coastal Risk Australia (http://www.coastalrisk.com.au/) provides a visual, conservative indication of those places at risk from tidal inundation in the present day (for example, Figure 11).

Figure 11: Conservative first-pass mapping of present-day risk from tidal inundation at Macksville

Source: Coastal Risk Australia (2019)

The typically shallow nature of each entrance is an important hydraulic control on the water levels within the estuaries, constricting the channel and reducing the tidal ranges upstream of the entrances. Whilst significant areas of intertidal wetlands within the estuaries rely on frequent tidal inundation, and some areas of low-lying pasture are subject to inundation, there are limited present day impacts of tidal inundation on built assets and infrastructure. Current areas impacted by tidal inundation (typically during a storm tide) occur at Bellwood Park including the inundation of the Stuart Island Causeway, inundation of Wellington Drive and inundation of boat ramps and water access ways.

Plate 14: Left: Tidal inundation of Stuarts Island causeway (Dec, 2012); Right: Inundation of the foreshore of Bellwood Park (Dec, 2012)

Source: J. Ashby at www.witnesskingtides.org

The key risk from present day tidal inundation is when high tides occur in combination with catchment flooding. This risk was assessed in the *Nambucca Shire Floodplain Risk Management Study* (WMAwater, 2016) which assessed the risk of catchment flooding in combination with tidal inundation for present day scenarios as well as consideration of sea level rise scenarios of an increase of 0.4 m by 2050 and 0.9 m by 2100, consistent with the coastal hazard mapping undertaken for the study area. A detailed suite of management actions is provided in the associated *Floodplain Risk Management Plan* (WMAwater, 2017) including revising flood planning levels (FPLs), amendments to planning instruments, flood proofing, reissuing s149 certificates and raising of low-lying land.

4.4.3 Coastal Management Strategies

Entrance Management

The state of the entrance of each estuary varies naturally in response to prevailing catchment runoff, sedimentation (from upstream sources or localised banks) and coastal conditions. Anthropogenic drivers of entrance change include entrance modifications such as training walls (i.e. Nambucca River estuary), and dredging and mechanical openings (i.e. Deep Creek).

Council has been responsible for mechanical opening of the Deep Creek entrance since 1991 and presently carries out opening of the entrance in accordance with the *Deep Creek Entrance Management Policy* (NSC, 2013). Until development of the *Deep Creek Entrance Management Policy* (NSC, 2013), Council mechanically opened the entrance four times in the preceding twenty-two years, typically in response to community concerns regarding natural processes within an ICOLL. This was primarily in response to requests from property owners affected by inundation of low lying pasture and landscaped gardens, but also from residents concerned about water quality, vegetation dieback, bank destabilisation, reduced aesthetics and odour (Gadd, 2000; NSC, 2013).

There is no entrance management policy for Swimming Creek and it is typically managed in its natural state. However, an emergency opening of the entrance was undertaken in early 2018 to mitigate water quality impacts in the creek as a result of a burst sewer pipeline (NSC, 2018). Placement of rubble and rocks at the entrance has occurred in an attempt to minimise erosion of a beach access track during entrance opening events, however this had limited success (Plate 15). When open, the entrance of Swimming Creek migrates across the beach and can scour across the toe of the frontal dune system (Umwelt, 2012). Council receives frequent complaints from the community regarding the smell and appearance of water quality in Swimming Creek.

Plate 15: Informal erosion control at Swimming Creek entrance (September 2018)

The Nambucca River entrance works and the state of the entrance have a significant effect on the hydrodynamics of the river and subsequent effects on tidal flushing, sedimentation/ erosion, ecological habitats and flooding (BMT WBM, 2006). The coastal protection infrastructure results in high velocity flood and ebb tide currents and the focussing of wave and current energy on sections of the estuary foreshore resulting in erosion such as at Bellwood Park. Waves are more likely to penetrate the estuary on the flood tide. Breakthrough of the berm immediately to the south of the entrance can also occur during floods (Umwelt, 2012). The typically shoaled nature of the entrance affects navigation such that navigability of the lower estuary, Warrell Creek and the entrance bar is limited to shallow draft vessels, typically recreational boats and some small commercial fishing vessel. At times, even passage of small recreational vessels is difficult at low tide downstream of Stuarts Island.

The entrance to Oyster Creek is closed for long periods (Luffman, 1999 in OEH, 2008) resulting in a poorly flushed ICOLL (OEH, 2008). Historically, large storm surges in the 1960s resulted in erosion of the frontal dune such that the entrance almost broke through to the swales behind (B. Sharmann, pers. comm. in OEH, 2008). Given its location and the immediate surrounding land tenure by DPIE - NPWS, State Rail and DPIE – Crown Lands, Council receives limited community feedback about the management of this system. The entrance is managed by DPIE - NPWS under the *National Parks and Wildlife Act 1974*. To date there has been no need for any mechanical interference with the entrance which operates in its natural state.

Coastal Protection Assets

Seawalls, whilst infrequent in the study area, are important assets for beach access infrastructure and recreational amenity. The major coastal protection asset is the Nambucca River estuary entrance breakwater, V-wall and training wall located on the north bank and extending approximately 2.5 km upstream and terminating in an arm extending off Stuarts Island.

Some private foreshore protection structures are also located on the lower Taylors Arm and Tilly Willy Creek, Macksville. Numerous unlicensed foreshore structures also continue to be erected within the estuaries for protection against bank erosion (BMT WBM, 2008) using materials such as dumped brick and old tyres (GECO Environmental, 2005). In total, 13.5 km of bank protection works, including the entrance infrastructure, has been mapped in the Nambucca River estuary (GECO Environmental, 2005) concentrated around the southern banks of the lower reaches of Taylors Arm, the northern banks of Tilly Willy Creek and in the vicinity of Pelican Caravan Park. Bank protection infrastructure is located at erosion hotspots in the Deep Creek estuary, such as at Thompson Street and South Valla Beach car parks and the footings beneath the footbridge. Some placed rock, and remnants of past protection structures are located on Main Beach at the entrance to Swimming Creek.

Design and condition of coastal protection infrastructure

A variety of coastal protection structures exists along the Nambucca coastline to protect infrastructure and assets. Council infrastructure (including coastal infrastructure) is managed under the NVC Asset Management Plan. Several coastal protection assets have recently been improved in accordance with the recommendations of the Nambucca CZMP using contemporary coastal protection methods. This includes recent works at Scotts Head and work addressing undercutting at the V-wall in Nambucca Heads. There are also a number of coastal structures that are either currently in a state of disrepair or require augmentation to sufficiently address protection of adjacent assets in the medium term. For example:

- An insufficiently designed seawall at the South Valla Beach carpark (Plate 16).

Plate 16: Poor design of seawall at South Valla Beach car park (February 2018)

Source: NSC (2018)

- The Ulrick Drive car park at the northern end of Beilbys Beach has been impacted by erosion and slumping and roadblocks were installed some years ago as a temporary measure.
- Whilst not a significant threat to assets or property, the rock revetment separating the 4WD beach access track from the entrance to Swimming Creek is in a state of disrepair with rock and concrete debris scattered along the foreshore of the creek (Plate 17).

Plate 17: Left: Failed rock revetment at the entrance to Swimming Creek (July, 2018); Right: Undercutting of the V-wall carpark (July, 2018), which has now been addressed in recent works

- In general, geofabric is lacking in many seawall and revetment structures along the coast of within the estuary which would otherwise prevent loss of fines through the rock armour.

Whilst monitoring of the condition of beach accesses is undertaken frequently, beach monitoring of the coastal zone (an action recommended in the CZMP) have not been undertaken due to a lack of resources.

4.5 Erosion

4.5.1 Stormwater erosion

Recent works have addressed stormwater erosion issues at Forster Beach, Scotts Head including augmentation of the stormwater culvert, improvements to both inner and outer seawalls, and reinforcement of the dune fronting part of the carpark with geofabric bags. Remaining stormwater issues in the study area include unprotected embankments on Main Beach and Beilbys Beach which are affected by stormwater erosion (Umwelt, 2012).

4.5.2 Estuarine Bank Erosion

Bank instability and erosion is a key threat within the estuaries and contributes to loss of land, estuarine vegetation and riparian habitat loss, increased sedimentation and water quality issues. Previous comprehensive mapping in the Nambucca River estuary indicated that whilst banks in Newee Creek and the upper reaches of Warrell Creek were generally in relatively good condition, a significant portion of banks within the remaining estuary areas were experiencing moderate to high levels of instability with the areas of highest instability located in the lower Warrell Creek backed by sand dunes (downstream of Scotts Head), the lower 7 km of the North Arm, Taylors Arm and Nambucca River (GECO Environmental, 2005) as shown in Plate 18.

Plate 18: Left: Unstable unconsolidated sand banks in Warrell Creek (July, 2018); Right: Severe bank instability and undercutting on the South Arm, upstream of Bowraville (July, 2018)

Causes of bank erosion include:

- Fluvial processes (e.g. floods) in the upper estuary.
- Wave action (from wind and boats) in the lower estuary (BMT WBM, 2008).
- Broad-scale historical clearing of the floodplain and riparian zone for agricultural development.
- Grazing in the riparian zone.
- Ongoing responses to historic extraction activities, particularly gravel extraction in the upper reaches such as in the North Arm and in Missabotti Creek which have resulted in poor geomorphic condition

(Doyle, 2003 in Mika *et al*., 2018) and has likely contributed to severe active erosion in the intertidal zone, and widespread bed lowering and bank incision (Mika *et al*., 2018). Historic gravel extraction may also have contributed to ongoing geomorphic condition in Deep Creek.

- Channel migration.
- Swell wave penetration.

Placement of ad hoc, unlicensed foreshore protection structures (Plate 19) within the estuaries may also contribute to bank instability as well as impacting river health and aesthetics. Areas of instability exacerbated by boat wash include popular boating areas in the North Arm up to the showgrounds, Taylors Arm up to the speed restriction area, and Warrell Creek above Boutons Crossing to Scotts Head (GECO Environmental, 2005).

Plate 19: Left: Slumping of the bank adjacent to Gumma Road (July 2018); Right: Unlicensed foreshore protection structures, Macksville (July 2018)

A more recent assessment of geomorphic condition undertaken as part of the Ecohealth monitoring project (Mika *et al*., 2018) measured bank condition (e.g. slope, bank slumping, exposed tree roots and undercutting) and local management (e.g. stock trampling). Whilst assessments were undertaken at "representative sites" within each catchment, and therefore are less comprehensive than previous catchment wide mapping undertaken, the Ecohealth results indicated that the geomorphic condition of Oyster Creek was excellent (A grade), Warrell Creek was in good condition (B- grade), and Deep Creek estuary in Fair condition (C-). Nambucca River estuary also received a fair score (C grade) with the poorest sites located in the upper estuary towards Bowraville (Plate 18), as well as near the estuary entrance, and on the Taylors Arm.

Current known areas of particular concern will be updated following proposed bank and riparian condition mapping (to be undertaken in Stage 2).

No comprehensive mapping of bank condition of bank protection structures has been undertaken in Deep Creek, Swimming Creek or Oyster Creek. GECO Environmental (2005) undertook mapping and assessment of bank protection works throughout the Nambucca River and Warrell Creek estuaries (Figure 12). A range of bank protection works had been implemented including rock, concrete, gabions (Plate 20), tyres, revegetation and fencing, tree lopping, logs and timber. Rock was the most widely implemented method (10.3 km of estuary) followed by concrete (6.8 km) with small extents using other materials. Most bank protection measures were deemed to be effective or partially effective with ineffective measures generally due to poor design, inappropriate use of materials, unsuitable materials, lack of maintenance, lack of vegetation and poor coordination of works between adjoining properties.

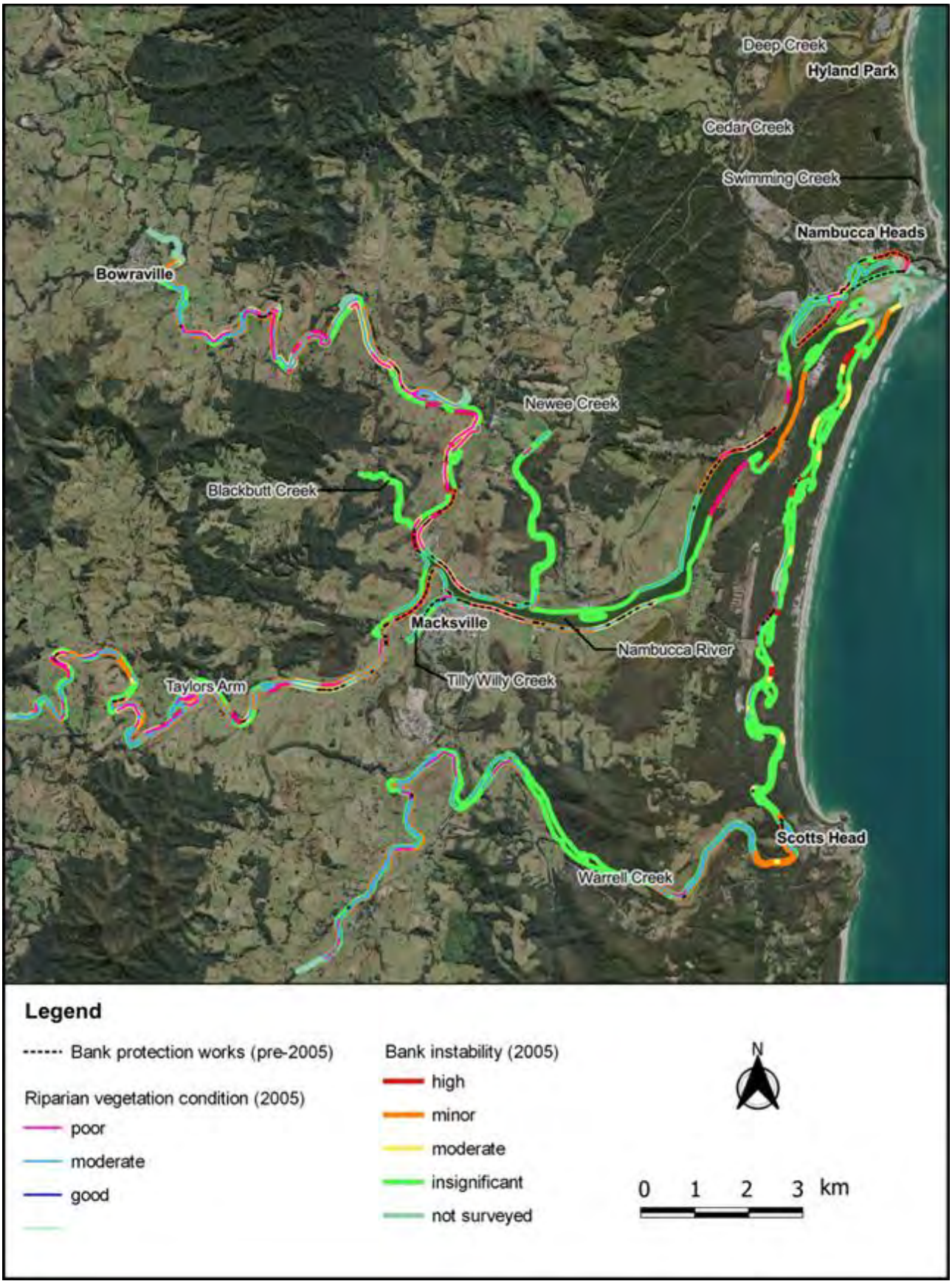


Figure 12: Nambucca River estuary riverbank instability, riparian condition and bank protection works

Source: GECO Environmental (2005)

Plate 20: Left: Appropriate treatment of unconsolidated banks using geofabric and coir log combination, Warrell Creek (July 2018); Right: Rock gabions used to remediate bank erosion under Deep Creek footbridge (July 2018)

Numerous bank rehabilitation measures and projects have been implemented throughout the Nambucca River and Warrell Creek estuaries, primarily focusing on the protection of reaches in good condition and rehabilitation in slightly degraded areas with a high likelihood of return to good condition, as well as rehabilitation of strategic reaches requiring reinforcement (BMT WBM, 2008). Works include control of stock access, weed control, revegetation with native species and bank protection works (e.g. retard structures, pin groynes, engineering log jams, rock chute, rock revetment and bank battering, rock toe protection etc.). Recent projects include stabilisation along River Street, Ferry Street, Stuart Island, Lower Nambucca, Wirrimmbi (Plate 21), Warrell Creek, Bellevue Drive, Macksville Foreshore, Riverside Drive, Wilson Road, Road Rodeo Drive and Deep Creek. Bank erosion is likely to be an ongoing issue in the estuaries and further work is required at key locations.

Plate 21: Left: Bank stabilisation at Wirrimbi (2017); Right: Recycled stumps used in bank stabilisation works (Landcare, 2019)

Numerous upper catchment bank rehabilitation works have recently been undertaken or are planned for future execution by Landcare in accordance with the River Reach Plans. To minimise and counteract bed instability and bed-level lowering, particularly in reaches of moderate recovery potential, and in strategic locations downstream of high recovery potential reaches, these plans recommend installation of bed controls/rock ramps within channels in conjunction with bank stability works in priority areas prior to undertaking longer term bank rehabilitation. The bed controls or rock ramps work to dissipate flow energy and help maintain or recreate pool and riffle sequences, reducing bed scour (and thereby downstream sedimentation), preventing zones of instability from extending further through the catchment, and providing suitable habitat for aquatic species (Landcare, 2016). Since 2010, the North Arm Project, Borefields Reach

and the Missabotti Reach projects have resulted in the completion of 28 new bed control structures and repair of 16 existing structures along with bank rehabilitation works. Four bed control structures have also recently been installed on South Creek and Nambucca Valley Landcare is preparing a River Reach Plan for Buckra Bendinni. These projects complement the coordinated and ad-hoc river restoration and bed stability works undertaken by Nambucca Valley Landcare since its inception in 1998.

4.6 Social Context

4.6.1 Land Use

Land use within the Nambucca catchments (Figure 13 and Figure 14) predominantly comprises conservation areas (39%, mostly state forest, nature reserves and National Parks) concentrated in the southern midland hills and the ranges to the west. Significant areas of agriculture (31.5%), primarily grazing and horticulture, are located on the alluvial plains. Horticulture in the catchments predominantly comprises macadamia/tree nuts and banana plantations with some blueberry, mango and passionfruit plantations (DPIE, 2017).

The remaining predominant land use is unprotected tree and shrub cover (24%, predominantly native forest, and including timber regrowth areas) dispersed across the catchments. Urban development comprises only 1.2% of the total catchment area (Mika *et al.*, 2018) but is concentrated in small individual villages (typically coastal other than Bowraville). Urban areas, transportation, wetlands and waterways and intensive animal production are also more significant land uses within the study area. New significant land uses in the Nambucca catchments include the Bowraville Dam, opened in 2015 and the Pacific Highway upgrade. The horticulture industry is also expected to expand, particularly blueberry farming in the Deep Creek catchment (NSC, 2018).

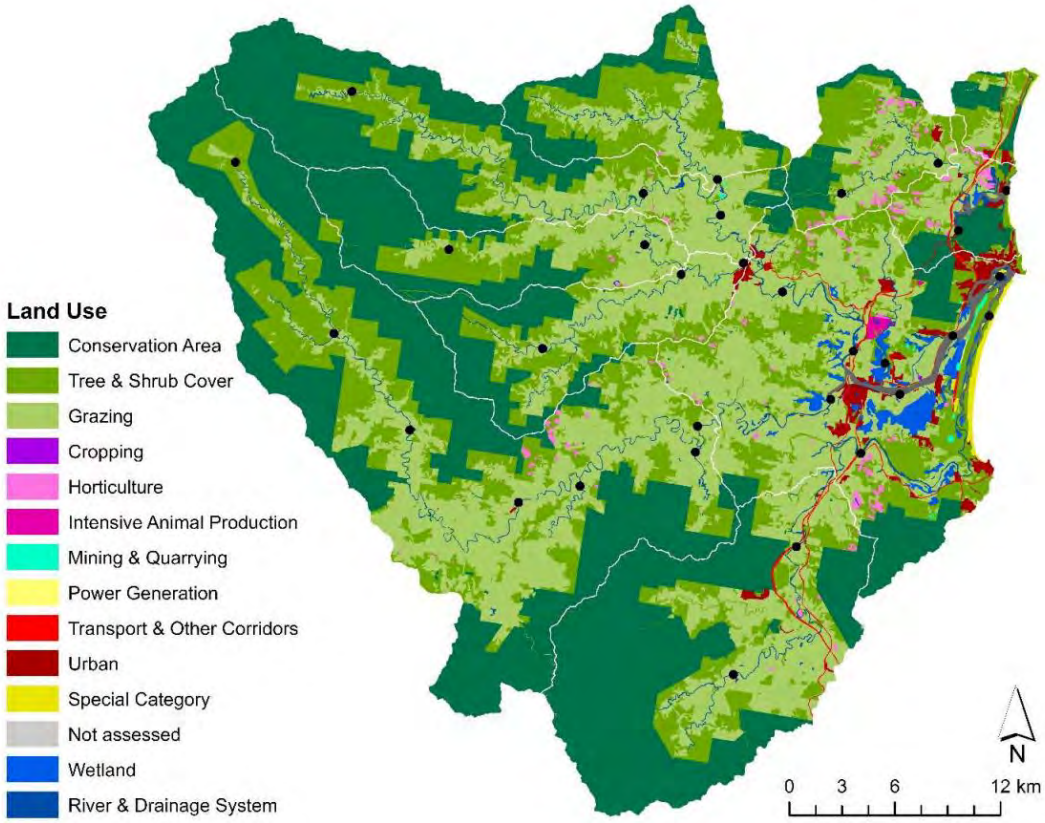


Figure 13: Land use of the Nambucca River catchment

Source: Mika *et al.* (2018)

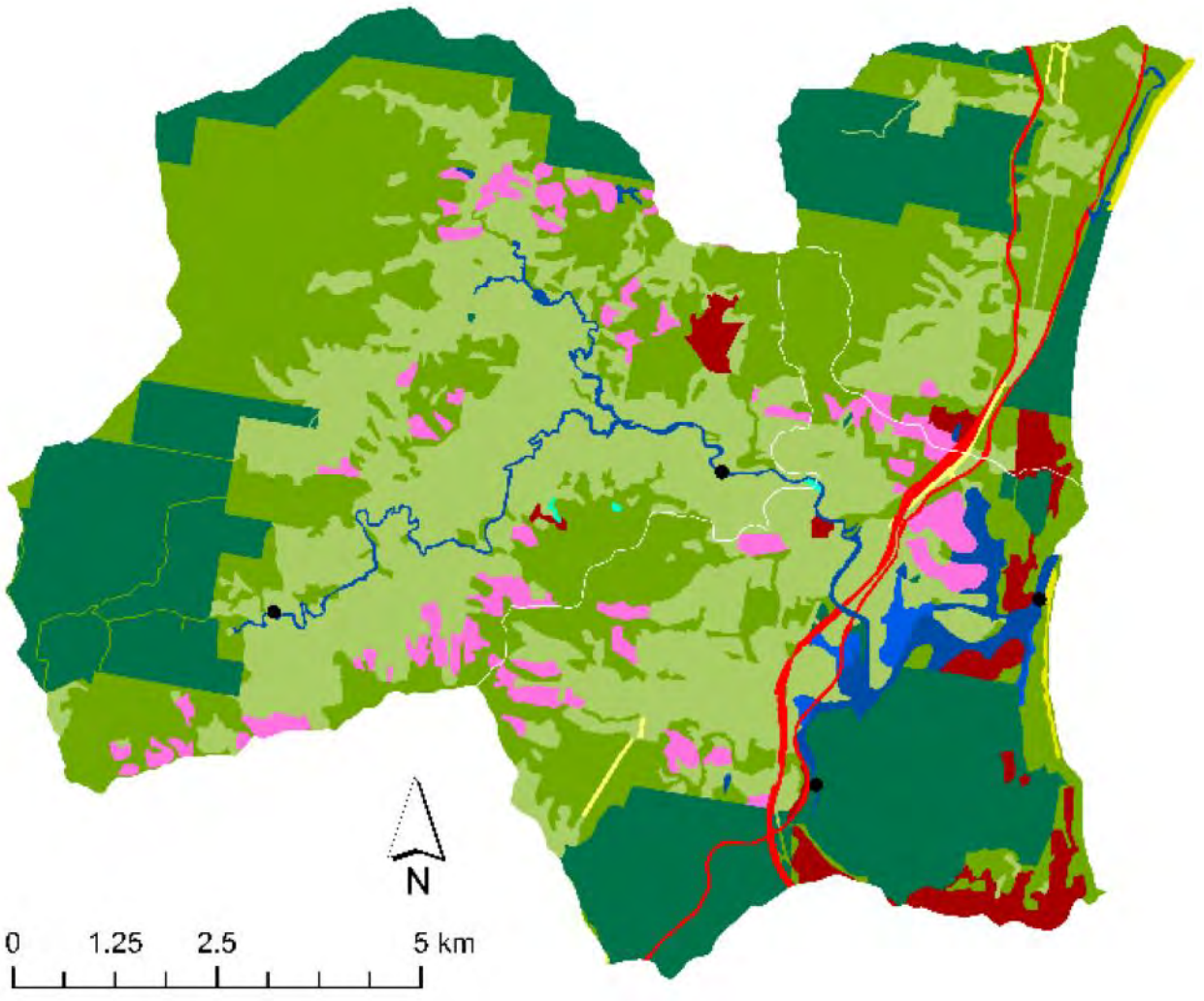


Figure 14: Land use of the Deep Creek catchment

Source: Mika *et al.* (2018)

4.6.2 Population and Demographics

The population of the Nambucca LGA was 19,212 in 2016 with a median age of 51 (compared to the median age of 43 in regional NSW). In 2016, 16.5% of the population was younger than 15 and 27.6% of the population was older than 65. The Nambucca Valley LGA has experienced substantial population growth over time, with 2016 levels about 8% above 2001 levels, equivalent to about 1,500 extra residents. However, this rate of growth is lower than the rates of growth for Sydney (+21 %) and regional NSW (+12 %) over the same period (NSW Government, 2018).

Aboriginal and Torres Strait Islanders made up 7.6% of the population (1,463 people) in 2016. The most common ancestries are Australian and English. There is a lower level of ethnicity than elsewhere in NSW and Australia (ABS, 2020).

Seasonal tourism influx during holiday periods is substantial with the total number of visitors to the Nambucca Valley LGA reported as 228,000 per year (4-year average as at June 2017) (Clare Ellis Consulting, 2018). This represents a greater than 10-fold increase in the local resident population of the LGA, with highest tourist numbers concentrated in coastal towns of Scotts Head, Nambucca Heads and Valla Beach. Tourism pressures can impact coastal habitats through increased recreational use including use of off-road vehicles, visual impacts and access issues associated with overcrowding. These pressures are likely to increase with population and tourism growth.

4.6.3 Culture and Heritage

The Nambucca coastline is the traditional land of the Gumbayngirr people and the land within the study area was traditionally occupied by the Dunghutti people. The estuaries, beaches and headlands are of great significance to the local Aboriginal people who are committed to the management of these areas. Native Title by the Gumbaynggir People was declared over South Beach (also known as Forster Beach) and adjacent land to the east of Warrell Creek in 2014. In December 2019, native title was also granted to the Gumbaynggirr People over the Gumma Peninsula and Islands in the lower Nambucca River estuary.

There are three Local Aboriginal Land Councils (LALCs, Nambucca, Bowraville and Unkya) working in conjunction with the NSW Aboriginal Land Council to representing the local Aboriginal people and protect the interest of, and further the aspirations of its members and the broader Aboriginal community.

There are a number of different archaeological sites and places within the study area including shell middens, open camp sites, waterholes/ wells, burials/ cemeteries (including the cemeteries at Stuart Island, Bowraville and Warrell Creek), story/ ceremonial places, Aboriginal Reserves and missions, places of conflict as well as places of contemporary social value (McIntyre-Tamwoy, 2003). The local Traditional Aboriginal Owners have made successful land claims over the area that is now Gaagal Wanggaan National Park including the bed of Warrell Creek. This area has spiritual significance, was a gathering place to teach young people, and gives Aboriginal people a feeling of security that they can continue to carry out traditional cultural practices in place for thousands of years. Successful land claims have also been made over three islands within the lower Nambucca River estuary (Umwelt, 2012) and these islands, along with much of the tip of Gumma Point is dedicated as Gumma Indigenous Protection Area, managed by the Nambucca LALC. The study area is also important for Aboriginal cultural fishing.

The Nambucca River estuary was the ‘lifeblood’ of early European settlers to the area and was the main means of transporting goods up until the 1920s before the introduction of rail (BMT WBM, 2006). European heritage in the Nambucca River estuary is centred around cedar-getting with a several timber mills previously located in the lower estuary (RDM *et al.,* 2010) and ship building places of significance concentrated around Macksville and the Taylors Arm including Franks Wharf, the Old Government Wharf, and the slipway and Drogher remnants at Kings Point (BMT WBM, 2006). The Breakwall, associated quarry, V-wall and the “Glen” boarding house are also listed as places of significance by RDM *et al.* (2010).

4.6.4 Community Uses and Values

Previous plans and the results of the community survey (Appendix B) undertaken during this Scoping Study indicate that for many community members, interaction with the coast and estuaries is a year-round daily part of life. The beaches and waterways provide a place for social interaction with the majority of respondents visiting these locations with other adults, as well as a moderate proportion (29%) of survey respondents bringing along a companion animal.

The most commonly stated community values from the community survey were:

- Scenic beauty.
- Relaxing/ peaceful.
- Environmental value/ ecosystems/ habitats.
- Good swimming area.
- Good for picnics/ BBQs.
- Good for tourism/ economy.
- Good for passive water-based activities.
- Ability to take dogs and off-lead dog walking.

- Good surf conditions.
- Good fishing.
- Cultural heritage value/ history.

Less popular values include the ability to participate in motorised water sports and vehicular beach access.

Plate 22: Left: The V-Wall, a popular, easily accessible fishing spot with deep-water access. Right: 4WD beach access at South Beach

Common recreational pursuits listed by popularity include wildlife watching/ nature appreciation, walking swimming, passive viewing from lookouts/ platforms, exercise, paddling activities, picnics/ BBQs, fishing, surfing/ wave riding, dog walking and activities with children. Other, less popular activities included motorised water sports, cycling, educational and cultural experiences, camping, four-wheel driving, spearfishing, sailing, bush/ dune regeneration, scuba diving/ snorkelling, bait collecting, and as places for reflection/ contemplation.

Usage is concentrated in the Nambucca River estuary and Nambucca Heads beaches with over 40% of survey respondents visiting these areas daily. Within the Nambucca River estuary, most of this usage is concentrated between Macksville and the entrance, and within Warrell Creek as far as Gumma Reserve/ Boultons Crossing with the entrance area being by far the most popular usage location overall (BMT WBM, 2006). Other highly frequented parts of the study area include Deep Creek, visited by 27% of respondents daily and South Valla Beach frequented by 48% of respondents a few times a week.

Off-leash dog exercise areas on beaches are located in specific areas of North Valla Beach, Scotts Head, the northern end of Stuarts Island, and between Swimming Creek and the Deep Creek footbridge. On-leash dog walking is provided in some other areas at specific times.

Four-wheel drive beach access is available at North Valla Beach, at Swimming Creek for access up to the Deep Creek footbridge and along much of South Beach/ Forster Beach. This activity is permitted through an annual permit system in conjunction with Kempsey and Port Macquarie-Hastings Councils.

The Nambucca River is generally more popular with boaters whereas Warrell Creek is more popular for passive uses such as fishing, kayaking and canoeing. Both swimming and jetski use are concentrated to the lower estuaries (BMT WBM, 2006).

More than half of the recreational fishing effort in the Mid-North Coast region is dominated by visitors to the estuaries (56%) with the majority of fishing being shore based in estuarine environments. Commonly caught recreational species include bream, dusky flathead, sand flathead, tailor, sand whiting, prawns and snapper (West *et al*., 2015). Whilst the recreational fishery harvests significantly higher numbers than the commercial fishery for some key fish species in NSW, overall, the commercial catch is substantially (approximately three times) greater than the total recreational catch (BMT WBM, 2006).

The majority of survey respondents thought that the beaches and estuaries are either moderately healthy or very healthy, other than Swimming Creek which was typically viewed as moderately unhealthy. Some (>10%) of respondents were unaware of the health status of the various beaches and estuaries, particularly for Forster Beach, Deep Creek, Scotts Heads Beaches, Warrell Creek and Swimming Creek.

4.6.5 Community Assets

Community assets within the study area include beach and estuary access ways, viewing platforms, surf clubs, roads, a weir, car parks, caravan parks, seawalls, pontoons/ wharves/ landings, floodplain drainage infrastructure (e.g. floodgates), amenities, signage, sewage treatment plants, and water and power supply infrastructure. Council assets along with risk ratings (with and without treatment for coastal hazards) and estimated replacement costs are listed in an asset register provided in the CZMP, with status updates to this register provided in Appendix D.

Council has estimated that the value of public infrastructure at risk in the coastal zone exceeds $4.5 million (Umwelt, 2012), primarily related to surf club facilities at Main Beach Nambucca Heads and Scotts Head, Council roads and protection structures. The infrastructure listed in the previous CZMP was limited to identified coastal erosion areas. The CMP will expand the study area to the entire coastline of the Nambucca Valley LGA and it is likely that the value of public infrastructure at risk in the coastal zone would be greatly increased.

Whilst harbour facilities are limited, with ocean going craft typically using the regional coastal harbours of Coffs Harbour and Port Macquarie (TfNSW, 2015), the Nambucca River estuary supports boating through the provision of several boat ramps maintained by NVC at Nambucca Heads, Warrell Creek, Macksville, Scotts Head and Shelly Beach. Numerous other informal public ramps for smaller vessels (e.g. dinghies, runabouts and non-powered craft) and private ramps are also present. In total, there are ten public ramps within the Nambucca River estuary and one in Deep Creek. Five public wharves/ jetties/ pontoons and landings are located within the Nambucca River estuary along with several for private use. There are no courtesy moorings within the study area and only a few on-water storage locations within the Nambucca River estuary including several (<10) visitor moorings at the Janning Tree restaurant (now Wharf Street cafe) (TfNSW, 2015). The Better Boating Program provided funding for seven upgrade projects within the Nambucca River estuary between 2005 and 2014 including enhancements at Ferry Street and Lions Park boat ramps (Macksville), at Nambucca Visitor Information Centre Wharf and at Stuarts Island, reconstruction of Scotts Head boat ramp and provision of pump-out facilities at Nambucca Heads (TfNSW, 2015). Since 2015, the regional boating plan has been extended and several other projects have been implemented to improve boating facilities in the LGA (e.g. boat ramps, amenities, lighting and jetties etc.).

A key facility used by tourists is the Boultons Crossing/ Gumma Reserve campground, a popular basic campground on the left bank of Warrell Creek adjacent to the boat ramp.

4.7 Socio-Economic Context

The Nambucca Valley LGA is an attractive place to live and visit with the resident population concentrated in the towns of Nambucca Heads, Valla Beach, Macksville, Bowraville and Scotts Head. The area is facing future demographic changes due to population growth and increasing tourism.

The Nambucca Valley supports a variety of businesses and industries including dairying, grazing, horticulture and tree crops (e.g. macadamia), aquaculture (Sydney Rock Oyster), commercial fishing, niche manufacturing, vehicle body manufacturing, timber processing, pre cast concrete production, tourism, boat/ houseboat hire, aged care and health services (BMT WBM, 2006; NSC, 2017) and extractive industries. The top three employment industries in are health care and social assistance, construction and retail trade (NSW Government, 2018). The weekly median income was $835 in 2016, significantly lower than regional NSW ($1,166 per week). The rate of unemployment was 9.4% in 2016 (ABS, 2020).

The North Coast Regional Plan 2036 (DP&E, 2017) identifies several aims relevant to the projected future use of the coastal zone including:

- Protect Nambucca's environmental assets to support the tourism sector and centres such as Nambucca Heads, Valla Beach and Scotts Head.
- Identify opportunities to expand nature-based, adventure and cultural tourism.
- Drive growth and strengthen connections with Coffs Harbour and other surrounding centres using the Pacific Highway upgrade and improved digital technology.

The *Nambucca Regional Economic Development Strategy 2018 – 2022* (NSW Government, 2018) specified the LGA's "*key endowments lie in its coastal, riverine and hinterland amenity; arable soils and favourable climate; mid-point location on the Pacific Highway between Sydney and Brisbane; balance of lifestyle, social and economic opportunities; and clean, green, organic branding*". One of four key strategic imperatives outlined in the strategy is the protection of these endowments supporting tourism and agriculture.

4.7.1 Commercial Fishing and Aquaculture

There are eight licensed commercial fishers in the Nambucca River estuary. A study of species recorded in Warrell Creek (Gibbs *et al.*, 1999 in BMT WBM, 2006) indicated that approximately 40% of the 56 fish species recorded were of direct economic value. Commercial fish stocks in the estuary include mullet, bream, whiting, black fish (luderick), flathead, trevally, shark, blue swimmer crab, mud crab, and less frequently, mulloway (jewfish), tarwhine, pike eel, butterfish and garfish (BMT WBM, 2006; J. Brislane, pers. Comm, 2019). The small but locally important fishery operates in the lower reaches of the Warrell Creek (downstream of Scotts Head boat ramp) and along the Nambucca River as far as the tidal limit. The value of the commercial fishery was approximately $280,000 per annum in 2006 (BMT WBM, 2006). In 2001, Deep Creek estuary was closed to commercial fishing and was designated a recreational fishing haven. Although consideration of closure of the Nambucca River estuary to commercial fishing was undertaken at this time, the proposal was discarded due to an overwhelming community response (BMT WBM, 2006).

The Nambucca River estuary supports 65.5 ha of priority oyster leases growing Sydney Rock Oyster (BMT WBM, 2006). Commercial oyster production occurs in the lower reaches of the Nambucca River estuary, the harvest area being between Goat Island and the upper end of Stuarts Island, though also including a lease area in the inner harbour (Nambucca River Oyster Farmers, 2014). There are currently 8 permit holders in the estuary and DPI recently valued the local industry at approximately $4 million (annual turnover) (B. Armstrong, pers. comm, 9 Jan 2019). The local industry has a reputation for producing high quality oysters providing employment, income and recognition for the Nambucca Valley LGA (BMT WBM, 2006). The industry relies on appropriate water quality conditions for food safety and healthy growth, as set out in the *NSW Oyster Industry Sustainable Aquaculture Strategy* (DPI, 2016). The industry is governed by a range of authorities including NSW Food Safety, the EPA, DPI Fisheries and NVC) (B. Armstrong, pers. comm, 9 Jan 2019). Oysters are grown and harvested under the NSW Shellfish Quality Assurance Program (SQAP) administered by the NSW Food Authority to ensure strict water quality and low risk to public health, as well as the Nambucca River Oyster Farmers environmental management systems.

4.7.2 Tourism

The study area is popular for tourists, primarily in summer with approximately 228,000 visitors in 2016 (Claire Ellis Consulting, 2018) bringing in revenue to businesses in Nambucca Heads, Scotts Head and Valla Beach and estimated in value to be between $300 - $400 million for the 2006-2007 financial years (Umwelt, 2012). The areas main attractions being "*its varied natural features and environment, largely undeveloped and unspoilt, including its National Parks, the largely pristine coastal landscape, river system and interesting hinterland*" (Claire Ellis Consulting, 2018). A variety of estuary-based tourism operators are located in the study area providing nature-based river and wetland tours, indigenous culture and bushtucker tours,

houseboat, kayak and surfboard hire and a water sports school (Nambucca Tourism, 2018). Visitors also enjoy recreational fishing opportunities, holiday rentals, and access to the commercial harvest of fish and oysters from the Nambucca River estuary.

4.8 Management Context

4.8.1 Governance, roles and responsibilities

Many organisations are involved in the management of the study area from the Federal to the local level and including private landholders, volunteers and community groups (refer Section 5). The study area comprises a complex mix of land ownership and management arrangements including national parks and nature reserves, road and rail reserves, Crown land reserves and submerged land, Council owned and Council managed land, and private freehold land. Effective management of the coastal zone depends on a high degree of collaboration and support amongst these land managers.

In the past, coastal zone and estuary management plans tended to concentrate on Council managed land and there has been a lack of alignment and implementation of actions on both Council managed land and other public land.

An example of a specific governance issue is the Management of the Scotts Head Coastal Reserve. This reserve is managed NSW Crown Holiday Parks Trust and the issue of responsibility and sourcing of funds for management of this area has always been an issue (NSC, 2018). This issue was highlighted in the Emergency Action Plan for the Nambucca Coastal Zone (Umwelt, 2011) appended to the CZMP. The plan stated that the reserve Trust is not well placed to make urgent decisions regarding emergency response, and a recommendation was made that Council should be made responsible for emergency response actions with an agreement to be prepared between Council and –DPIE – Crown Lands, and amendments made to the subplan to make this arrangement clear. This recommendation has not been completed.

Another example is the potential inadequacy of the LEP and DCP to protect areas/ aspects of the catchment important to the health of the estuary (e.g. riparian areas, significant vegetation, communities) from inappropriate forms of development and land use). This was identified as an issue in the *Estuary Management Study* (BMT WBM, 2006) however the LEP and DCP were updated in 2010 under statewide reforms and significant areas of sensitive habitat were subsequently rezoned as either waterways or environmental management. It is unclear whether the amended 2010 mapping and provisions of the NLEP2010 sufficiently protect sensitive estuarine, riparian and floodplain vegetation communities.

The development of a comprehensive CMP, backed by the significant funding opportunity provided by the Coastal and Estuary Grants Program, allows for a more strategic approach to improve engagement, collaboration and coordination between the various land managers and stakeholders, and to improve the delivery of a tailored set of management actions for the entire coastal zone of the Nambucca Valley LGA. Effort will still be required to ensure that localised Plans of Management, Master Plans and local planning instrument (NLEP and DCP) are updated where necessary to ensure adequate support of overall estuary and coastal zone management.

4.8.2 Lack of awareness, education and engagement

Whilst some sectors of the community have a high level of understanding and engagement regarding the key threats to estuary and coastal values, there remains a large portion of the general community who are uninformed, mis-informed and/or disengaged as to the appropriate management of the study area. This threat is exacerbated by high tourism/visitation rates, a lack of coordination between land managers, and limited resources for community education and engagement.

The development and implementation of a CMP improves community awareness and engagement through a significant level of community and stakeholder consultation, and the identification of specific actions regarding ongoing education, engagement and participation in coastal management.

4.8.3 Compliance

The study area experiences a lack of community compliance with regulations (impacted by awareness/education/engagement as noted above) as well as a lack of compliance effort by regulators. Council and state government regulators (e.g. DPI Fisheries, TfNSW – Maritime, and DPIE – NPWS) have limited resources (i.e. officers and funding) to effectively manage the study area. Key examples of non-compliance include unauthorised foreshore structures, breach of development consent conditions, camping/vegetation damage in dunes, excessive/inappropriate boating speed/usage, illegal fishing, littering/dumping, dogs off-lead/ in prohibited area, unauthorised 4WD-ing on beaches.

4.8.4 Political Risk

Preparation and implementation of a CMP is subject to a degree of political risk associated with:

- Election promises.
- Media profiles.
- Political support for climate change mitigation and adaptation.
- Political support which limit actions involved with certain activities, e.g. development, tourism, certain recreational activities (e.g. boating), fishing etc.
- Ad hoc release of state and federal funding associated with political cycles and the integration of that funding with more frequent local government funding cycles.
- Ideological beliefs of community members.
- The need for land managers to consider the desire of the local community whilst also balancing the community expectation of actions that may not be appropriate in the study area. Community understanding of the CMP process and uptake of the key findings and actions can be increased through early engagement.

4.9 Future Context

4.9.1 Population Growth

Population within the Nambucca Valley LGA is projected to increase by 0.2% (50 additional people) per year from 2016 to 2036 with a trend towards an ageing population into the future (NVC, 2020). Tourism is a major industry within the LGA, particularly for the coast, and visitor numbers are growing with a reported 10% increase in visitors to the mid-north coast region between 2015 and 2016 (Destination NSW, 2016). Population growth and tourism will put increased pressure on natural assets such as coasts and estuaries and the protection of these highly valued environments is a key challenge for the region. Urban growth areas under investigation as mapped in the North Coast Regional Plan 2036 (DP&E, 2017) are shown in Figure 15. The Plan aims to deliver housing at Macksville, Valla and Scotts Head, employment lands at Macksville and Valla, and to direct future growth away from important farmland and towards Macksville, Nambucca, Bowraville, Valla and Scotts Head (i.e. within the coastal zone). The Valla Urban Growth Area includes over 70 ha of sensitive land zoned as Environmental Management under the LEP.

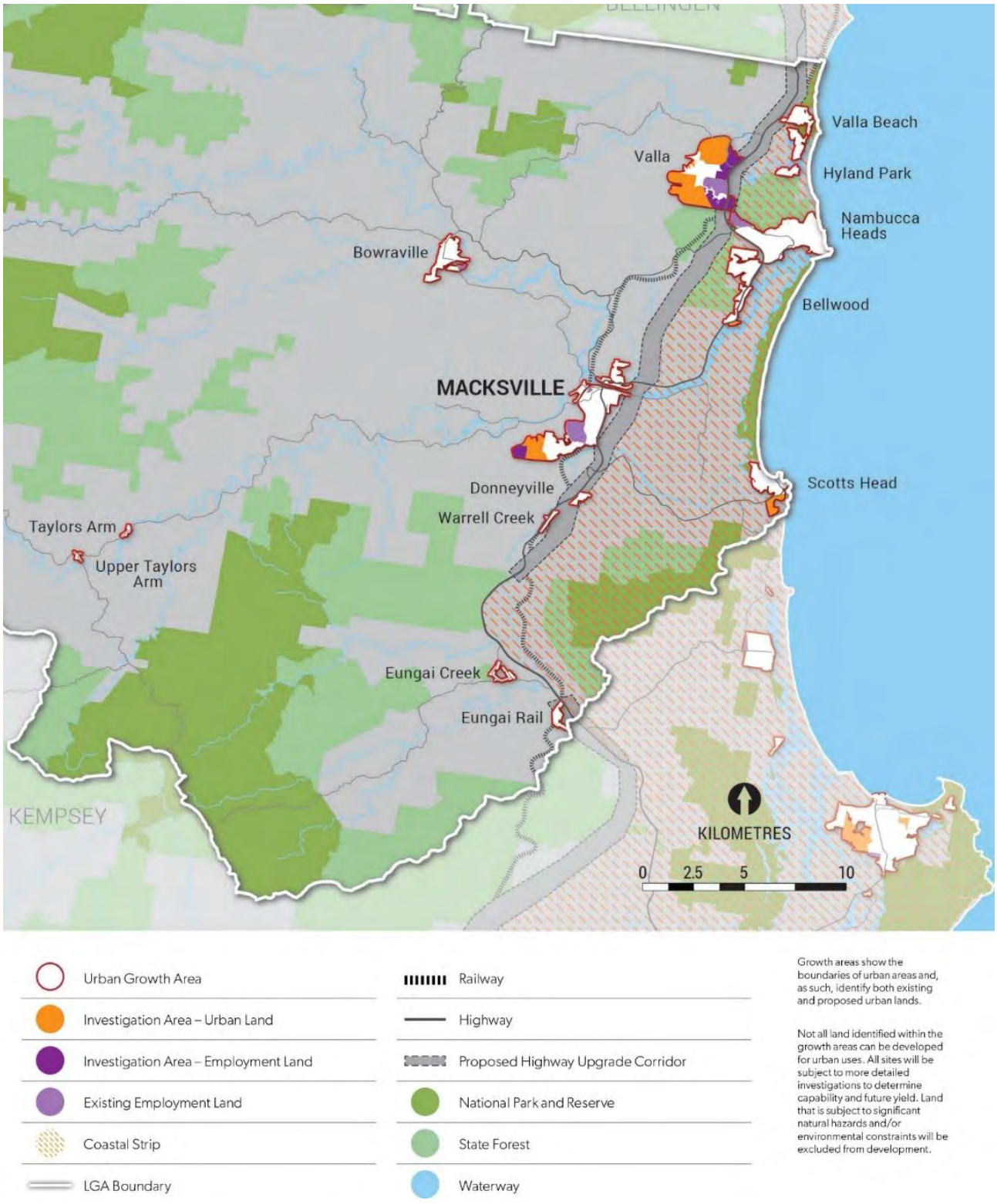


Figure 15: Urban growth area map for the Nambucca Local Government Area

Source: North Coast Regional Plan 2036 (DP&E, 2017)

4.9.2 Climate Change and Sea Level Rise

Threats from a changing climate and warming oceans are broad ranging, however, key threats to the study area have been identified including (BMT WBM, 2006; Umwelt, 2012; Climate Risk, 2010a; BMT WBM, 2017):

- Sea level rise resulting in:
    - Coastal inundation, primarily an increase in 'wet areas' in the Nambucca River estuary, i.e. low-lying areas along Wellington Drive, Bellwood Park and in the lee of the breakwall (i.e. the caravan park).
    - Increased tidal propagation into Nambucca River estuary resulting in changing tidal velocities, storm tide inundation, changed geomorphology (shoaling, bank stability and erosion) and migration of estuarine vegetation communities (saltmarsh in particular).
    - Increased salinity in the upper estuary reaches and subsequent impacts to vegetation communities and distribution of fauna species.
    - Aquifer salinity.
    - Increased coastal erosion and recession (refer Table 5 below).
- A shift towards dominant El Nino conditions and therefore a more southerly wave climate and enhanced longshore drift.
- Increased storminess from tropical cyclones and resultant effects e.g. stronger winds and larger storm surges and a greater flood risk.
- Increased ocean acidification.
- Climate and sea temperature rise resulting in physical, vegetation and wildlife disturbances.
- Inadequate zoning and planning for medium and long-term coastal risks.
- Barriers to migration of vegetation communities with sea level rise (particularly saltmarsh communities).
- Decreased winter runoff, increased average warming, extreme temperatures and changing rainfall leading to decline in potable water quantity and quality, reduced environmental flows, increased bushfire risk, degradation of riparian vegetation and expansion of invasive species.
- Impacts to urban and recreational assets and infrastructure from tidal inundation and extreme weather events (e.g. breaching of protection structures, inundation of estuary access infrastructure, roads, housing, stormwater mains, sewer mains, playgrounds etc.).
- Reduced tourism.
- Council liability associated with existing approvals and legal issues associated with current and future development.
- Potential impacts to future urban release areas including bushfire, flooding, tidal inundation, and isolation.

Table 5: Range of predicted overall recession and erosion for each area with sea level rise modelled on the 2009 NSW Sea Level Rise Policy levels

	Planning horizon	Scotts Head Beaches	Nambucca Heads Beaches	Valla Beach Beaches
Beach Recession (m)*	2050	23.3 – 28.7	34.2 – 38.7	40 – 42.9
	2100	52.5 – 64.6	77 - 87	90 – 96.5
Beach Erosion (m^3/m)	2050	140 - 316	136.8 – 328.9	128.7 – 440
	2100	315 - 711	307.9 - 740	289.5 - 990

* potentially conservative as the Bruun Rule used to calculate recession values does not take into account the presence of underlying rock strata within dune areas.
Source: SMEC (2009)

A detailed assessment of risk from coastal hazards for the 2050 and 2100 planning periods was undertaken for the coastal zone within the certified CZMP (Umwelt, 2012) including consideration of storm bite erosion, long term recession, coastal inundation, geotechnical instability, migration of creek and river entrances and stormwater discharges. The CZMP (Umwelt, 2012) also provided a suite of management actions in addressing risks from future coastal hazards. The status of these management actions is described in Appendix D.

Hazard zones have been established for immediate, 2050 and 2100 planning periods and a risk assessment undertaken on threats to assets, amenity areas, facilities, coastal protection and community infrastructure and private property. Potential risks to assets and infrastructure identified from future coastal erosion and recession hazards were documented in SMEC (2009). Potential risks to assets and infrastructure identified from future coastal erosion and recession hazards are also identified in SMEC (2009).

Mapping of coastal inundation risk for 2050 has not been undertaken, however 2100 mapping can be used as a conservative risk estimate for 2050 hazards.

The best available projections of global mean sea level (GMSL) rise have been obtained from the IPCC (2014) *AR5 Synthesis Report – Summary for Policy Makers*. This report provides projected GMSL rise for four scenarios for the mid- and late 1st century relative to the 1986-2005 period. The scenarios include representative concentration pathways (RCPs) as detailed in Table 6. The "business as usual" scenario of continuing current greenhouse gas emissions with limited reductions would be somewhere between RCP6.0 and RCP8.5. Conservatively, it is prudent to consider RCP8.5 when assessing risk from future tidal inundation. However, IPCC (2013) projections, as reiterated in the *NSW MEMA Threat and Risk Assessment Background Environmental Information Report* (DPI, 2018) provide that NSW mean model predictions suggest sea level rise of 0-10% above the global average. Table 6 presents the mean and upper end of the range of IPCC (2014) projections for each RCP scenario, amended to account for a possible increase of NSW mean sea level in comparison to GMSL. Table 6 indicates that for RCP8.5 (high inundation scenario), that by the mid-21st century (2046-2065), NSW mean sea level may rise by up to 0.42 m, and by up to 0.9 m by the end of the century (2081-2100) relative to the 1986-2005 period. These predictions are in keeping with those in the rescinded 2009 sea level rise policy, i.e. those currently used by NVC in coastal planning and risk assessments.

Table 6: Projected change in NSW mean sea level (MSL) rise under RCP8.5 for the mid- and late 21st century, relative to the 1986-2005 period

Scenarios		Increase in MSL in NSW (m)*			
		Mid-21st century (2046-2065)		Late 21st century (2046-2065)	
		Mean	Upper end of likely range	Mean	Upper end of likely range
RCP2.6	Stringent greenhouse gas (GHG) mitigation scenario to keep global warming likely below 2°C above pre-industrial temperatures	0.26	0.35	0.44	0.61
RCP4.5	Some GHG emission reductions, emissions decline around ~2040	0.29	0.36	0.52	0.69
RCP6.0	Moderate GHG emission reductions, emissions decline around ~2080	0.28	0.35	0.53	0.69
RCP8.5	A very high GHG scenario where emissions continue to rise throughout the 21st century	0.33	0.42	0.69	0.90

* amended to account for NSW mean sea level rise of up to 10% above the global mean sea level provided in IPCC (2014)
Source: IPCC (2014)

In a more extreme case, a recent technical report from the US National Oceanic and Atmospheric Administration (NOAA, 2017) supports a plausible global mean sea level rise in the range of 2 to 2.7 m by 2100. Climate change science is continually evolving and higher sea levels predictions in the future may occur.

Future Tidal Inundation

A preliminary tidal inundation assessment was undertaken for the purpose of this Scoping Study by visual consideration of the extent of tidal inundation for future scenarios, as provided by publicly available online interactive mapping software by Coastal Risk Australia (http://www.coastalrisk.com.au/). No specific analysis such as GIS mapping was undertaken, though the online mapping exercise was used to provide a basic, qualitative discussion of potential key risks to natural, cultural and asset values of the estuaries based on the application of a bathtub model. The model makes no allowance for dynamic boundary conditions such as constrictions of tidal ranges caused by entrance morphology, shoreline erosion due to sea level rise or oceanic events (barometric set up and changes in oceanic circulation, wave and wind driven forcing mechanisms, e.g. storm surge etc.) and no consideration of assessment of frequency is possible (i.e. persistent versus intermittent inundation). The first-pass risk assessment for tidal inundation was based on RCP8.5 as a conservative worst-case scenario (i.e. business as usual without additional efforts to constrain emissions), using the following formula:

> *Inundation = Sea Level Rise Scenarios (i.e. upper end of range of RCP8.5 for 2050 and 2100) + HAT + Water-Land (MSL-AHD) Offset.*

A visual assessment was undertaken using high greenhouse gas scenarios (IPCC (2014) RCP8.5) for sea level rise above a present day HAT of 1.22 m MSL which was obtained from MHL (2016) data for nearby Coffs Harbour for the recent (1994-2014) epoch. The resulting preliminary tidal inundation scenarios were manually input into the coastal Risk model as follows:

- Mid-century sea level rise of 0.42 m above HAT = 1.64 m MSL (conservatively rounded up to 1.7 m MSL).

- End of century sea level rise of 0.9 m above HAT = 2.12 m MSL (conservatively rounded up to 2.2 m MSL).

Each scenario was compared to locations of natural and built assets and infrastructure as well as proposed urban growth area maps (NSW Planning and Environment, 2019). The assessment identified that investigation areas for future urban or employment lands (i.e. a Valla, South west Macksville and Scotts Head) are unlikely to be at risk of tidal inundation from the 2050 and 2100 year sea level rise scenarios, however, the following major natural and built assets and infrastructure are likely to be at risk of tidal inundation:

- Significant areas of stormwater and sewerage infrastructure as well as local and regional link roads (including the Old Pacific Highway between Nambucca Heads and Macksville).
- Large areas of wetland and swamp vegetation on coastal floodplains (including islands in the mid and lower estuary such as Stuarts Island) and low-lying pastures.
- Commercial and residential private properties at Macksville, Nambucca Heads, Hyland Park (likely to affect backyards rather than dwellings) and rural areas.
- Significant areas of foreshore infrastructure such as at Gordon Park; Bellwood Park, Lions Park.
- Other infrastructure such as caravan parks; Nambucca Airport runway; sand mining and quarrying operations.

The risk of future tidal inundation to significant infrastructure and assets such as energy facilities, waste depots, sewerage and water treatment plants, public health infrastructure, evacuation centres is not known. However, it is likely that these facilities have been located above flood planning levels in the estuaries and are therefore unlikely to be heavily impacted by saline tidal intrusion. There appears to be limited risk of impacts from tidal inundation in the vicinity of the Bowraville water supply bores based on the 2100 scenario.

It is anticipated that sea level rise will result in the landward recession of fringing estuarine wetland systems in adapting to changed tidal range, sedimentation and salinity influences. However, there is a risk that natural upslope migration of these wetlands will be curtailed by anthropogenic constraints such as roads, rock walls, retaining walls, urban development (DECCW, 2009) and other land use constraints on the landward side. This loss of habitat area has been named “Coastal Squeeze” (DECCW, 2009) (refer Plate below).

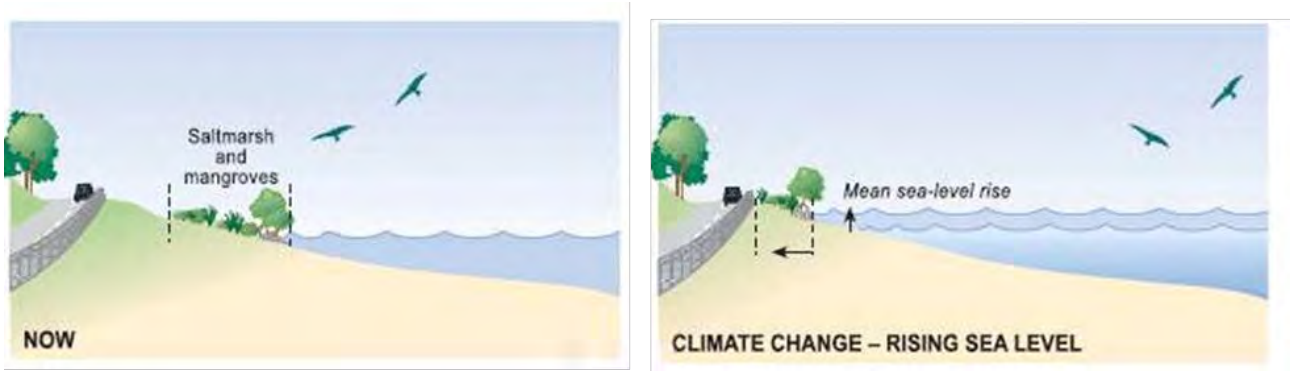


Plate 23: ‘Coastal squeeze’ under sea level rise: impact of development

Source: DECCW (2009)

Council has previously taken steps to protect and conserve high value estuarine macrophyte vegetation (wetlands, saltmarsh and mangroves) through amendment of the Nambucca LEP such that the majority of existing mapped areas of these vegetation communities are now zoned appropriately as either E1 (National Parks and Nature Reserves), E2 (Environmental Management), E3 (Environmental Conservation), W1 (Natural Waterways) or W2 (Recreational Waterways). Additional studies are required to identify potential

locations for migration of estuarine vegetation with sea level rise, possible anthropogenic barriers to migration, areas to prioritise for migration and suitable management actions such as making changes to planning instruments. This will ensure that upslope migration of key habitats can be accommodated within the long-term land use adjoining the estuary and/or landholder agreements in “buffer zones” around existing protected wetland areas.

Coastal inundation, i.e. overtopping or breaching of frontal dunes and lower estuary foreshores from oceanic waters (as opposed to tidal inundation or inundation from catchment floodwaters) is primarily a future risk in low lying areas within the lower Nambucca River estuary as in much of the study area, the dunes are high enough that inundation will not be a problem until the long-term (Umwelt, 2012; SMEC, 2009).

5. CURRENT COASTAL MANAGEMENT ARRANGEMENTS

5.1 Coastal Management Areas

The Coastal Management Areas (CMA) within the Nambucca Valley LGA have been mapped as part of the CM SEPP, and are presented in Figure 5. CM SEPP mapping is currently not available for the coastal vulnerability area. Mapping of coastal hazards and coastal inundation risk is available for areas where infrastructure is potentially at risk (Umwelt, 2012). A preliminary assessment of tidal inundation risk undertaken using the publicly available online interactive mapping software by Coastal Risk Australia (http://www.coastalrisk.com.au/) identified that whilst there are limited present day impacts of tidal inundation on built assets and infrastructure, several major natural and built assets and infrastructure are likely to be at risk from future tidal inundation in the future.

The Nambucca CMP will be developed for the coastal management areas shown in Figure 5 and will examine where current and future coastal hazards are expected to impact on the study area. The existing mapping for the coastal wetland and rainforest areas, coastal environment area and coastal use area are considered suitable for management of the coastline and the estuaries and no changes to existing CMA mapping are proposed by this CMP. There is currently insufficient information available on coastal hazards and tidal inundation risk to map the coastal vulnerability area and no such planning proposal is recommended at this stage. Consideration of whether coastal vulnerability areas should be mapped and included in the CM SEPP via a planning proposal is a component of the CMP process and further consideration will be given to this aspect during implementation of Stage 5 CMP actions.

5.2 Land Tenure

Land tenure within the study area is shown on Figure 16. Most of the Nambucca coastline and land immediately landward of the hind dune is in public ownership as National Park, Crown Reserve or Council community land. Land adjoining the estuaries is predominantly private with small areas of Crown land, with the exception of lower Warrell Creek. Within the wider catchments, the majority is private with significant areas of State Forest, encompassing approximately 22% of the broader Nambucca/Warrell/Taylors Arm catchment and National Park extending over a further 17%. Private land also dominates the Deep Creek catchment with National Parks and State Forests comprising 6% and 14% of the catchment, respectively. The remainder of land in both catchments constitutes a variety of Crown Land and road reserves.

Land management arrangements are detailed further below:

- Nature Reserves (managed by NPWS):
    - Jagun Nature Reserve comprises 100 ha of coastal land between Valla Beach and the entrance to Oyster Creek and is managed by DPIE - NPWS under the *National Parks and Wildlife Act 1974*. The reserve is bounded by MHWM on the eastern side and the bed of Oyster Creek on the north-western side. Part of the inlet to Oyster Creek also lies within the reserve.
    - Adjacent to the entrance to Deep Creek, Valla Nature Reserve contains 47 ha of diverse vegetation communities and is managed by DPIE - NPWS under the *National Parks and Wildlife Act 1974*.
- Crown Reserves:
    - Several coastal reserves combined to form the Crown Valla Beach reserves are located along the foreshore from the southern end of Jagun Nature Reserve to the northern shoreline at the entrance to Deep Creek. NVC manages these coastal reserves either as an appointed Crown land manager, or through devolvement of management responsibility to Council.

  - The coastal Crown reserve from Valla Beach southwards to Nambucca Heads and including Stuarts Island is managed by Council. These reserves typically have purposes for public recreation, access, or preservation of native flora. Under the *Crown Land Management Act 2016*, Council manages these reserves as community land under the *Local Government Act 1993*.

- National Park:
  - The Gaagal Wangaan National Park comprises the coastal land between the entrance to the Nambucca River and Scotts Head along South Beach, also known as Forster Beach, including the bed of the lower section of Warrell Creek. The land is owned by the Nambucca Heads and Unkya local Aboriginal land councils on behalf of the Gumbaynggir Aboriginal community and jointly managed by a board of management primarily comprised of the Aboriginal owners, and DPIE - NPWS (OEH, 2019). The National Park was created in 2010 as a resolution to land claims by the local Aboriginal people and is leased back to the NSW Government under the *National Parks and Wildlife Act 1974* (OEH, 2010).
- Indigenous Areas:
  - Native Title (NCD2014/001) by the Gumbaynggir People was declared over South Beach (also known as Forster Beach) and adjacent land to the east of Warrell Creek in 2014. This area has become part of the Gaagal Wanggaan (South Beach) National Park (refer Section 4.6.1).
  - Native Title (NC2016/003) by the Gumbaynggir People #3 was declared over the Gumma Peninsula and Islands in 2019. The claim area includes the Gumma Peninsula and including three islets in the lower Nambucca River estuary.
  - Indigenous Land Use Agreements (ILUAs) NI2018/044 and 2018/005 are also registered for land at the very northern end of the study area, the boundary located just to the south of the entrance to Oyster Creek, and extending northwards beyond the study area into the Coffs Harbour LGA.
  - Gumma Indigenous Protection Area (IPA) comprises much of Gumma Point along with three small islets in the lower Nambucca River estuary and is dedicated by its traditional owners, the Baga Baga and Ngambaa clan of the Gumbaynggirr people, for biodiversity conservation and cultural heritage protection and managed in line with international standards (DEE, 2011). The IPA is owned and managed by Nambucca Local Aboriginal Land Council (NHLALC, DEE, 2019) under an agreement with the Federal Government.
  - A property on the Inner Harbour (21 Riverside Drive) was recently identified as an Aboriginal burial site and is in the process of being transferred to Council to manage in partnership with the Gumbaynggirr people to preserve and manage the site's Aboriginal heritage and protect it for public access.

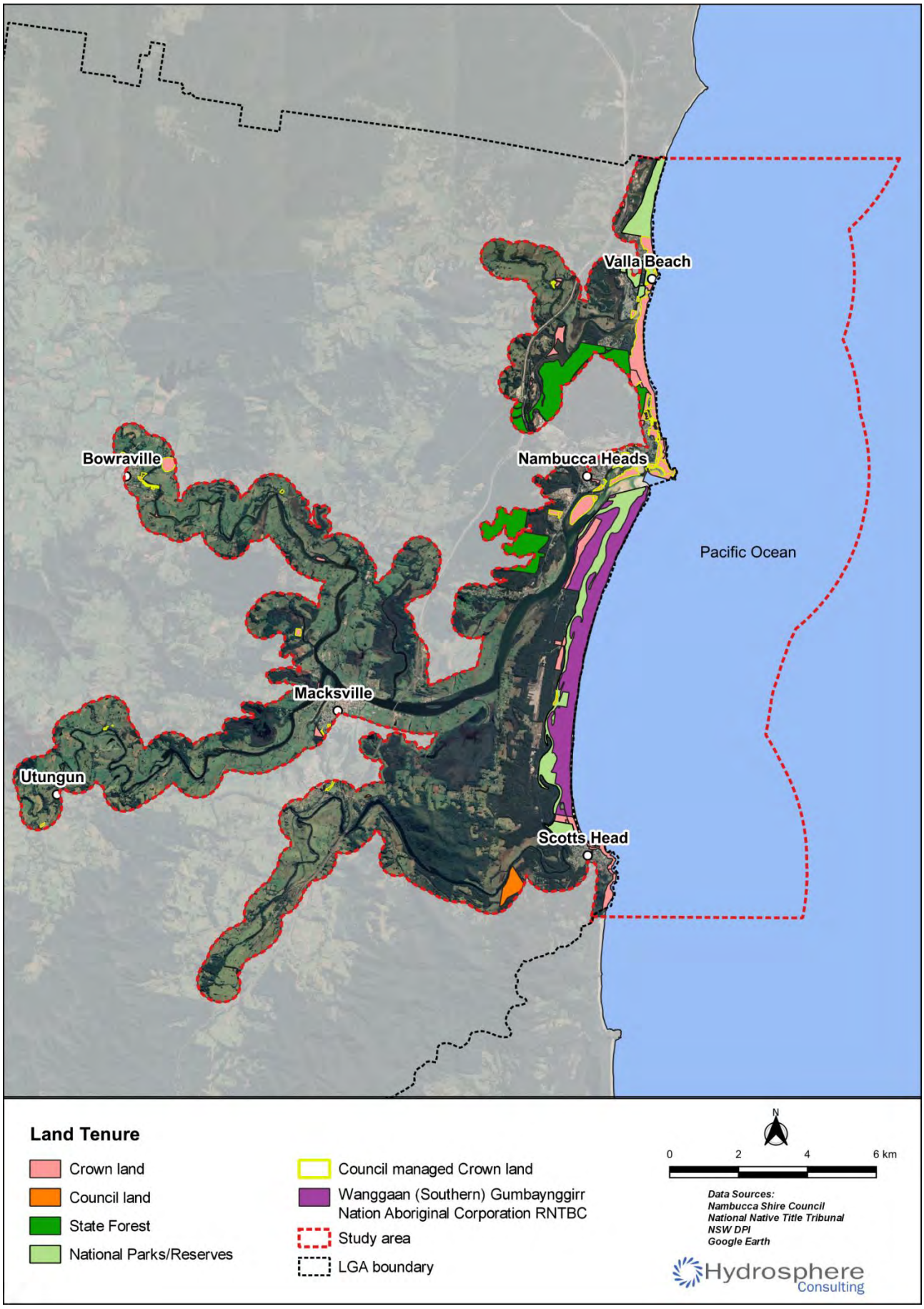


Figure 16: Existing catchment land management responsibility

5.3 Management Roles and Responsibilities

Many organisations, community groups, industry groups and government agencies have a role in the management of study area and the surrounding catchment, as follows:

- Gumbayniggir people – Native Title by the Gumbaynggir People exists over South Beach (also known as Forster Beach) and adjacent land to the east of Warrell Creek and the Gumma Peninsula and Islands in the lower Nambucca River estuary (refer Figure 16). The traditional owners of the study area are committed to the sustainable management of these areas.
- Nambucca LALC - a community body constituted through the *NSW Aboriginal Land Rights Act 1983*. The Nambucca LALC region extends from the northern boundary of the Nambucca LGA south to Macksville. The Nambucca LALC owns and manages Gumma Indigenous Protection Area (IPA) comprising much of Gumma Point along with three small islets in the lower Nambucca River estuary and is dedicated by its traditional owners, the Baga Baga and Ngambaa clan of the Gumbaynggirr people, for biodiversity conservation and cultural heritage protection and managed in line with international standards.
- Unkya LALC - a community body constituted through the *NSW Aboriginal Land Rights Act 1983*. The Unkya LALC region extends from Mackville, south to Scotts Head.
- Bowraville LALC - a community body constituted through the *NSW Aboriginal Land Rights Act 1983.* The Bowraville LALC region occupies the mid and upper Nambucca River catchment including the town of Bowraville.
- Nambucca Valley Council (NVC) - NVC has a central role in managing the coastline and estuaries and is responsible for for preparing the Nambucca CMP which sets out the long-term strategy for management of the coastal zone. They are also directly responsible for managing Council assets and infrastructure and land dedicated as Crown reserves under their jurisdiction (refer Figure 16).
- The Department of Planning, Industry and Environment – Environment, Energy and Science (DPIE – EES) works closely with local councils and communities to reduce threats from flood risk and coastal storms and ensures that people in NSW are well informed about these risks and better equipped to adapt to climate change. DPIE – EES also works with local councils and communities to maintain or improve the health of estuaries/ lakes and enhance the recreational experience. DPIE - EES has provided funding to Council for the development and preparation of this CMP.
- DPIE – Crown Lands - directly responsible for management of the submerged Crown land (e.g. bed of rivers, lakes and lagoons). The department is also responsible for managing Crown reserves within the study area. DPIE – Crown Lands appoints Crown land managers and ensures that Crown land is administered and managed in accordance with the *Crown Land Management Act 2016*. Any actions in the CMP that are located on or affect Crown land that is administered by DPIE - Crown Lands, will require authorisation under the *Crown Land Management Act 2016* (e.g. leases and licences) (refer Figure 16).
- NPWS - directly responsible for management of National Parks Estate under the *National Parks and Wildlife Act 1974* (refer Figure 16).
- The NSW Department of Primary Industries – Fisheries (DPI Fisheries) administers the *Fisheries Management Act 1994* (FM Act) and the *Marine Estate Management Act 2014* (MEM Act) and has jurisdiction over all fish (including oysters, crustaceans, polychaetes), and marine vegetation (saltmarsh, mangroves, seagrass and macroalgae) in State Waters including ‘water land’ below HAT in the estuaries and extending up to 3 nm offshore.

  Under the FM Act, DPI Fisheries:

  - Supports economic growth and sustainable access to aquatic resources through commercial and recreational fisheries management, research, aquaculture development, habitat protection and rehabilitation, regulation and compliance.
  - Mitigates and manages risks from use of land and water.

  Under the MEM Act, DPI Fisheries is responsible for:

  - Ensuring strategic and integrated management of the whole marine estate – our marine waters, coasts and estuaries.
  - Fisheries and aquaculture management, marine biodiversity, marine protected areas, biosecurity, marine estate research, fisheries compliance, marine estate communications and community engagement.

- The Marine Estate Management Authority (MEMA) advises the NSW Government on the management of the NSW marine estate under the *Marine Estate Management Act 2014* (refer Appendix A) and for:
  - Ensuring policies and programs address priority issues, are well coordinated, efficient, evidence based and result in positive outcomes.
  - Undertaking threat and risk assessments, developing management strategies, promoting collaboration between public authorities and fostering consultation with the community.
- DPI – Forestry leads policy, industry development, science and research for the State's $2.4 billion wood and product manufacturing industry. The NSW Forestry Industry Roadmap sets out the NSW Government's long-term vision for a sustainable forestry sector including actions around:
  - Modernising regulation and a targeted reform agenda.
  - Balancing supply and demand to increase business confidence.
  - Improving community acceptance and confidence.
  - Driving industry innovation and capitalising on new markets.
- Transport for NSW – Maritime (TfNSW – Maritime) is the key agency with statutory and policy responsibilities related to the safety and accessibility of New South Wales waterways for recreational and commercial vessels.
- The Maritime Infrastructure Delivery Office (MIDO) is a joint initiative between DPIE – Crown Lands and Transport for NSW. A number of relevant DPIE – Crown Lands' programs are currently managed through the MIDO including:
  - Coastal Infrastructure Program (i.e. management of the lower estuary v-wall, breakwall and training walls).
  - Rescuing our Waterways dredging program.
- North Coast Local Land Services (NCLLS) plays a key role in the management of catchment activities and natural resources relevant to estuary catchments and through the facilitation of relationships between landholders and key environmental organisations.
- Nambucca Valley Landcare (NVL) is a non-profit community organisation which encourages and supports sustainable natural resource management within the Nambucca River catchment. The organisation undertakes a range of projects with landholders, volunteer groups, and government agencies including river restoration, farm planning and bush regeneration.
- Scotts Head Dunecare - a non-profit community organisation undertaking dune rehabilitation, bank stabilisation and dune revegetation within the vicinity of Scotts Head.

- Valla Beach Bushcare - a non-profit community organisation undertaking dune rehabilitation, bank stabilisation and bushland revegetation within the vicinity of Valla Beach.
- Nambucca River Oyster Farmers – there are three areas in the Nambucca River between Macksville and Nambucca Heads classified by the NSW Food Authority for the harvesting of oysters.
- NSW Crown Holiday Parks – there are two holiday parks located on Crown land within the study area managed by Reflections (NSW Crown Holiday Parks) at Scotts Head and Nambucca Heads.
- Nambucca River, Creeks, Estuaries and Coastline Management Committee. The Committee is represented by key local stakeholder groups including government organisations, Councillors, the three LALCs and special environmental and interest groups. The committee ensures that the interests and views of these groups are understood; and provides advice to Council on coastal and estuary management.

5.4 Status of Previous Management Actions

The management actions recommended within all current plans for the study area are collated in Appendix D with the current status (as at 2018) of each action, where known. These management actions have been allocated an agency(s) and/or organisation(s) responsible for implementation and in some cases allocated a priority rating in regard to the importance of completing the action. Not all management actions have been completed since the adoption of each plan and the timing of preparation of the CZMP in 2012 means that medium term actions (implementation in 5-20 years) in the coastal zone are only now starting to be addressed. However, many actions from each plan have been implemented with targets met through either a combination of on-ground works or other programs undertaken by Council and other agencies.

A large proportion of management actions from the adopted plans, with the exception of the Mid-North Coast Regional Boating Plan, are yet to be implemented or are only partially implemented (ongoing or in progress), largely due to a lack of available funding and resources.

There are a number of constraints and limitations that have historically impeded the ability to plan and implement many coastline and estuary management actions in the many different CZMP / EMPs / entrance management plans and other management plans for specific areas. These management plans have traditionally adopted an aspirational approach, with each plan putting forward a long list of potential management actions. The Nambucca LGA has a relatively low population and hence a limited ratepayer base with which to fund the implementation of coastal management actions – and the funding provided for coastal management is typically weighed against the many other competing demands on Council as a service provider to its community. As a result, Council is generally limited by the funding and resources (such as staffing) available and is reliant on other sources of revenue such as state government grants and subsidies. Given the funding and resource constraints, this has resulted in the need to stringently prioritise and schedule coastal and estuary management actions across the LGA, with implementation typically undertaken on an ad hoc basis as funding becomes available. The current CMP process represents an opportunity to develop a more manageable suite of coastal management actions across the LGA with a focus on practical management actions that are rationalised and prioritised by a robust cost-benefit analysis. The CMP also represents an opportunity to improve the funding and resources available for estuary management through the NSW Coastal and Estuary Grants Program, Council's IP&R Framework and other available funding and grant programs.

6. SCOPE OF THE CMP

6.1 Issues and Threats

Current management issues and concerns, and potential opportunities have been determined from:

- Previous studies and management plans for the study area and the status of management actions (Appendix D).
- Regional priority risks identified through the *Threat and Risk Assessment (TARA) for the Marine Estate* (BMT WBM, 2017).
- Results of the community survey and submissions received during the community consultation period (Appendix B).
- Discussions with Council and DPIE - EES.

The issues and threats are presented in the first-pass risk assessment discussed in the following sections.

6.2 First-Pass Risk Assessment and Gap Analysis

Following the identification of the current threats and issues within the Nambucca CMP study area, a first-pass (or preliminary) risk assessment and gap analysis was completed to prioritise risks and identify those that needed to be further investigated in subsequent stages of the CMP.

The objectives of the first-pass risk assessment and information gap analysis are:

1. Identify potential management issues/ threats within the catchment and assess the risk to known values and assets.
2. Identify gaps in knowledge relating to each issue and assess the importance of addressing each knowledge gap to allow for effective future management.
3. Establish if the risk and gap in knowledge warrants further investigation or detailed assessment.

The risk assessment and gaps analysis were combined into one process to streamline the investigation and provide a mechanism to ascertain where gaps in knowledge will hinder successful future management of issues. Where immediate priority knowledge gaps exist, the results of this process will feed into Stage 2 to identify where additional information needs to be obtained, and to allow for appropriate management options/ actions for each issue to be highlighted in Stage 3. This streamlined methodology shortens the process for having a certified CMP in place with access to associated funding and therefore, quicker implementation of effective management for priority issues.

6.2.1 Methodology

The methodology adopted for the risk assessment is detailed in Appendix E. The risk assessment included the following components:

- Assessment of community uses and values incorporating information gathered during the community survey and other consultation activities.
- Identification of study area threats and stressors.
- Analysis of the level of risk presented by those threats

The process identifies credible risks, the likelihood of the risk event occurring, the consequences should the event occur, and applies a risk rating (Table 7). This has been completed in accordance with ISO 31000:2018 "*Risk management – Principles and guidelines, provides principles, framework and a process*

for managing risk" and employing methodology adapted and modified from the *NSW MEMA TARA* (BMT WBM, 2017). The full description of methodology and results is included in Appendix E.

For each of the identified threats, the following factors have been taken into account:

- How is the threat currently being managed? Have previous management plans addressed this threat?
- How effective are the current management measures, and what is the residual risk (as per the residual risk rating provided)?
- In the future, how is the risk level likely to change (i.e., over 20, 50 and 100 years)? Specifically, how will climate change, increasing development pressures, and population increase impact these risks?

Table 7: Qualitative risk estimation

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Minimal	Low	Moderate	High	High
Likely	Minimal	Low	Moderate	High	High
Possible	Minimal	Minimal	Low	Moderate	High
Unlikely	Minimal	Minimal	Minimal	Low	Moderate
Rare	Minimal	Minimal	Minimal	Minimal	Low

The gap analysis involved identification of knowledge gaps related to each issue, for each knowledge gap the following factors were taken into account:

- The assessment of the importance of resolving each knowledge gap to allow for effective future management of issue, using the scale outlined in Table 8.
- The allocation of a timeframe for resolution of knowledge gaps, i.e. immediate, short term (1-2 years), medium term (3-5 years) and long term (5-10 years and beyond).
- Recommendations for Stage 2 in regard to further in-depth assessments with an immediate priority for resolution. Knowledge gaps with a longer-term priority for resolution will be addressed through Stage 5 (CMP implementation).

Table 8: Importance of knowledge to effectively manage the coastal zone and estuaries

Importance	Description
Low	This knowledge is not required for management decisions/ actions/ planning – academic interest only.
Moderate	The knowledge would improve the effectiveness of management.
High	Management action required within the timeframe of this CMP cannot proceed effectively without this knowledge.
Unknown	Unknown importance of knowledge for management decisions/ actions/ planning.

6.2.2 Results

Threats to the Nambucca CMP study area and corresponding risk levels identified by the risk assessment are summarised Table 10 as current and future risk (20 year, 50 year and 100 yr). The threats were reviewed with respect to the coastal management area extents and their objectives. This review deemed the existing *CM SEPP* mapping to be suitable at present for addressing the high priority issues for the Nambucca

coastline and estuaries.

Threats were prioritised to assist in determining the importance of management action as part of subsequent stages of the CMP. High priority threats were identified as those presenting a high present-day risk to values and uses of the Nambucca coastline and estuaries (, grouped by issue category, in no particular order).

Table 9: High priority threats identified by the first-pass risk assessment

Issue	ID	High priority threats
Coastal hazards	T1	Coastal long-term shoreline recession
	T3	Increased risk of slope instability/ landslip
	T5	Tidal inundation
	T6	Disrepair of, or inadequate design of coastal protection structures and infrastructure
Estuarine bank erosion	T12	Flooding
	T15	Historic clearing of riparian vegetation and adjacent habitat
	T16	Uncontrolled stock access to and grazing within the riparian zone
Riparian vegetation and weed management	T19	Dominance of invasive weeds
	T16	Uncontrolled stock access to and grazing within the riparian zone
	T15	Historic clearing of riparian vegetation and adjacent habitat
Entrance management, shoaling and estuary hydraulics	T40	Siltation affecting navigation, water quality (reduced flushing) and aesthetics
	T41	Shoaling of marine sands affecting navigation and marine safety
	T44	Dangerous currents
Threats to biodiversity	T45	Removal, fragmentation and degradation of riparian and adjacent habitat
	T46	Removal of instream (e.g. dead wood) and reef habitat
	T47	Predation and invasion by introduced animals and exotic plants
	T49	Overgrazing by stock resulting in reduction in groundcover, enabling erosion and compaction of soil
	T55	Fire/ altered and inappropriate fire regimes/ frequent burning
Water Quality	T65	Agricultural diffuse source runoff (runoff from large areas of agricultural land with no specific point source)
	T66	Urban stormwater pollution and lack of maintenance of existing controls
	T67	Sewer surcharge and STP overflows

The results of gap analysis identified requirements for several further studies. Several knowledge gaps were identified, allocated a rank of importance (high, moderate, low) and a timeframe for resolution, i.e. immediate (Stage 2 study), short term (1-2 years), medium term (3-5 years) and long term (5-10 years and beyond) as detailed in Appendix E2, Table 20. Of these, only one high importance knowledge gap was considered of immediate priority for resolution, being a lack of comprehensive, up to date bank stability and riparian condition mapping. Resolving immediate priority knowledge gaps in Stage 2 (Section 8.1) allows for the identification of appropriate management options/actions that address identified issues. Where knowledge gaps are not allocated an immediate priority, addressing these gaps has been allocated as an action of the CMP in Stage 5.

Table 10: First-Pass Risk Assessment results for Nambucca coastline and estuaries

Issue category	ID	Threats (use, activity or stressor)	Current Risk	20-year Risk	50-year Risk	100-year Risk
Coastal hazards	T1	Storm surge and storm bite coastal erosion	Moderate	Moderate	High	High
	T2	Coastal long-term shoreline recession	High	High	High	High
	T3	Increased risk of slope instability/ landslip	High	High	High	High
	T4	Coastal inundation including wave propagation into estuaries	Moderate	Moderate	High	High
	T5	Tidal inundation	High	High	High	High
	T6	Disrepair of, or inadequate design of coastal protection structures and infrastructure	High	High	High	High
	T7	Stormwater erosion in the coastal zone	Moderate	Moderate	Moderate	High
Climate change impacts	T8	Increased storminess	Moderate	Moderate	High	High
	T9	Increased salinity in the upper estuary	Low	Moderate	High	High
	T10	Average warming and extreme temperatures	Low	Moderate	High	High
	T11	Anthropogenic barriers to migration of vegetation communities with sea level rise	Moderate	Moderate	High	High
Estuarine bank erosion	T12	Powered vessels and towing	Moderate	Moderate	Moderate	High
	T13	Wind waves	Moderate	Moderate	Moderate	High
	T14	Historic clearing of riparian vegetation and adjacent habitat	High	High	High	High
	T15	Uncontrolled stock access to and grazing within the riparian zone	High	High	High	High
	T16	Past gravel extraction contributing to ongoing poor geomorphic condition	Moderate	Moderate	Moderate	Moderate
	T17	Flooding	High	High	High	High
	T18	Accumulation of flood debris impacting bank stability	Moderate	Moderate	Moderate	High

Issue category	ID	Threats (use, activity or stressor)	Current Risk	20-year Risk	50-year Risk	100-year Risk
Riparian vegetation and weed management	T19	Dominance of invasive weeds	High	High	High	High
	T16	Uncontrolled stock access to the riparian zone	High	High	High	High
	T15	Historic clearing of riparian vegetation and adjacent habitat	High	High	High	High
	T20	Community concern about pesticide use (e.g. catchments and roadside weed spraying)	Low	Low	Low	Low
Public use and access	T21	Not enough public recreational access and facilities	Moderate	Moderate	Moderate	Moderate
	T22	Poor condition and inadequate foreshore access and parking during summer peak use	Low	Moderate	Moderate	High
	T23	No linkage of coastal pathways	Low	Low	Low	Low
	T24	Not enough mobility infrastructure	Low	Moderate	Moderate	Moderate
	T25	Insufficient maintenance of access infrastructure to minimise safety risks	Low	Moderate	Moderate	Moderate
	T26	Insufficient, or inappropriate public education and signage	Moderate	Moderate	Moderate	Moderate
	T27	Litter and marine debris	Moderate	Moderate	Moderate	High
	T28	Conflict of use between off-leash dogs (at both on-leash and off-leash areas)	Low	Low	Moderate	Moderate
	T29	4WD/ motorbikes on beaches (ambiguity of permitted areas; lack of enforcement)	Moderate	Moderate	Moderate	High
	T30	Illegal camping in coastal and foreshore areas	Moderate	Moderate	Moderate	High
	T31	Conflicts of use between cyclists and other users of footpaths and boardwalks	Low	Low	Moderate	Moderate
	T32	Use of recreational drones disturbing amenity and birdlife	Minimal	Minimal	Low	Moderate
	T33	Trampling and unfenced access to coastal vegetation	Low	Low	Moderate	Moderate
	T34	Public safety risks from faecal contamination of waterways	Moderate	Moderate	Moderate	High
	T35	Public safety risks from marine life (e.g. shark bite, stingers)	Moderate	Moderate	Moderate	Moderate
	T36	Lack of exclusion areas and regulatory restrictions (speed and usage controls)	Moderate	Moderate	High	High
	T37	Irresponsible usage (e.g. speeding) and lack of enforcement	Moderate	Moderate	High	High
	T38	Lack of understanding habitat sensitivities and locations; impacts to sensitive habitats	Moderate	Moderate	High	High
	T39	Marine noise pollution	Low	Low	Low	Low

Issue category	ID	Threats (use, activity or stressor)	Current Risk	20-year Risk	50-year Risk	100-year Risk
Entrance management, shoaling and estuary hydraulics	T40	Siltation affecting navigation, water quality (reduced flushing) and aesthetics	High	High	High	High
	T41	Shoaling of marine sands affecting navigation and marine safety	High	High	High	High
	T42	Artificial entrance management (risk of unintended impacts on water quality, salinity regimes, vegetation etc.)	Moderate	Moderate	Moderate	Moderate
	T43	Closure of ICOLLs (likely to decrease in frequency with SLR)	Moderate	Moderate	Low	Minimal
	T44	Dangerous currents	High	High	High	High
Threats to biodiversity	T45	Removal, fragmentation and degradation of riparian and adjacent habitat	High	High	High	High
	T46	Removal of instream (e.g. dead wood) and reef habitat	High	High	High	High
	T47	Predation and invasion by introduced animals and exotic plants	High	High	High	High
	T48	Soil disturbance through uncontrolled stock access/ erosion/ nutrient and pathogen introduction	High	High	High	High
	T49	Overgrazing by stock resulting in reduction in groundcover, enabling erosion and compaction of soil	High	High	High	High
	T50	Development including catchment, foreshore, reducing land for habitat	Moderate	High	High	High
	T51	Unrestricted pedestrian access in sensitive vegetation communities (e.g. dunes)	Moderate	Moderate	Moderate	Moderate
	T52	Pesticide spray drift	Low	Low	Low	Low
	T53	Dumping of rubbish and green waste	Moderate	Moderate	Moderate	Moderate
	T54	Illegal plant collection	Low	Low	Low	Low
	T55	Fire/ altered and inappropriate fire regimes/ frequent burning	High	High	High	High
	T56	Inconsistencies in planning framework	Low	Low	Low	Low
Recreational and commercial fishing and aquaculture	T57	Commercial ocean trawl and ocean haul	Moderate	Moderate	Moderate	Moderate
	T58	Commercial trap and line	Moderate	Moderate	Moderate	Moderate
	T59	Estuary general fishing	Moderate	Moderate	Moderate	Moderate
	T60	Estuary prawn trawl	Moderate	Moderate	Moderate	Moderate
	T61	Recreational boat and shore-based line and trap fishing	Moderate	Moderate	Moderate	Moderate
	T62	Recreational hand gathering	Low	Low	Low	Low

Issue category	ID	Threats (use, activity or stressor)	Current Risk	20-year Risk	50-year Risk	100-year Risk
	T63	Oyster aquaculture	Low	Low	Low	Low
	T64	Marine debris, including monofilament fishing line, bait bags and microplastics	Moderate	Moderate	Moderate	High
Water quality	T65	Agricultural diffuse source runoff (runoff from large areas of agricultural land with no specific point source)	High	High	High	High
	T66	Urban stormwater pollution and lack of maintenance of existing controls	High	High	High	High
	T67	Sewer surcharge and STP overflows	High	High	High	High
	T68	On-site wastewater management (e.g. failing septic systems)	Moderate	Moderate	Moderate	Moderate
	T69	Pet and wild fauna faeces	Low	Low	Low	Low
	T70	Logging on steep, highly erodible soils (i.e. of the Nambucca Beds)	Moderate	Moderate	Moderate	Moderate
	T71	Urban development	Moderate	Moderate	High	High
	T72	Construction industries	Moderate	Moderate	High	High
	T73	Other licensed industrial sources (e.g. sand and gravel extraction, quarries	Moderate	Moderate	High	High
	T74	Pesticide and fertilizer runoff	Moderate	Moderate	High	High
	T75	Poor geomorphic condition (i.e. bed instability)	Moderate	Moderate	Moderate	Moderate
	T76	Poor flushing of ICOLLs	Moderate	Moderate	Low	Minimal
Hydrology, connectivity and water extraction	T77	Water extraction, likely to increase with expansion of the horticultural industry	Moderate	High	High	High
	T78	Hydrological modifications of wetlands and floodplain drainage works	Moderate	Moderate	High	High
	T79	Floodgate design, operation and maintenance	Moderate	Moderate	High	High
Governance, education and compliance	T80	Insufficient governance	Moderate	Moderate	Moderate	Moderate
	T81	Lack of awareness, education and engagement	Low	Low	Low	Low
	T82	Compliance	Low	Low	Low	Low
Political risk	T83	Political risk (e.g. ad hoc release of state and federal funding associated with political cycles, ideological beliefs, and differing community priorities and expectations etc.)	Moderate	Moderate	Moderate	Moderate

7. PRELIMINARY BUSINESS CASE

This section details the preliminary business case for the preparation of each stage of the Nambucca Coastline and Estuary CMP.

Table 11 outlines the responsibility for completion, current status, and associated cost of each stage (along with information on any budget deficits). An additional amount of $14,720 (ex GST) will be required to complete the CMP. It is anticipated that the additional costs outlined below will be apportioned at a rate of 2:1 (DPIE – EES: NVC) as per the existing funding arrangements for CMP development. Low priority knowledge gaps have been allocated for resolution during Stage 5 (i.e. CMP actions) and have not been costed at this stage. This streamlined methodology shortens the process for having a certified CMP in place with access to associated funding and therefore, quicker implementation of effective management for priority issues.

Table 11: Funding requirements to complete Stages 2, 3 and 4 of the Nambucca CMP

Stage and Required Component	Responsibility for completion	Status	Cost Estimate (ex GST)		
			Cost	Current Budget	Budget Deficit
Stage 1 – Scoping Study	Project team with assistance from NVC	Complete	$23,660	$15,500	$8,160
Stage 2 – Bank condition and riparian assessment	Project team	In progress	$40,812	$40,812	-
Stage 2 - Document risks, vulnerabilities and opportunities	Project team	Not started			
Stage 3 - Identify and evaluate options	Project team	Not started	$4,000	$4,000	-
Stage 4 - Prepare, exhibit, finalise, certify and adopt the CMP	Project team with assistance from NVC	Not started	$18,060	$11,500	$6,560
Stage 5 – Implement, monitor, evaluate and report	NVC and other responsible and supporting agencies	Not started	To be determined during Stages 3 & 4		
Total			**$85,532**	**$71,812**	**$14,720**

The catchments, estuaries and foreshores of the study area provide a high level of ecosystem services (e.g. provision of food, carbon sequestration, habitat provision and aesthetic value etc.) integral to the region's continuing ecohealth and economic value. Continuing with the development of the CMP will assist with:

- Strengthening stakeholder relationships responsible for management in the coastal zone and the shared understanding of the values, risks and management priorities for each of those stakeholders.
- Obtaining funding for coastal management actions through the NSW Coastal and Estuary Grants Program.
- Protecting, conserving, promoting and sustainable integrated management of ecosystem services and other social, cultural, environmental and economic values of the study area, now and for future generations.

- Early capturing of opportunities to reduce and adapt to future risks and to reduce associated future financial costs (e.g. disaster management costs), particularly in a climate of emerging coastal, climatic and political risks.
- Limiting Council's liability under Section 733 of the *Local Government Act 1993* in respect of land in the coastal zone through acting in "good faith", i.e. by preparation of a CMP "substantially in accordance with the principles and mandatory requirements set out in the current coastal management manual under the *Coastal Management Act 2016*".

In continuing with the preparation and implementation of a CMP, Council should consider:

- Council's obligation to implement a certified CMP under the CM Act.
- The immediate financial cost of CMP preparation (though these are considered negligible in comparison to the future financial risk of not preparing a CMP) as discussed below.
- Competing needs for internal and external (stakeholder) resources (funding, staff and equipment etc.). These risks may add significant time or cost to the project. Early engagement with stakeholders required to collaborate on the CMP will ensure these risks are minimised.
- Community expectations regarding expected actions. Transparency in the CMP and community engagement process may help to minimise unrealistic expectations from the community.

In support of this preliminary business case, it is evident that the benefits of continuing with the development and implementation of this CMP significantly outweigh the alternative financial costs, and costs to coastal and estuary values.

8. FORWARD PLAN

8.1 Stage 2 – Determine Risks, Vulnerabilities and Opportunities

Through the first-pass risk assessment and the gap analysis (Appendix E), it was identified that a critical knowledge gap existed regarding understanding of the condition of estuarine banks and riparian vegetation. Resolving this knowledge gap is necessary for effective, and immediate and future management of the study area with improvements to bank condition likely to result in the single biggest improvement to the ecohealth of the riparian zone and waterways within the study area (refer Table 12).

Table 12: Recommended detailed studies and associated tasks to be completed during Stage 2

Issue	Knowledge gap	Study required and recommended tasks	Anticipated outcomes
Estuarine bank erosion	Lack of comprehensive, up to date bank stability and riparian condition mapping including for previous unmapped areas of Oyster Creek, Deep Creek and Swimming Creek.	Estuarine bank and riparian vegetation condition assessment - desktop assessment, field survey and mapping of bank condition (erosion and riparian vegetation) of navigable reaches of Nambucca River estuary (including Taylors Arm, Newee Creek and Warrell Creek), Swimming Creek and Deep Creek.	Detailed, comprehensive mapping and photography of current bank condition, current riparian vegetation condition and connectivity, causative factors and stressors, existing bank treatments, and priorities for management.

Low priority knowledge gaps have been allocated for resolution during Stage 5, i.e. during implementation of the CMP (refer Table 20). Some of these gaps (e.g. tidal inundation assessment) are proposed to be undertaken in the short-term following CMP certification but are not considered critical for implementation of immediate management such as bank condition rehabilitation works.

8.2 Stage 3 – Response Identification and Evaluation

Potential management options/actions will be developed to address the identified risks. This process will take into account all findings from Stage 1, Stage 2, stakeholder engagement activities and discussions with relevant agencies and land managers. It is envisaged that a large component of this Stage will involve combining and prioritising the remaining incomplete actions from existing management plans as detailed in Appendix D, along with the inclusion of actions for key issues and threats as identified during Stages 1 and 2.

The Nambucca River, Creeks, Estuaries and Coastline Management Committee may provide a platform for introducing potential management actions and formal consultation will take place with each agency with either a responsible or supporting role for each action.

8.3 Stage 4 – Finalise, Exhibit and Certify the CMP

Stage 4 will involve the preparation of the draft CMP document, review by Council and Government agencies, placement of the draft CMP on public exhibition and feedback from all stakeholders in the form of written submissions. All submissions will be reviewed, considered and if applicable, incorporated into the finalised version of the CMP. Council and DPIE- EES will then review and if satisfied approve the final CMP for implementation (Stage 5).

8.4 Stage 5 – Implementation, Monitoring and Reporting

The CMP will be implemented by Council, following approval, in accordance with Councils Integrated Planning and Reporting (IP&R) framework. This framework will guide the implementation of the CMP, ensure all required monitoring and reporting is completed and will provide a framework for the review and assessment of CMP outcomes.

8.5 Timeframe

The indicative timeframe for the completion of CMP stages is as follows:

- Stakeholder engagement strategy: implemented throughout the entire project.
- Stage 1 'Identify the scope of the CMP' (Scoping Study) – to be finalised and submitted to DPIE - EES by in September 2020.
- Stage 2 'Determine risk, vulnerabilities and opportunities' – to be finalised and submitted to DPIE - EES in October 2020.
- Stage 3 'Identify and evaluate options' - to be finalised and submitted to DPIE – EES in November 2020.
- Stage 4 'Prepare, exhibit, finalise, certify and adopt the CMP' - to be finalised, council approved and submitted to DPIE - EES by March 2021.
- Stage 5 'Implementation, monitoring and reporting' – to be implemented following Council's approval of the CMP.

REFERENCES AND FURTHER READING

ABS (2020) *Census data 2016*. https://www.abs.gov.au/websitedbs/D3310114.nsf/Home/2016%20QuickStats, accessed September 2020.

Aquatic Science and Management (2019) *Gumma Creek and Wetlands Water Quality and Level Monitoring. Annual Report – 2018 – draft*. Report prepared for Nambucca Shire Council.

Australian Bureau of Statistics (2017) *Nambucca LGA*. http://stat.abs.gov.au/itt/r.jsp?RegionSummary&region=15700&geoconcept=REGION&dataset=ABS_REGIONAL_LGA&datasetLGA=ABS_REGIONAL_LGA&datasetASGS=ABS_REGIONAL_ASGS&regionLGA=REGION&regionASGS=REGION. Accessed: 21/09/2018

BMT WBM (2006) *Nambucca River Estuary Management Study - Final Report*. Prepared for Nambucca Shire Council, October 2006.

BMT WBM (2008) *Nambucca River Estuary Management Plan - Final Report*. Prepared for Nambucca Shire Council, April 2008.

BMT WBM (2017) *NSW Marine Estate Threat and Risk Assessment Report*. Prepared for the NSW Marine Estate Management Authority. Available at: file:///C:/Users/orla/Desktop/NSW-Marine-Estate-Threat-and-Risk-Assessment-Final-Report.pdf. Accessed 12/12/18.

Clair Ellise Consulting (2018) *Nambucca Shire Strategic Tourism Plan 2018 – 2023: Discussion Paper – Draft Jan 2018.* Available at: https://claireellisconsulting.com.au/wp-content/uploads/2018/02/Nambucca-Shire-background-research-discussion-paper-Jan-18-.pdf. Accessed 20/8/18.

Claire Ellis and Wray (2018) *Nambucca Shire Strategic Tourism Plan 2018 – 2023* – Final Draft May 2018.

Climate Risk (2010a) *A Climate Risk Adaptation Strategy for Nambucca Bellingen and Kempsey*.

Climate Risk (2010b) *Climate Change Risk Assessment: Nambucca Shire Council*.

CoastAdapt (2017a) *Macleay NSW01.02.05*, CoastAdapt, viewed 28/7/2020, < https://coastadapt.com.au/sites/default/files/docs/sediment_compartments/NSW01.02.05.pdf.

CoastAdapt (2017b) *Urunga NSW01.02.04*, CoastAdapt, viewed 28/7/2020, < https://coastadapt.com.au/sites/default/files/docs/sediment_compartments/NSW01.02.04.pdf.

Coastal Risk Australia (2019). Tidal inundation model mapping. Available at: https://coastalrisk.com.au/viewer. Accessed November 2019.

Conrad, S.R., Sanders C.J., Santos, I. R., White S.A. (2018) *Investigating water quality in Coffs coastal estuaries and the relationship to adjacent land use. Part 1: Sediments*. National Marine Science Centre, Southern Cross University, Coffs Harbour, NSW. 42 pp. Available at: https://www.coffsharbour.nsw.gov.au/environment/Compliance-and-Reporting/Documents/Part1_Sediments%20Hearnes%20Lake_EL%20report.pdf Accessed 8/10/18.

Creese, R.G., Glasby, T.M., West, G., and Gallen, C. (2009) *Mapping the habitats of NSW estuaries*. Industry & Investment NSW Fisheries Final Report Series 113. Port Stephens, NSW, Australia. ISSN 1837-2112.

Davis, M. (a) "*Blockage causes raw sewage to overflow into Nambucca River*." Nambucca Guardian 1 Nov 2018: Available online at: https://www.nambuccaguardian.com.au/story/5734128/oh-crap-raw-sewage-leaks-into-nambucca-river/. Accessed 12/11/18.

Davis, M. (b) "*Glyphosate debate comes to Nambucca over Council's roadside weed spraying activities*." Nambucca Guardian 9Nov 2018: Available online at: https://www.nambuccaguardian.com.au/story/5746099/glyphosate-debate-comes-to-nambucca/. Accessed 12/11/18.

DECCW (2009) *NSW Sea Level Rise Policy Statement*.

DECC NPWS (2008) *Valla and Jagun Nature Reserves Plan of Management*.

DEE (2011) *Media Reese – Gumma – A coastal sanctuary on the NSW North Coast*. https://www.environment.gov.au/system/files/pages/1df99040-10b3-44db-b164-1f75fe50b161/files/mr25nov11.pdf. Accessed 29/4/19.

DEE (2019) *Gumma Indigenous Protected Area*. https://www.environment.gov.au/indigenous/ipa/declared/gumma.html. Accessed 29/4/19.

Dela-Cruz J, Pik A. & Wearne P. (2017*) Risk-based framework for considering waterway health outcomes in strategic land-use planning decisions*, Office of Environment and Heritage and Environment Protection Authority, Sydney. Available at: https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Water/Water-quality/risk-based-framework-waterway-health-strategic-land-use-planning-170205.pdf. Accessed 8/1/19.

Destination NSW (2016) *Travel to Mid North Coast sub region*. http://www.destinationnsw.com.au/wp-content/uploads/2016/07/Mid-North-Coast-sub-region-YE-Mar-16.pdf?x15361. Accessed: 21/09/2018

DLWC (2000) *Deep Creek Entrance Dynamics Valla Beach, NSW*. Draft Report. Specialist Coast and Flood Services, NSW Department of Land and Water Conservation.

Doyle, C. (2003) *Fluvial geomorphology of the Nambucca river catchment: late quaternary change, post-settlement channel degradation and proposals for rehabilitation*. Doctor of Philosophy thesis, School of Geosciences, University of Wollongong, 2003.

DPI (2016) *NSW Oyster Industry Sustainable Aquaculture Strategy Third Edition 2016*. Available at: https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/638250/NSW-oyster-industry-sustainable-aquaculture-strategy-2016.pdf. Accessed 26/2/19.

DPI (2017) *NSW Marine Estate Threat and Risk Assessment – background environmental information*. Available at: https://www.marine.nsw.gov.au/__data/assets/pdf_file/0006/672198/NSW-Marine-Estate-Threat-and-Risk-Assessment-background-environmental-information-TARA-report.PDF. Accessed 14/11/18.

DP I&E (2020). Local government narratives and urban growth areas maps, Nambucca. Available at: https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/North-Coast/North-Coast-Regional-Plan/Local-government-narratives-and-urban-growth-area-maps. Accessed Aug 2020.

DPI Fisheries (2018a) *Estuary General Fishing Enclosures – Nambucca River* and *Warrell Creek*. Available at: https://www.dpi.nsw.gov.au/fishing/closures/commercial/estuary-general-fishery-closures/nambucca-river and https://www.dpi.nsw.gov.au/fishing/closures/location-closures/deep-creek. Accessed 22/8/18.

DPI Fisheries (2018b) *Solitary Island Marine Park*. Available at: https://www.dpi.nsw.gov.au/fishing/marine-protected-areas/marine-parks/solitary-islands-marine-park. Accessed 22/8/18.

DPI Fisheries (2019) *Management of coastal lakes and lagoons in NSW*. Available at: https://www.dpi.nsw.gov.au/fishing/habitat/aquatic-habitats/wetland/coastal-wetlands/management-of-coastal-lakes-and-lagoons-in-nsw. Accessed 6/5/19.

DPI Water (2016) *Water Sharing Plan for the Nambucca Unregulated and Alluvial Water Sources – Background document*. Available at: https://www.industry.nsw.gov.au/__data/assets/pdf_file/0008/166868/nambucca-unreg-alluvial-background.pdf. Accessed 12/02/19.

DPIE (2017) *NSW Landuse 2017* (GIS dataset). Available at: https://data.gov.au/dataset/ds-nsw-de27e381-9595-4562-9347-b00e71d4c3bd/details?q=. Accessed January 2020.

DPIE (2020). Estuaries of NSW. Available at: https://www.environment.nsw.gov.au/topics/water/estuaries/estuaries-of-nsw. Accessed August 2020.

Eddie, M. W. (2018) *Land and Soil Hazards on the Nambucca Beds, Northeast NSW*. Commissioned by the North Coast Environment Council (NCEC).

EPA (2018) *Protection of the Environment Operations Act (POEO) public register*. Available at: https://www.epa.nsw.gov.au/licensing-and-regulation/public-registers. Accessed 28/8/18.

Forestry Corporation of NSW (2016) *Forest Management Plan for the Coastal Forests of NSW*

Gadd, R. (2000) *Baseline Studies for the Development of an Entrance Management Plan for Deep Creek* (Bachelor of Applied Science (Honours) – Major Thesis). Southern Cross University, Lismore, NSW.

GECO Environmental (2005) *Estuarine Geomorphology, Physical Condition and Mapping*. Unpublished report prepared for NSW as part of the Nambucca River Estuary Management Study.

GECO Environmental and Aquatic Services and Management (2009*) Lower Nambucca River Estuary Water Quality Study*. Prepared for the NSW Environmental Trust and Nambucca Valley Landcare.

GHD (2016) *Shoaling Investigation and Dredging Strategy Nambucca River Lower Estuary*. Prepared for Nambucca Shire Council.

Gray, D and N Chrysanthos (2019) "Cancer Council urges caution as spotlight sharpens on weedkiller Roundup", *The Sydney Morning Herald, 22 March 2019*. Available at: https://www.smh.com.au/business/companies/cancer-council-urges-caution-as-spotlight-sharpens-on-weedkiller-roundup-20190322-p516px.html. Accessed 7 May 2019. IPCC 2013. Summary for policymakers. In: Climate change 2013: the physical science basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

IPCC (2014) *Climate Change 2014 Synthesis Report Summary for Policymakers*. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf. Accessed 13/2/19.

Integrated Site Design (2014) *Plan of Management for Reserve 65963 for Public Recreation, Resting Place and Communication Facilities at Scotts Head*. Prepared for NSW Crown Holiday Parks Trust and NSW Trade and Investment (Crown Lands).

Johnston, E. L., Mayer-Pinto, M., Hutchings, P. A., Marizinelli, E. M., Ahyong, S. T., Birch, G., Booth, D. J., Creese, R. G., Doblin, M. A., Figueira, W., Gribben, P. E., Protchard, T., Roughan, M., Steinberg, P. D., and L. H. Hedge (2015) Sydney Harbour: what we do and do not know about a highly diverse estuary. *Marine and Freshwater Research* 2015, Vol 66: 1073 – 1087.

Letcher, R., Birch, M. Ticehurst, J., Merritt, W. (2007) *Deep Creek Sustainability Assessment Report*. iCAM Client Report 2007/04, The Australian National University, Canberra, ACT.

LPMA and NSC (2009) *Valla Beach Coastal Reserves (R90906, R82967, R88941) Draft Plan of Management*. Prepared for Valla Beach Coastal Reserves Trust.

March, S (2018) "Cancer Council calls for Australian review amid Roundup cancer concerns", *ABC News, 8 October 2018*. Available at: https://www.abc.net.au/news/2018-10-08/cancer-council-calls-for-review-amid-roundup-cancer-concerns/10337806. Accessed 7/5/19.

Markell, H. (2016) 'National Parks warn of growing threats to endangered shorebirds on NSW North Coast". *ABC Coffs Coast*, *27 October 2016*. Available at: https://www.abc.net.au/news/2016-10-27/nsw-north-coast-threats-endangered-shorebirds/7970216.

McIntyre-Tamwoy, S. (2003) *Nambucca Shire Council Aboriginal Cultural Heritage Management Plan*.

McPherson, A., Hazelwood, M., Moore, D., Owen, K., Nichol, S. (2015) *Australian Coastal Sediment Compartments*. Geoscience Australia, Canberra. Available at: http://dx.doi.org/10.4225/25/56171AF00B6C5, accessed August 2020.

Mika, S., Vincent, B., Ryder, D., Lewis, S., Baker, A., and Schmidt, J (2018) *Nambucca Ecohealth Project 2016-2017: Assessment of River and Estuarine Condition*. Final Technical Report. University of New England, Armidale.

MEMA (2018) *Marine Estate Management Strategy 2018-2028*. Available at: https://www.marine.nsw.gov.au/__data/assets/pdf_file/0007/815596/Marine-Estate-Management-Strategy-2018-2028.pdf. Accessed 26/2/19.

MHL (2002) *DLWC Deep Creek Tidal Data Collection April – June 2002*. MHL Report No. 1182.

MHL (2016) *NSW Ocean and river entrance tidal levels annual summary 2015-2016*. Report MHL2475. Prepared for NSW Office of Environment and Heritage. Available at: https://www.mhl.nsw.gov.au/docs/oeh/2016/MHL2475ocean%20tides%20annual%20summary%2015-16%20final%20011116.pdf. Accessed 13/2/19.

MHL (2020) *Coffs Harbour Offshore Wave, Height, Period and Direction: Storm History Table*. Manly Hydraulics Laboratory.

Nambucca Heads Bellwood Park Reserve Trust (2003) *Bellwood Park Reserve Plan of Management*.

Nambucca River Oyster Farmers (2014) *Nambucca River Oyster Farmers: Environmental Management System*. Available at: http://www.oceanwatch.org.au/wp-content/uploads/2016/08/Final-Nambucca-EMS.pdf. Accessed 21/8/18.

Nambucca Tourism (2018) *Discover more in the Nambucca Valley*. Available at: https://www.nambuccatourism.com.au/cp_themes/default/home.asp#. Accessed 22/8/18.

Nambucca Valley Landcare. (2013) *Nambucca Valley Bore Field River Plan*.

Nambucca Valley Landcare (2014) *Missabotti Creek Reach Plan* V2.

Nambucca Valley Landcare (2016) *Nambucca River Function and Water Protection. Part A North Arm Reach Plan*.

NCCARF (2016) *Datasets Guidance 1: Shoreline Explorer. Present-day coastal sensitivity to flooding and erosion*. CoastAdapt, National Climate Change Adaptation Research Facility, Gold Coast. Available at: https://coastadapt.com.au/sites/default/files/factsheets/Datasets_guidance_1_present.pdf#sedimentcomps. Accessed 28/7/2020.

NCCARF (2020) *NCCARF sediment compartment builder*, NCCARF, viewed 28/7/2020, <https://nccarf.carto.com/tables/sediment_compartments_v3/public>.

Newcastle Innovation (2009) *Water Quality Within Newee Creek and its Catchment (Phase 2).* Draft Report 2 prepared for Nambucca Shire Council.

NOAA (2017) *Global and regional sea level rise scenarios for the United States*. NOAA Technical Report NOS CO-OPS 083. Available at: https://tidesandcurrents.noaa.gov/publications/techrpt83_Global_and_Regional_SLR_Scenarios_for_the_US_final.pdf?clicksource=inartcilelink. Accessed 12/12/19.

NSW Office of Water (2012*) River Styles Spatial Layer for New South Wales. Bioregional Assessment Source Dataset*

North Coast Regional SOE Working Group (2016) *Regional State of the Environment Report 2016 for the North Coast Region of New South Wales*.

NSC (2001) *Deep Creek Entrance Management Data Compilation Study*.

NSC (2012) *Natural Areas Bushland Part Lot 40 DP 711098 Old Coast Road Plan of Management*.

NSC (2013a) *Deep Creek Entrance Management Policy*.

NSC (2013b) *Plan of Management – Natural Area – Foreshore – Northern River Foreshore Macksville (Part Lot 160/161 DP 187473)* (known locally as Lions Park – Ferry Street Macksville).

NSC *(2015) Gumma Gumma Wetland Restoration Plan*.

NSC (2016a) *Integrated Water Cycle Management Draft Strategy Report*.

NSC (2016b) *Plan of Management for Gordon Park Recreational Area – Playing Fields, Wellington Drive, Nambucca Heads* (Lots 7009 and 7010 DP 1054529, Lot 701 DP 1055530, Lot 2 DP 721291 and Lot 4 DP 721291).

NSC (2016c) *State of Environment 2016 Summary*. Nambucca Shire Council.

NSC (2017) *Nambucca Shire Council Annual Report 2016 – 2017*.

NVC (2020) *Local Strategic Planning Statement* Nambucca Shire Council.

NSW Government (2018) *Nambucca Regional Economic Development Strategy 2018-2022*

NSW Planning and Environment (2019*) Local government narratives and urban growth area maps: Nambucca*. Available at: https://www.planning.nsw.gov.au/Plans-for-your-area/Regional-Plans/North-Coast/North-Coast-Regional-Plan/Local-government-narratives-and-urban-growth-area-maps. Accessed 19/03/19.

OEH (2010) Gaagal Wanggaan National Park Aboriginal Ownership and Leaseback Agreement. Available at: https://www.environment.nsw.gov.au/research-and-publications/publications-search/gaagal-wanggaan-south-beach-national-park-aboriginal-ownership-and-leaseback-agreement. Accessed 13/2/19.

OEH (2013) *Assessing estuary ecosystem health: sampling, data analysis and reporting protocols*. NSW Natural Resources Monitoring, Evaluation and Reporting Program, Sydney, Australia.

OEH (2018a) *Gaagal Wanggaan (South Beach) National Park joint management program*. Available at: https://www.nationalparks.nsw.gov.au/conservation-programs/gaagal-wanggaan-south-beach-national-park-joint-management-program. Accessed 8/8/18.

OEH (2018b) *Our Future on the coast. NSW Coastal Management Manual Part A: Introduction and mandatory requirements for a coastal management program. NSW* Office of Environment and Heritage.

OEH (2018c) *Our Future on the coast. NSW Coastal Management Manual Part B: Stage 1 – Identify the scope of a coastal management program*. NSW Office of Environment and Heritage.

OEH (2018d) *Our Future on the coast. NSW Coastal Management Manual Part B: Stage 2 – Determine risks, vulnerabilities and opportunities.* NSW Office of Environment and Heritage.

OEH (2018e) *Estuaries of NSW*. Available at: https://www.environment.nsw.gov.au/topics/water/estuaries/estuaries-of-nsw. Accessed 21/8/18.

OEH (2019) *Gaagal Wanggaan (South Beach) National Park joint management program*. https://www.nationalparks.nsw.gov.au/conservation-programs/gaagal-wanggaan-south-beach-national-park-joint-management-program. Accessed 29/4/19.

Planning and Environment (2017) *2016 New South Wales State and Local Government Area Population and Household Projections, and Implied Dwelling Requirements.* http://www.planning.nsw.gov.au/research-and-demography/demography/population-projections. Accessed: 21/09/2018

Redman, M. B. and Greenway, M. (1995) *Swimming Creek Estuary Plan of Management*.

RDM, Hunter, K., Smyth, G., Bennet, F., Harrison, A., Amos, J., Eco-Logical, Appleton, J. (2010) *Nambucca Master Plan and Compendium*. Prepared for Nambucca Shire Council.

RMS (2009) *Boating maps: Nambucca River, Warrell and Deep Creek Areas*. Available at: http://www.rms.nsw.gov.au/documents/maritime/usingwaterways/maps/boating-maps/4a-nambucca-warrell-deep.pdf. Accessed 22/8/18.

Rogers, K., Saintilan, N., and Copeland, C. (2014) Managed retreat of saline coastal wetlands: Challenges and opportunities identified from the Hunter River Estuary, Australia. *Estuaries and Coasts* 37 (1): 67-78.

Rutherfurd I.D, J. K. (2000) *A Rehabilitation Manual for Australian Streams Vol 1*. Cooperative Research Centre for Catchment Hydrology, Monash University.

Saintilan, N., Wilson, N. C., Rogers, K., Rajkaran, A., and Krauss, K. W. (2014) Mangrove expansion and salt marsh decline at mangrove poleward limits. *Global Change Biology* 20(1), 147–157.

Schulenberg, U. (2019a) "Nambucca River fish stocks depleted", *Guardian News, 25 February*. Available at: https://www.nambuccaguardian.com.au/story/5833533/nambucca-river-fishers-raise-alarm-about-fish-stocks/. Accessed 15/5/19.

Schulenberg, U. (2019b) "No fish to catch in Nambucca River", *Guardian News, 25 February*. Available at: https://www.nambuccaguardian.com.au/story/5917824/lack-of-fish-is-bleeding-shires-economy-dry/. Accessed 15/5/19.

SKM, (2011) *Nambucca Heads Flood Study*. Prepared by SKM for Nambucca Shire Council.

Slezak, M. (2016) "Massive mangrove die-off on Gulf of Carpentaria worst in the world, says expert", *The Guardian, 11 July 2016*. Available at: https://www.theguardian.com/environment/2016/jul/11/massive-mangrove-die-off-on-gulf-of-carpentaria-worst-in-the-world-says-expert. Accessed 26/6/19.

SMEC (2009) *Nambucca Shire Coastal Hazard Study*. Prepared on behalf of the Nambucca Shire Council.

SMEC (2011) *Coastal Process and Hazard Definition Study – Coastal Slope Instability Hazard Study*. Prepared on behalf of the Nambucca Shire Council.

Telfer, D and Birch, M (2009) *Lower Nambucca River Estuary Water Quality Study*. Prepared for NSW Environmental Trust and Nambucca Valley Landcare

Telfer, D. and Birch, M. (2014) *Gumma Swamp Event Water Quality Monitoring Study*. Prepared by GECO Environmental and Aquatic Science and Management.

Thom, B. G., Eliot, I., Eliot, M., Harvey, N., Rissik, D., Sharples, C., Short, A. D. and Woodroffe, C. D. (2018) National sediment compartment framework for Australian coastal management. *Ocean and Coastal Management* 154(2018): 103 – 120.

TRA (2017) *Tourism Forecast 2017*. Available at: https://www.tra.gov.au/Archive-TRA-Old-site/Tourism-forecasts/tourism-forecasts-2017. Accessed 28/8/17.

Transport for NSW (2015) *Regional Boating Plan: Mid-North Coast Region*. Available at: http://maritimemanagement.transport.nsw.gov.au/documents/mid-north-coast-reg-boating-plan.pdf. Accessed 22/8/18.

Umwelt (2012). *Coastal Zone Management Plan for the Nambucca Shire Coastline.* Prepared on behalf of the Nambucca Shire Council.

West, L. D., Stark, K. E., Murphy, J. J., Lyle, J. M. and F. A. Ochwada-Doyle (2015) *Survey of recreational fishing in New South Wales and the ACT, 2013/14*. Fisheries final report series No. 149.

WetlandCare Australia (undated) *Gumma Swamp Wetland Restoration Plan*. Prepared for Nambucca Shire Council.

White, S.A., Santos, I. R. (2018) *Water Quality on Bucca Bucca Creek and the potential impacts of intensive plant agriculture*. National Marine Science Centre, Southern Cross University, Coffs Harbour, NSW. 50pp.

Available at: https://www.surg.org.au/sites/surg.org.au/files/attached_media/Water_Quality_on_Bucca_Bucca_Creek_and_the_potential_impacts_of_intensive_plant_agriculture.pdf. Accessed 8/10/18.

White, S.A., Santos, I. R., Conrad, S.R., Sanders C.J. (2018) *Investigating water quality in Coffs coastal estuaries and the relationship to adjacent land use. Part 2: Water Quality*. National Marine Science Centre, Southern Cross University, Coffs Harbour, NSW. 39 pp. Available at: https://www.coffsharbour.nsw.gov.au/environment/Compliance-and-Reporting/Documents/Part%202_Water%20Hearnes%20Lake_EL%20Report.pdf. Accessed 8/10/18.

Wilk, P. and Ireland, G. (2008) *Soil and Water Management Practices for Blueberry growers in Northern NSW*. NSW DPI. Available at: https://www.dpi.nsw.gov.au/__data/assets/pdf_file/0009/197190/blueberry-soil-water-management-northern-nsw.pdf. Accessed 8/10/18.

Williams, R. J., Watford, F. A., and Taylor, M. A. (1996) A *Summary of Aspects of FRDC Project 94/041 "Restoration of Estuarine Fisheries Habitat" Relevant to Tidal Restrictions in New South Wales Estuaries*. Fisheries Research Institute Cronulla, NSW.

WMAwater (2012) *Deep Creek Flood Study*. Prepared for Nambucca Shire Council.

WMAwater (2013a) *Hydraulic Modelling Report Nambucca River and Warrell Creek.*

WMAwater (2013b) Nambucca River and Warrell Creek Hydraulic Modelling Report – Additional Analysis. Prepared on behalf of the Nambucca Shire Council.

WMAwater (2016) *Nambucca Shire Floodplain Risk Management Study*. Prepared on behalf of the Nambucca Shire Council.

WMAwater (2017) *Nambucca Shire Floodplain Risk Management Plan*. Prepared on behalf of the Nambucca Shire Council.

GLOSSARY AND ABBREVIATIONS

4WD	Four Wheel Drive/ing
ABS	Australian Bureau of Statistics
Acid sulfate soils (ASS)	Acid sulfate soils are the common name given to soils containing iron sulfides. In Australia, the acid sulfate soils of most concern are those which formed within the past 10,000 years, after the last major sea level rise. When the iron sulfides are exposed to air and produce sulfuric acid, they are known as actual acid sulfate soils. The soil itself can neutralise some of the sulfuric acid. The remaining acid moves through the soil, acidifying soil water, groundwater and, eventually, surface waters.
AHD	Australian Height Datum
Amenity	A desirable or useful feature or facility of a building or place
BSC	Bellingen Shire Council
CHCC	Coffs Harbour City Council
Chlorophyll a	The green pigment in plants used to capture and use energy from sunlight to form organic matter (see photosynthesis). Concentrations of chlorophyll-a in the water column are used as an indicator for phytoplankton and benthic algae biomass. It provides a useful proxy indicator of the amount of nutrients incorporated into phytoplankton biomass, because phytoplankton have predictable nutrient-to-chlorophyll ratios
CMA	Coastal Management Area
CM Act	Coastal Management Act 2016 – the legislation under which this Scoping Study has been prepared.
CMP	Coastal Management Program
CSP	Community Strategic Plan
CZMP	Coastal Zone Management Plan
DECCW	Former (NSW) Department of Environment, Climate Change and Water (now DPIE)
DCP	Development Controls Plans
Dissolved Oxygen	Oxygen dissolved in the water (oxygen saturation). Often abbreviated to DO
DLWC	Department of Land and Water Conservation
DPI	(NSW) Department of Primary Industries
DPIE	Department of Planning, Industry & Environment
DPI Fisheries	NSW Department of Primary Industries – Fisheries
Ecosystem	Refers to all the biological and physical parts of a biological unit (e.g. an estuary, forest, or planet) and their interconnections.
EEC	Endangered Ecological Communities
EES	Environment, Energy and Science (a Division of DPIE)
El Nino	A global climate driver which affects extreme rainfall and flooding, hail and storm frequency
EMP	Estuary Management Plan
EMS	Estuary Management Study

EPA	NSW Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
Estuarine	Part of the river channel with a mix of fresh water and salt (tidal) water
FM Act	*Fisheries Management Act 1994*
Foreshore	That part of the shore that lies between the mean high tide mark and the mean low tide mark
GHG	Greenhouse Gas
GIS	Geographic Information System
GMSL	Global Mean Sea Level
Ha	Hectares
HAT	Highest Astronomical Tide
Hsig	The significant wave height (in metres), defined as the average of the highest one-third of wave heights in a 26.6 minute wave record.
Hydrodynamics	The motion of a fluid and interactions with its boundaries
Hydrology	The study of water and its properties, including precipitation onto land and returning to oceans
ICOLL	Intermittently Closed and Open Lakes and Lagoons
IP&R	Integrated Planning and Reporting
IPA	Indigenous Protection Area
IPCC	Intergovernmental Panel on Climate Change
KSC	Kempsey Shire Council
LALC	Local Aboriginal Land Council
LEP	Local Environmental Plan
LGA	Local Government Area
LSPS	Local Strategic Planning Statement
MEMA	Marine Estate Management Authority
MEMS	Marine Estate Management Strategy
MER	NSW Natural Resources Monitoring, Evaluation and Reporting Strategy
MHL	Mainly Hydraulics Laboratory
MHWM	Mean High Water Mark
MSL	Mean Sea Level
NCLLS	North Coast Local Land Services
NOAA	US National Oceanic and Atmospheric Administration
NOx	Oxides of nitrogen - Compounds of nitrogen and oxygen, primarily NO, NO2, N2O and N2O5
NPWS	National Parks and Wildlife Service
NSC	Nambucca Shire Council (now known as Nambucca Valley Council)
NVC	Nambucca Valley Council (previously Nambucca Shire Council)
NSW	New South Wales

OEH	Office of Environment and Heritage
PoM	Plan of Management
RCP	Representative Concentration Pathways
Riparian	Of, on or relating to the banks of a watercourse
RMS	Roads and Maritime Services
Salinity	The level of salt dissolved in the water
Sedimentation	The deposition or accumulation of sediment
SEPP	State Environmental Planning Policy
SLSC	Surf Life Saving Club
SOE	State of Environment
SRP	Soluble reactive phosphorus - The concentration of inorganic ions of phosphorus (predominately HPO42- and PO43-) in water. These ions are available to be used by aquatic biota
STP	Sewerage Treatment Plant
TARA	Threat And Risk Assessment
Terrestrial	Living or growing on land (not aquatic)
TN	Total Nitrogen - The concentration of inorganic ions of phosphorus (predominately HPO42- and PO43-) in water. These ions are available to be used by aquatic biota
TP	Total Phosphorous - The concentration of phosphorus in natural or anthropogenic substances that contain, or decompose to produce phosphate ions
Turbid	Cloudy or dirty (not clear)
Turbidity	A measure of the amount of light-attenuating particles in a water body
TSS	Total Suspended Solids - All particles suspended in water that do not pass through a 1.2µm filter

Appendix A. STATUTORY AND PLANNING FRAMEWORK

This Appendix provides a summary of legislation and management plans relevant to coastal and estuary planning.

A1. LEGISLATION

Coastal Management Act 2016

The *Coastal Management Act 2016* communicates the NSW Government's vision for coastal management. The Act reflects the vital natural, social, cultural and economic values of our coastal areas and promotes the principles of ecologically sustainable development in managing these values. The Act establishes requirements for the preparation of CMPs under guidance provided by the Coastal Management Manual.

The legislative and policy framework introduced by recent coastal reforms recognises natural coastal processes and the local and regional dynamic character of the coast and promotes land use planning decisions that accommodate them. The reforms ensure coordinated planning and management of the coast and support public participation in these activities.

The Act provides for the integrated management of the coastal environment of NSW consistent with the principles of ecologically sustainable development for the social, cultural and economic well-being of the people of the state. The Act:

- Establishes high level statutory objects for integrated coastal management in NSW.
- Defines the NSW coastal zone as being made up of four distinct 'coastal management areas' and sets out specific management objectives for each of those areas.
- Establishes a new independent coastal advisory body, the NSW Coastal Council.
- Requires local councils to embed coastal management within the Integrated Planning and Reporting (IP&R) framework established in the *Local Government Act 1993*. This approach will ensure that coastal management needs inform, and are informed by, councils' overall service delivery, financial and asset management planning responsibilities.
- Provides for public authorities to take into consideration the objectives and processes to achieve integrated management of the NSW coast.

Coastal Management SEPP

The *Coastal Management SEPP* forms part of the broader land-use planning framework in NSW. This is now the key environmental planning instrument for land-use planning in the coastal zone and delivers the statutory management objectives for each of the four coastal management areas that make up the coastal zone:

- Coastal wetlands and littoral rainforests: support high value biodiversity that are particularly sensitive to development. This management area is defined in the Act as land which displays 'the hydrological and floristic characteristics of coastal wetlands or littoral rainforests and land adjoining those features. This area focusses on protecting well established and more extensive vegetation communities (as opposed to single trees or isolated stands). The maps include a 100 m proximity area, applying to all land use zones, around coastal wetlands and littoral rainforests. The objectives within the Act are to:
    - Protect coastal wetlands and littoral rainforests in their natural state, including their biological diversity and ecosystem integrity.
    - Promote the rehabilitation and restoration of degraded coastal wetlands and littoral rainforests.
    - Improve the resilience of coastal wetlands and littoral rainforests to the impacts of climate change, including opportunities for migration.
    - Support the social and cultural values of coastal wetland and littoral rainforest communities.

  - Promote the objectives of State policies and programs for wetlands or littoral rainforest management.
- Coastal vulnerability area: land which is subject to current and future coastal hazards including beach erosion, shoreline recession, entrance instability, coastal inundation, tidal inundation, slope instability and foreshore tidal erosion. The objectives within the Act are to:
  - Ensure public safety and prevent risks to human life.
  - Mitigate current and future coastal hazards.
  - Maintain the presence of beaches, dunes and other natural features.
  - Maintain public access, amenity and use of the coast.
  - Encourage land use that reduces exposure to hazards, including through siting, design, construction and operational decisions.
  - Adopt coastal management strategies that reduce exposure to hazards, in the first instance by restoring or enhancing natural defences such as dunes, and thereafter by taking other action and if taking other action, to:
  - avoid significant degradation or disruption of biological diversity, ecosystem integrity, coastal processes (ecological, biophysical, geological, geomorphological), beach and foreshore amenity, and social and cultural values.
  - avoid adverse offsite impacts, or otherwise restore the land if any impacts are caused by the action to reduce exposure to hazards.
  - Maintain essential infrastructure.
  - Improve community resilience and reduce reliance on emergency responses.
- Coastal environment area: areas that are characterised by natural coastal features such as beaches, rock platforms, undeveloped headlands, coastal lakes and marine and estuarine waters. The area is made up of estuaries and a 100 m landward area, coastal lakes and lagoons and a 500 m landward area and specified sensitive coastal lakes and lagoons. The CMA is mapped upstream to one kilometre beyond the highest astronomical tide. The objectives within the Act are to:
  - Protect and enhance coastal environmental values and natural processes of coastal waters, estuaries, coastal lakes, coastal lagoons, and enhance natural character, scenic value, biological diversity and ecosystem integrity.
  - Reduce threats to and improve resilience of these coastal environments, including in response to climate change.
  - Maintain and improve water quality and estuary health.
  - Support social and cultural values of the coastal environments.
  - Maintain the presence of beaches, dunes and natural features of the foreshore.
  - Maintain and improve public access, amenity and use of the coast.
- Coastal use area: land adjacent to coastal waters, estuaries and coastal lakes and lagoons where impacts of development on the use and enjoyment of the beaches, dunes, estuaries and lakes need to be considered. The area starts at the seaward local government boundary, typically the low water mark and extends to the estuary limit (one km landward of coastal waters, estuaries and coastal lakes). The objectives of the CUA within the Act are to:
  - Protect and enhance the scenic, social and cultural values of the coast by ensuring that:
  - the type, bulk, scale and size of development is appropriate for the location and natural scenic quality of the coast.
  - adverse impacts of development on cultural and built environmental heritage are avoided or mitigated.

- urban design, including water sensitive urban design, is supported and incorporated into development activities.
- adequate public open space is provided, including for recreational activities and associated infrastructure.
- the use of the surf zone is considered.
- Accommodate both urbanised and natural stretches of coastline.

The SEPP gives effect to the objectives of the CM Act from a land use planning perspective, by specifying how development proposals are to be assessed if they fall within the coastal zone. This becomes relevant to the preparation of the CMP with regards to the intent and description of recommended actions and their intended approval pathways (if required) under the SEPP. For example, under the CM SEPP, in order for coastal protection works to be undertaken without consent they need to be identified in a certified CMP.

State Environmental Planning Policy (Infrastructure) 2007

The State Environmental Planning Policy (Infrastructure) 2007 (known as the Infrastructure SEPP) assists in providing infrastructure by modifying planning provisions to improve efficiency and service delivery. The SEPP allows for a wide range of infrastructure development to occur without consent. This SEPP is likely to enable potential infrastructure related CMP actions to be implemented by Council without consent. However, there are provisions within the CM SEPP that override the Infrastructure SEPP, particularly with regards to coastal protection works. Both SEPPs and their relationship, being that in the event of an inconsistency between the two SEPPs the CM SEPP prevails to the extent of the inconsistency, should be carefully considered in the development of CMP actions and their potential approvals pathway.

Marine Estate Management Act 2014

The CM Act (s.3(m)) legally supports the objects of the *Marine Estate Management Act 2014*, with the coastal zone forming part of the marine estate. The *Marine Estate Management Act 2014* provides for strategic and integrated management of the whole marine estate – marine waters, coasts and estuaries. The Act does this by:

- Providing for the management of the marine estate consistent with the principles of ecologically sustainable development.
- Establishing two advisory committees, a Marine Estate Management Authority (MEMA) and Marine Estate Expert Knowledge Panel.
- Requiring the development of a Marine Estate Management Strategy to address priority threats identified through threat and risk assessment (TARA).
- Facilitating the maintenance of ecological integrity, and economic, social, cultural and scientific opportunities.
- Promoting the coordination of government programs.
- Providing for a comprehensive system of marine parks and aquatic reserves.

Crown Land Management Act 2016

The *Crown Land Management Act 2016* (CLM Act) commenced on the 1st July 2018. Department of Planning, Industry & Environment – Crown Lands, thereafter DPIE – Crown Lands, is responsible for the management of the Crown Land estate in accordance with this act. DPIE – Crown Lands may transfer management responsibilities to a reserve trust or to Council.

Some areas of Crown land within the study area are under Council Reserve Trust management (refer Section 5.1). Under the CLM Act, Council will need to categorise and prepare Plans of Management (PoM) under the *Local Government Act 1993* for these reserves. Any PoMs that are prepared will need to be consistent with the CMP. Refer to Section A6 for a list of existing PoMs.

Actions proposed on public land require an understanding of the boundaries of public land (i.e. survey may be required), and the relevant authorisations and appropriate tenure arrangements from public land managers, in particular, where works are proposed on Crown land not under Council management. Council requires a licence under the CLM Act to mechanically open the entrance to Deep Creek. Commercial dredging operations are also licenced under the CLM Act. Under the Marine Estate Management Strategy 2014, DPIE - Crown Lands is undertaking an audit of commercial dredging licences on the coast and in estuaries including licence L11573 for Austone Pty Ltd extractive activities in the Nambucca River estuary.

Fisheries Management Act 1994

In NSW, threatened fish (both saltwater and freshwater), their habitat, and threatened marine vegetation are protected under the *Fisheries Management Act 1994* (FM Act). The FM Act is administered by the NSW Department of Primary Industries – Fisheries (DPI Fisheries). Under the FM Act, DPI Fisheries is responsible for ensuring that fish stocks are conserved and that there is "no net loss" of key fish habitats upon which those stocks depend. DPI Fisheries achieves this through regulating recreational and commercial fishing and assessing activities under Part 4 and Part 5 of the *Environmental Planning and Assessment Act 1979* that are located on or adjacent to key fish habitats in accordance with the objectives of the FM Act, the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the FM Act, and the associated and *Policy and Guidelines for Fish Habitat Conservation and Management* (DPI, 2013 Update). Key fish habitats include, but are not limited to, 3rd order and greater freshwater waterways, Coastal Wetlands and tidal waters up to the Highest Astronomical Tide (HAT) level.

Relevant divisions and sections of the FM Act under which permit and consultation requirements may apply to a range of coastal management activities necessary under the pending CMP include:

- Division 3, Section 199, 200 and 201: RE dredging and reclamation of water land.
- Division 4, Section 205 RE harm to marine vegetation.
- Division 8, Section 219 RE obstruction of fish passage.

A permit to dredge, or to mechanically open an ICOLL entrance is not required under the FM Act where works are carried out under appropriate Crown land authorisations. However, a permit may be required for harm to marine vegetation and DPI Fisheries should still be notified and consulted with in regards to any action with the potential to impact on fisheries or marine vegetation.

Water Management Act 2000

The objects of the Water Management Act 2000 are to provide for the sustainable and integrated management of the water sources of the state for the benefit of both present and future generations. The Act is administered by the NSW Natural Resources Access Regulator (NRAR), Water NSW and the DPIE - Water. DPIE – Water is accountable for the development and implementation of water sharing plans which allocate water for direct use, extraction and environmental needs. NRAR regulates activities or works on waterfront land or works that may interfere with an aquifer. Relevant approvals under the Act include:

- Aquifer interference approval, i.e. a water licence (other than where exemptions apply or where water is being taken under a basic landholder right) such as may be required for dewatering and groundwater filling during and post construction activities.
- Controlled activity approvals for works on waterfront land (defined as the bed of any river, lake or estuary, and the land within 40 metres of the riverbanks, lake shore or estuary mean high water mark). Examples include erosion control works, construction of waterway crossings and roads, and depositing extracted material on waterfront land. Public authorities are exempt from requiring a controlled activity approval.

Native Title Act 1993 (Commonwealth) and Aboriginal Land Rights Act 1983 (NSW)

Native Title (NCD2014/001) by the Gumbaynggir People was declared over South Beach (also known as Forster Beach) and adjacent land to the east of Warrell Creek in 2014. This area has become part of the Gaagal Wanggaan (South Beach) National Park (refer Section 5.1).

Native Title (NC2016/003) by the Gumbaynggir People #3 was declared over the Gumma Peninsula and Islands in 2019. The claim area includes the Gumma Peninsula and including three islets in the lower Nambucca River estuary.

Indigenous Land Use Agreements (ILUAs) NI2018/044 and 2018/005 are also registered for land at the very northern end of the study area, the boundary located just to the south of the entrance to Oyster Creek, and extending northwards beyond the study area into the Coffs Harbour LGA.

Maps of these areas are provided on the National Native Title website at http://www.nntt.gov.au/Pages/Home-Page.aspx.

Where actions are proposed on Crown land, consideration of Aboriginal Land Claims lodged under the *Aboriginal Land Rights Act 1983* (NSW) will need to be undertaken. Any works will need to be compliant with the *Native Title Act 1993*.

Other relevant legislation

Other legislation relevant to the management of the coast and estuaries include:

- *Biodiversity Conservation Act 2016.*
- *Environmental Planning and Assessment 1979.*
- *Heritage Act 1977.*
- *Local Government Act 1993*.
- *Local Land Services Act 2013.*
- *National Parks and Wildlife Act 1974.*
- *State Emergency and Rescue Management Act 1989.*
- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth).

A2. NSW PLANS AND STRATEGIES

Marine Estate Management Strategy (2018)

The *Marine Estate Management Strategy 2018-2028* (MEMA, 2018) provides an overarching strategic approach to the coordinated management of the NSW marine estate, i.e. the coastal waters, estuaries, lakes, lagoons and coastal wetlands. The Strategy considers the ten MEMA management principles as well as priority threats for the marine estate as identified in the NSW marine estate threat and risk assessment (TARA, BMT WBM, 2017). The Strategy sets out nine initiatives and a set of associated objectives and key actions to address these priority threats and seeks to balance economic growth, use and conservation of the marine estate. The initiatives comprise:

1. Improving water quality and reducing litter.
2. Delivering healthy coastal habitats with sustainable use and development.
3. Planning for climate change.
4. Protecting the Aboriginal cultural values of the marine estate.
5. Reducing impacts on threated and protected species.
6. Ensuring sustainable fishing and aquaculture.

7. Enabling safe and sustainable boating.
8. Enhancing social, cultural and economic benefits.
9. Delivery effective governance.

This Scoping Study considers the key state-wide threats as well as priority threats to environmental assets and to social, cultural and economic benefits for the North Region (refer Appendix E) as identified in the TARA. In developing strategies and actions for the CMP, the principles and management initiatives of the *Marine Estate Management Strategy* will be considered and any alignment identified.

A3. REGIONAL PLANS

Regional Boating Plan for the Mid-North Coast Region (2015)

The Regional Boating Plan for the Mid-North Coast (TfNSW, 2015) was developed in part to boost the experience of recreational boating within the region as part of a state-wide initiative. The Plan was developed in consultation with Council, key stakeholders and the community (through an online survey). RMS oversees the boating program and is responsible for ensuring the program is progressing, whereas NVC is responsible for implementing actions with funding from TfNSW - Maritime.

The Plan identifies region-wide actions for boating safety, access and infrastructure required to be implemented over five years (to 2020) under the *NSW Boating Now* program including navigational aids and better safety signage. In addition, funding under the NSW Boating Now program was allocated to support delivery of six local priority boating infrastructure projects in the 2015 – 2018/19 period including improvements to Stuart Island boating facilities, upgrade of the boat ramps and car parks at Shelly Beach and Gordon Park (Nambucca Heads) and at Deep Creek, improved access for non-powered vessels at Nambucca Heads RSL boat ramp, and installation of pontoons for foreshore access at Macksville.

Additional projects have been endorsed under the boating now program for improvements to facilities at Weir Reserve, Gumma Reserve and Devils Elbow/Grassy Park.

A Climate Change Adaptation Strategy for Nambucca, Bellingen and Kempsey (2010)

An adaptation strategy was prepared as a comprehensive means for Nambucca Bellingen and Kempsey Councils to develop climate change resilience and adaptive capacity (Climate Risk, 2010). The strategy is part of an Australian Government initiative designed to support local government climate change risk assessment and adaptation planning. The Strategy is supported by a risk assessment considering regional specific information including extreme event analysis, historical re-analysis, climate variability review, and newly developed regionally specific economic modelling.

The strategy provides an adaptation plan specific to the Nambucca LGA including 133 actions categorised into those relevant to planning and development controls, local growth management strategy, on-site sewerage management, flood risk, integrated water cycle management (IWCM), asset management, disaster management, human resources, economic development and environmental reporting.

A4. LOCAL PLANS

Coastal Zone Management Plan for the Nambucca Shire Coastline

The *Coastal Zone Management Plan for the Nambucca Shire Coastline* (Umwelt, 2012) was prepared by NVC as a part of their strategy to reduce the level of risk to coastal assets, infrastructure and amenity from coastal erosion and inundation and to manage future risks and resource requirements for coastal works in light of climate change and sea level rise. The plan covers the Nambucca coastline, including beaches,

dunes and headlands, extending from Scotts Head in the south to Valla Beach in the north and considers the impacts of coastal processes over a 100 year timeframe.

The plan builds on the *Nambucca Shire Council Coastal Slope Instability Hazard Study* (SMEC, 2009b) and *Nambucca Shire Coastal Hazard Study* (SMEC, 2009a). The key aims of the Coastal Zone Management Plan (CZMP) are to minimise risks associated with coastal processes, protect important community values and enable residents and visitors to continue to be able to enjoy safe access to an attractive healthy coastal landscape.

The objectives of the CZMP are:

- To guide Council and community contributions to achieving healthy functioning natural coastal systems.
- To guide Council land use and land management strategies and actions so that they take coastal hazards into account for short and long-term timeframes.
- To provide good value investment in Council assets in the coastal zone, so that infrastructure for coastline access and enjoyment is good quality, meets the needs of residents and visitors and is affordable.
- to provide clear information about coastal processes and hazards and support community involvement in planning future activities in the coastal zone.

The plan identified a range of coastal issues and risks to be addressed by the plan and developed a suite (39) of actions aligned with the plan objectives to be implemented. A site-specific emergency action sub-plan is included as an appendix to the CZMP. The status of the recommended actions is detailed in Appendix D. The CZMP will be superseded by the new CMP. A review of the emergency action sub-plan identified that it meets the requirements of the CM Manual.

Nambucca River Estuary Management Study (2006) and Management Plan (2008)

The *Nambucca River Estuary Management Plan* (BMT WBM, 2008) (henceforth the Nambucca River EMP) was prepared under the direction of the Nambucca Shire Estuary and Coastline Management Committee in conjunction with NVC and the Department of Environment and Climate Change (now DPIE) and has been adopted by Council. The EMP builds upon the work completed as part of the *Nambucca River Estuary Management Study* (WBM, 2006) and *Estuarine Geomorphology, Physical Condition and Mapping report* (GECO, 2005) which together identified values, significant issues (both management and environmental) and management objectives and strategies relevant to the Nambucca River estuary.

The Management Study and Plan covers the entrance and tidal waterways, foreshores and adjacent lands of the Nambucca River, Taylors Arm and Warrell Creek. The following minor tributaries, among others, are included in the management area: Blackbutt Creek, Newee Creek, Gumma Gumma Creek, Watt Creek, Bellwood/ Swampy Creek, Tilly Willy Creek, Rhones Creek, Welshes Creek.

The Management Plan was developed to provide a framework for the effective management of the Nambucca River estuary in accordance with overarching management objectives developed for the estuary in respect of the general goals of the Estuary Management Policy (NSW Government, 1992) current at the time of preparation of the Plan. These objectives, based on community uses and values associated with the estuary, as identified through community and stakeholder engagement, and from technical reviews completed as part of the *Estuary Management Study* (BMT WBM, 2006), are provided in Table 13. The Plan provides 25 prioritised and ranked management strategies based on a process of community consultation, as well as subsequent actions to be implemented to meet these objectives.

The *Nambucca River Estuary Management Plan* (BMT WBM, 2008) will be superseded by the new CMP.

Table 13: Objectives of the Nambucca River Estuary Management Plan (2008)

Category	Objectives
Land tenure and usage (LTU)	Protect and enhance the existing uses and values of the estuary in both the short- and long-term by adoption of best practice land use planning and development controls.
Entrance Condition and Behaviour (EC)	Maintain navigation within the lower estuary for shallow draft vessels, consistent with current use, to maintain user amenity, safety and aesthetics, within the natural constraints of ocean and fluvial processes.
Boating and Waterway Usage (BWU)	Encourage waterway use that causes a minimum of environmental and social impact, and where possible, enhances user amenity through improved safety controls and reduced conflict. Improve the safety of swimmers of all ages within the estuary.
Water Quality (WQ)	Maintain and improve water quality within the estuary to support ecosystem function, commercial fishing/oyster production and tourism, and other forms of human recreation including swimming.
Habitat Management (HM)	Protect and enhance habitats to improve the health and biodiversity of the Nambucca River estuary.
Bank Erosion and Sedimentation (BE)	Improve overall riverbank condition on all major streams and waterways of the Nambucca Valley to limit future bank erosion and sedimentation.
Climate Change and Sea Level Rise (CCSLR)	Consider the potential implications of sea level rise on the estuary and its surrounds as a result of global scale climate change.
Cultural Heritage (CH)	Protect areas and items of Aboriginal and European cultural heritage within the estuary.
Community Liaison (CL)	Maintain open lines of communication with the community and local Aboriginal groups in relation to the ongoing management of the estuary.
Fisheries and Oyster Aquaculture (FOA)	Maintain and improve the viability of existing (and potential future) types of ecologically and commercially sustainable estuary-based aquaculture industries and enterprises.
Tourism Management (TM)	Maintain and improve the recreational and amenity values of the Nambucca River estuary, without resulting in deleterious impacts on the natural environment.

Source: BMT WBM (2008)

Deep Creek Entrance Management Policy (2013)

The *Deep Creek Entrance Management Policy* (NSC, 2013) was prepared to provide Council, the community, and other relevant State Government Authorities with a procedure for the management of the entrance of the ICOLL when in its closed state, based on the findings of the *Deep Creek Flood Study* (WMA Water, 2012). Several previous studies were also prepared in the lead up to the development of the policy including *Deep Creek Entrance Dynamics, Valla Beach* (DLWC, 2000), *Baseline Studies for the Development of an Entrance Management Plan for Deep Creek* (Gadd, 2000), *Deep Creek Entrance Management Data Compilation Study* (NSW, 2001), *DLWC Deep Creek Tidal Data Collection* (MHL, 2002), and the *Deep Creek Sustainability Assessment Report* (Letcher *et al*., 2007).

The Policy aims to achieve the following objectives:

- Implement a protocol or management regime consistent with the principles of ecologically sustainable development identified in the local government charter.
- Identify the need to open the entrance and streamline the decision making and approval process for artificial opening.
- Provide a scientific basis for the management of the entrance, which aim to minimise risk to private property, public infrastructure and services, biodiversity and the health of the surrounding natural system.
- To minimise risk to public health associated with excessive bacterial contamination of waters.
- To ensure minimal interference with natural entrance opening processes as much as possible.
- Obtain broad community acceptance and understanding of the policy requirements.
- Identify monitoring requirements post artificial opening.
- Provide opportunity to review this policy as required.

The policy provides entrance management recommendations, triggers (water level, water quality and emergency management), opening procedures and monitoring requirements (for beach berm level, water level, and water quality). The procedures are based on consideration of a range of management options, legislative requirements (e.g. Review of Environmental Factors, Crown land authorisations, fisheries permits) and environmental aspects.

The Policy takes that the position that to maintain a healthy creek, ideally it should be left to operate as close to natural as possible.

Swimming Creek Plan of Management (1995)

The Swimming Creek Plan of Management was prepared in response to water quality issues posed from catchment runoff of suspended solids and increased nutrients, and from sewerage surcharges from a now replaced sewerage pumping station. The plan identified five key management issues with some limited community consultation and provides a management strategy to improve the aesthetic attributes of the waterway whilst improving the environmental and ecological integrity of the creek as well as increasing the recreational, educational and environmental amenity of the entire catchment. Ongoing, short, medium and long-term actions were identified to meet the following objectives:

- To reduce and control pollutants emanating from the urban areas.
- To return the waterway to a near natural state.
- To ensure that stormwater discharges from the caravan park do not contribute significantly to the pollution loads of the creek.
- Inform residents and visitors to the area of how their activities impact on the natural environment.
- Improve the recreational amenity of the foreshore area of Swimming Creek.

The plan was prepared some 23 years ago and recommended the maintenance of the Committee of Management until mid-1997 for implementation of the plan. The Swimming Creek catchment was excluded from more recent management plans for the Nambucca River estuary and coastal zone but has been incorporated into the study area for this CMP.

Nambucca Ecohealth Project 2016-2017

The *Nambucca Ecohealth Project 2016-2017 Assessment of River and Estuarine Condition Final Report* (Mika *et al.*, 2018) provides a standardised framework for collecting, analysing and interpreting riverine, coastal and estuarine assessments of ecological and geomorphic condition commensurate with the statewide Natural Resources Monitoring Evaluation and Reporting (MER) Strategy (NSW OEH, 2013). Sampling was undertaken at three sites in the Deep Creek estuary, 10 sites in the Nambucca River estuary

(including in Warrell Creek, Newee Creek and the Taylors Arm) and 18 other sites in the upper, freshwater reaches of the catchments. The project provides a first baseline dataset report card for water quality, freshwater macroinvertebrates, and freshwater riparian and geomorphic condition in the Nambucca catchments based on an Ecohealth grading of A (excellent) to F (Very Poor). Overall Ecohealth grades for the estuaries were provided as C- (Fair) for Deep Creek estuary, C- (Fair) for Warrell Creek estuary, and D+ (poor) for the remainder of the Nambucca River estuary. Specific monitoring and management recommendations for the estuary and upper catchment reaches are also provided along with their relationship to existing management strategies in the Nambucca River EMS.

River Reach Plans

Nambucca Valley Landcare (NVL) has developed river reach plans for the North Arm Reach (NVL, 2016) and Missabotti Creek (NVL, 2014) providing strategic guidance for the restoration of these upper catchment reaches and flow on impacts on bed load and water quality of the Nambucca River estuary. The plans form part of NVL's strategy to complete river planning throughout the Nambucca Valley catchment. The river reach plans work in conjunction with individual property plans which are the basis for the delivery of works. Management of the upper catchments is effectively undertaken through actions recommended in the Ecohealth Project and the river reach plans.

The plans aim to:

- Summarise current geomorphic condition and riparian vegetation in the upper reaches.
- Develop a strategy for improving geomorphic condition and riparian vegetation, including engineering works to reduce river bed lowering and bank erosion.
- Provide participating landholders with a strategy of works for their properties.

Nambucca River Master Plan

The *Nambucca River Master Plan* and *Master Plan Compendium* (RDM *et al*., 2010) were prepared to improve the built forms and recreational facilities, and to strengthen and highlight the use and aesthetics of the Nambucca River for both residents and visitors, whilst also ensuring maintenance of the unique existing natural environment in the Nambucca Valley. The Master Plan covers the lower Nambucca River from the entrance to just upstream of Stuarts Island at Teagues Creek. The preparation of the Master Plan involved site assessments, review of past studies and an extensive consultation process including four community workshops.

Nambucca Shire Floodplain Risk Management Plan (2017)

The *Nambucca Shire Floodplain Risk Management Plan* (WMAwater, 2017) was prepared for NVC under the guidance of NVC's floodplain management committee. The plan was prepared in accordance with the NSW Floodplain Development Manual and is based on a comprehensive and detailed evaluation of all factors that affect and are affected by the use of flood prone land and provides a long-term plan for the future development of the floodplain. The plan area covers Nambucca River, Warrell Creek and Deep Creek catchments within the Nambucca Valley LGA. Modelling of flood risk supporting the plan included consideration of catchment flooding in combination with entrance shoaling and coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences, excluding tsunami (WMAwater, 2013b).

The plan was developed from the *Nambucca Shire Floodplain Risk Management Study* (2016) and numerous other historic flood studies and provides the basis for the future management of the flood liable land within Nambucca Valley LGA. The Floodplain Risk Management Study assessed the flood risk within the study area including a description of flood hazard, as well as an estimate of the economic impact of flooding. The study developed a range of potential measures to manage the identified risks that were

evaluated and assessed for their ability to reduce flood risk while also considering their economic, social and environmental impact. Recommended measures are categorised into response modification measures, property modification measures, and flood modification measures and form the basis of the plan. The plan outlines the flood risks and identified options identified in the *Floodplain Risk Management Study* and provides an implementation schedule for the recommended measures. Several of the recommended management options would result in a reduced risk from future tidal inundation including making amendments to Flood Planning Levels (FPLs), Flood Planning Areas (FPAs), revising LEPs and DCPs, recommendations for flood proofing and amendments to s149 certificates and filling low lying terrain in Hyland Park.

Gumma Gumma Wetland Restoration Plan (2015)

The *Gumma Gumma Wetland Restoration Plan* was prepared by NVC in accordance with Section 7A of the *State Environmental Planning Policy No. 14* and relevant guidelines to support a Development Application for recommended wetland restoration actions to be implemented in the wetland. The plan provides for the implementation of wetland management actions that require development consent recommended in the *Gumma Swamp Event Water Quality Monitoring Study* (Telfar & Birch, 2014). These actions include installation of weirs, floodgate and drain maintenance and stock management. The actions form part of a wider containment strategy recommended in Telfar & Birch (2014) to be implemented in problem areas of Gumma Gumma Swamp. The plan was implemented and completed by December 2016 under the Healthy Wetlands for a Healthy Estuary – Nambucca River project. Council is continuing to monitor the project to determine performance of the actions to date.

Nambucca LEP 2010 and DCP

The Nambucca Local Environment Plan 2010 (NLEP), prepared in accordance with the NSW *Environmental Planning and Assessment Act 1979* provides for the sustainable use and development of land within the Nambucca Local Government Area through provision of requirements for development consent and planning controls for certain development in certain zones. The Nambucca Development Control Plan (DCP) guides how to carryout development to ensure consistency, sustainability and meeting of community expectations.

The LEP and DCP contain provisions regarding, but not limited to heritage, development below mean high water mark, acid sulfate soils, flooding, site contamination, earthworks, flora and fauna, vegetation clearing, watercourses, climate change and coastal processes. The DCP provides recommendations regarding development in areas likely to be affected by coastal processes based on the recommendations of the SMEC (2009) *Coastal Hazard Study*.

A5. INTEGRATED PLANNING AND REPORTING

The Integrated Planning and Reporting (IP&R) framework is established under Chapter 13 of the *Local Government Act 1993*, and is the main mechanism by which councils comprehensively plan for, and report on, their asset management and service delivery responsibilities within a local government area. The *Coastal Management Act 2016* requires that CMPs are given effect through the IP&R framework. This will include performance auditing powers to ensure that programs are appropriately implemented. This means that coastal management programs and identified coastal management activities are aligned with broader community strategic plans, reflect community priorities, and are feasible, financially viable and able to be resourced.

The *Nambucca Valley: Living at its Best* 2027 Community Strategic Plan (CSP) sits above all other Council plans and policies in the planning hierarchy (Figure 17). The CSP identifies long term priorities, outcomes and aspirations for the future of the community and the local government area. Council uses this document to guide and inform their decision making and planning for at least the next ten years. The NVC *Local Strategic Planning Statement* (LSPS) (NVC, 2020) provides a vision for the Nambucca Valley, details the

special characteristics which contribute to local identity and shared community values and provides a summary of actions to manage growth and change into the future.

Figure 17: Nambucca Valley Council's IP&R Framework

Source: NSC (2017)

The Delivery Program and Operational Plan describes what parts of the CSP the Council is responsible for and identifies all key activities to be undertaken by Council during their elected term, and which year the activities are to be undertaken.

The Resourcing Strategy assists Council to translate the outcomes identified in the CSP, for which it is responsible, into actions. Some issues will be the responsibility of Council, some will be the responsibility of other levels of government, and some will rely on input from community groups or individuals. The Resourcing Strategy contains three interlinked, major planning and management documents:

- Asset Management Plans which describes all the assets under Council's control plus proposed new assets and asset disposals (e.g. for stormwater and sewerage services, roads, bridges and coastal infrastructure).

- Workforce Management Plan which defines current and future workforce capabilities.
- Long Term Financial Plan which sets out current and future Council finances

The CSP and LSPS will assist in guiding the development of the CMP. The CSP itself is guided by its vision "Nambucca Valley – Living at its best" and NVC's Mission Statement "*The Nambucca Valley will value and protect its natural environment, maintain its assets and infrastructure and develop opportunities for its people*." The CSP reflects the key aspirations of the community. Strategies, delivery programs and actions from NSC's Delivery Program 2017 – 2023 that are relevant to the CMP are provided in Table 14.

Table 14: Delivery Program strategies and actions relevant to Nambucca CMP

Key Strategy	Delivery Program	Objective	Actions		Success Measure
CSP THEME – CARING FOR OUR COMMUNITY					
1.1 Sustainable delivery of services	1.1.1 Civic Leadership and administrations	Council engages the Community in the process of open government. Public participation is encouraged not only in policy development and major decisions, but in the day to day operations of the Council.	1.1.1.1	Using a variety of tools, engage with the community in ways that are accessible and transparent	Liaise with Council S355 Committees, public forums and Council meetings, open access to information
			1.1.1.2	Use information from the community in decision making	Undertake regular Community Satisfaction Surveys. Report submissions and community comment to Council.
			1.1.1.3	Keep the Community informed of the decisions, key issues and actions of Council	Use Council's website, media opportunities, newsletters and direct personal communications to inform stakeholders and the community.
			1.1.1.4	Maintain an effective governance regime	Integrated Planning and Reporting requirements met. An effective Internal Audit Function is maintained.
	1.1.3 Risk Management	Council will identify and manage risks likely to have a material impact on the organisation's ability to achieve its mission and objectives.	1.1.3.1	Integrate effective risk management practices across the organisation	Maintain a current risk register with considered risk treatments. Maintain effective insurance coverage. Maintain a register of instances of safety, regulatory or financial non-compliance or mishaps. Impact on Council's risk profile considered as part of Council's regular reporting.
1.3 Public health	1.3.2 Public Health (Clean Water)	Council will improve healthy waterways through promoting and implementing where possible the protection of riparian areas and minimising pollution sources	1.3.2.1	Ensure Nambucca waterways will not be contaminated by on-site sewerage systems. This will be achieved by efficient licensing and monitoring regime and effective enforcement of the current standards	All required on-site sewerage systems licensed. All routine inspections completed. Effective response to complaints. Reduction in warnings, infringements and reported cases of pollution from on-site sewerage systems.
			1.3.2.2	Protection and restoration of riparian areas as prioritised in the Nambucca River Estuary Management Plan - dependent on grant funding and funding from the Environmental Levy	Projects from the Nambucca River Estuary Management Plan completed.
CSP THEME – CARING FOR OUR ENVIRONMENT					
2.3 Environmental services and community amenities	2.3.1 Waste Management	The natural environment will be protected through ensuring cost effective and environmentally responsible management of solid waste.	2.3.1.3	Implement waste minimisation strategies	Source separation of waste enforced. Waste Minimisation Education Program delivered. Advanced waste processing to minimise amount of waste going to landfill.
			2.3.1.4	Minimise illegal dumping of waste	Reduced instances of illegal dumping. Successful prosecution of illegal dumping offenders.
	2.3.3 Environmental Protection	Council will seek to protect our natural environment by strategically managing operations and development and regulating activities with environmental impacts.	2.3.3.1	Protect against deliberate damage on public land	Tree vandalism is investigated in accordance with policy and legislation
			2.3.3.2	Support community organisations undertaking natural resource management	Support Landcare, Dunecare and wetlands projects. Co-ordinated projects with North Coast Local Land Services.
			2.3.3.3	Develop management plans for environmentally sensitive areas	Development management plans or amended plans adopted
	2.3.4 Biodiversity	The biodiversity of the Nambucca Valleys will be protected and enhanced	2.3.4.1	Control noxious weeds	Control of noxious and other environmentally hazardous weeds. Education program on noxious weeds.
			2.3.4.2	Deliver projects funded under the Environmental Levy that promote biodiversity	Projects delivered.

Key Strategy	Delivery Program	Objective	Actions		Success Measure
CSP THEME – LIVING WELL					
3.1 Recreation and culture	3.1.3 Active Recreational Activities	The Nambucca Valley will have a variety of safe and well maintained sporting fields, recreational areas and facilities to meet needs of all age groups in the Community	3.1.3.1	Maintain sporting facilities – ovals, skate parks, tennis courts, netball courts, basketball courts, and fitness trails	Work with 355 Committee to manage sporting facilities. Review Master plans for sporting facilities. Delivery of priorities in the Open Space Strategy. Safety and maintenance inspection program completed.
			3.1.3.3	Operate and maintain open spaces	Open spaces effectively and efficiency maintained to service levels agreed with the community. Work with and support community volunteers and community work schemes to maintain and improve open spaces.
3.2 Community support and education	3.2.1 Connected Community	Council will seek to foster a Community that is mutually self-supporting and proud of its identity and will regularly engage with all segments of the Community across the Shire.	3.2.1.1	Work with S355 Committees to deliver social and community infrastructure	S355 Committees operating successfully and fulfilling their charters. Projects and events delivered in co-operation with S355 Committees.
			3.2.1.2	Auspice grant funding and provide grant writing support	Grant funds obtained. Grants Auspiced on behalf of Community organisations as required.
			3.2.1.3	Promote social equity with equal opportunities for access and participation	Access committee functions effectively and recommendations passed to Council. Senior weeks supported.
			3.2.1.4	Volunteers in the community are recognised and encouraged	Successful volunteers program in libraries, Visitor Information Centre, museums, volunteer gardeners, Service Club maintaining parks, volunteer maintenance of sporting fields and Work-for-the-Dole programs.
	3.2.4 Cultural Diversity	The Nambucca Valley will promote an understanding and respect for the Valley's Indigenous culture and heritage	3.2.3.1	Promote an understanding and respect for the Valley's Indigenous culture and heritage	Engage in consultation on culturally sensitive issues.
			3.2.3.2	Support Indigenous heritage and culture projects	Projects supported. Support NAIDOC week celebrations
CSP THEME – PROMOTING PROSPERITY					
4.2 Transport	4.2.1 Transport Accessibility	Nambucca Valley Residents will be able to get where they need to go in a way that is safe, efficient and affordable	4.2.1.1 – 4.2.1.4	Maintain and construct road network, bridges, footpath and cycleways, car parking to the level of service agreed by the community	Various
			4.2.1.6	Maintain and construct boat ramps and boat access points to the level of service agreed with the community	Regular Inspection and Cleaning Program completed. Maintain and construct new works as per the Delivery Program.
4.3 Sustainable water cycle	4.3.1 Water Management	Council will work with the Community to ensure the water resources of the Nambucca Valley are used in a sustainable way	4.3.1.2	Operate the Bowra Dam to ensure water security for the Nambucca Shire	Dam is maintained and operated according to the Dam Operation Manual. Operate and maintain the rising main network from the Bowra bore fields. Maintain water levels in the Dam that will protect water security for the Shire.
			4.3.1.3	Efficiently maintain, augment and operate the potable water reticulation system, the Bowra bore fields and treatment plant	Asset Management Plan developed and implemented.
	4.3.2 Sewerage Services	The capacity of the Nambucca Valley's sewerage services will service current and future demand and outflow quality will exceed regulated requirements	4.3.2	Council will apply the Integrated Water Cycle Management Strategy to effectively undertake the reticulation and treatment sewerage	IWCM reviewed and implemented. Reliable reticulation and treatment of sewerage. that meets public health standards. Regular outflow testing is conducted. Any breach of required standards is reported
			4.3.2.2	Efficiently maintain, augment and operate the sewerage reticulation and treatment network	Asset Management Plan developed and implemented. The Nambucca pressure sewerage system augmentation completed.

A6. OTHER PLANS OF MANAGEMENT

Plans of Management have also been prepared for numerous parks, reserves and foreshore areas including:

- *Swimming Creek Estuary Plan of Management* (Redmand and Greenaway, 1995).
- *Valla and Jagun Nature Reserves Plan of Management* (DECC NPWS, 2008).
- *Valla Beach Coastal Reserves (R90906, R82967, R88941) Draft Plan of Management* (LPMA and NSC, 2009) (noting that R88941 is now within Gaagal Wanggaan National Park).
- *Plan of Management for Reserve 65963 for Public Recreation, Resting Place and Communication Facilities at Scotts Head* (Integrated Site Design, 2014).
- *Bellwood Park Reserve Plan of Management* (Nambucca Heads Bellwood Park Reserve Trust, 2003) for Crown land managed by NSC.
- *Plan of Management for Gordon Park – Natural Area – Rainforest, Wellington Drive, Nambucca Heads* (Part Lot 8 DP 831156)(NSC, 2013) for community land owned by NSC.
- *Plan of Management for Gordon Park Recreational Area – Playing Fields, Wellington Drive, Nambucca Heads* (Lots 7009 and 7010 DP 1054529, Lot 701 DP 1055530, Lot 2 DP 721291 and Lot 4 DP 721291) (NSC, 2016b).
- *Plan of Management – Natural Area – Foreshore – Northern River Foreshore Macksville* (Part Lot 160/161 DP 187473) (known locally as Lions Park – Ferry Street Macksville) (NSC, 2013).
- *Natural Areas Bushland Part Lot 40 DP 711098 Old Coast Road Plan of Management* (NSC, 2012).

There also are numerous other management programs being implemented by NVC, government agencies, statutory bodies and community groups addressing various locations or components of estuary and coastal zone management in parallel with the primary management plans and programs discussed above including, but not limited to:

- *Climate Change Risk Assessment* (Climate Risk, 2010) and *Climate Change Adaptation Study: Nambucca Shire* (Climate Risk, 2010).
- *Environmental Management System: Nambucca River Oyster Farmers* (2013).
- *Nambucca Valley Beach Access Improvement Program – Scotts Head Beaches* (NSC, CMA, NSW Government; 2013).
- *Aboriginal Cultural Heritage Management Plan* (McIntyre-Tamwoy, 2007).
- *Lower Nambucca Water Quality Study* (including a water quality strategy) (GECO Environmental and Aquatic Services and Management, 2009).
- *Draft Nambucca Shire Strategic Tourism Plan 2018-2023* (Claire Ellis and Wray, 2018).
- *Nambucca Koala Habitat Study* (NSC, 2015).
- *Vegetation Management Plan for Scotts Head Crown land* (Coffs Coast Bush Regeneration, 2016).
- *Forest Management Plan for the Coastal Forests of NSW* (Forestry Corporation, 2016).

Appendix B. STAGE 1 COMMUNITY CONSULTATION OUTCOMES

This Appendix provides:

- *A summary of the results of the Stage 1 community survey.*
- *Detailed results from the Stage 1 community survey (with contact details removed for anonymity).*
- *Submission received from individuals during the survey period (with contact details removed for anonymity).*
- *Submissions received from government agencies and other stakeholder regarding the Scoping Study and the development of the CMP.*

B1. RESULTS OF THE COMMUNITY SURVEY

- The survey generated a total of 92 responses primarily from individuals, two unspecified organisations and a response from Nambucca Marine Rescue. Ninety-two percent of respondents are residents of the Nambucca Valley Council LGA. Respondents of the community survey were skewed towards the 60+ and the 40-59 year age groups.
- Summary statistics reported for matrices have been calculated across rows (i.e. per location rather than per issue), i.e. for Questions 3, 4, 5, 6, 8, and 10.
- Results are presented as either a count (number of respondents) or as a percentage of all respondents who answered.
- Question 14 and other contact details have been removed from these results to maintain anonymity of respondents.

Summary of Key Issues Raised by the Community

The community survey and submissions received from community members indicated that community members were concerned about issues in each beach and estuary with the majority of concerns, ranked in order of number of responses throughout the estuary, centred around the Nambucca River estuary, Deep Creek and Swimming Creek. The top ten issues of concern to the community (i.e. ranked by greatest count of responses to multiple choice options for all estuary and waterway areas) are:

- Litter/ marine debris.
- Habitat loss or degradation.
- Poor water quality.
- Beach erosion/ shoreline recession.
- River bank erosion.
- Conflicts of use (e.g. swimming & watercraft; beach access & shorebirds).
- Entrance management.
- Climate change/ sea level rise threats.
- Foreshore vegetation/ weeds.
- General access to waterways.

In specific locations, other key issues of community concern not listed above include:

- Deep Creek: siltation/ shoaling and conflicts of use.
- Swimming Creek: algal blooms and aquatic weeds.
- Nambucca River estuary: siltation/ shoaling and general access to waterways.
- Warrell Creek: Siltation/ shoaling and aquatic weeds.
- North Valla Beach, South Valla Beach, Nambucca Heads Beaches and Forster Beach: General access to waterways, sufficiency of disabled access, and quality and sufficiency of recreational facilities.
- Forster Beach and Scotts Head Beach: General access to waterways, sufficiency of disabled access, quality and sufficiency of recreational facilities, and aquatic weeds.

A suite of other specific issues were raised by the community (Question 9 and submissions received by individuals). The recurring themes include:

- Excessive availability of beach access for recreational trail biking and four wheel driving; the lack of enforcement of licensing, speeding and driving in restricted areas (on dunes and in no-go zones); erosion and trampling caused by motorised vehicles; and the conflict of use issues that arise, i.e.

safety of shorebirds and their nests, and safety of beach users including children and dog walkers. This is of particular concern for the North Valla and Swimming Creek 4WD access locations. Suggestions were made to increased regulation and enforcement of this activity, and to reduce the availability of access.

- The abundance of allocated off-leash dog areas; irresponsible dog owners (not picking up faeces/ leaving bags on beaches/ letting dogs roam in on-leash areas) and the associated health and safety risks; the lack of enforcement of both off-leash and on-leash areas.
- A lack of facilities such as boardwalks, fishing cleaning facilities, access facilities for both boats (especially in Deep Creek) and non-motorised watersports, and sufficient and suitably designed seating for the elderly.
- Commercial fishing (primarily netting in Warrell Creek) and the perceived impact on fish stocks, recreational fishing and tourism.
- Perceived inadequacy of the Deep Creek Entrance Management Policy in:
    - recognising the estuary's environmental values;
    - managing water quality for recreational and biodiversity purposes (particularly being a recreational fishing haven); and
    - managing long inundation periods which cause vegetation changes (mangrove die-off in particular).
- Lack of boating restrictions contributing to erosion and causing safety and amenity issues as well as conflicts of use between boats/ jet skis and swimmers/ passive estuary users. A 4 kn speed limit adjacent to urban areas in Deep Creek was suggested.
- Access for, and safety of swimmers in the vicinity of the V-wall due to conflicts with boats/ jet skis and dangerous currents. Suggestions were made to make this area a passive recreational use area only and/ or to incorporate a tidal pool in the inner harbour.
- Runoff from construction sites (most recently, the Hyland Park subdivision) and newly developed areas (e.g. rubber laden runoff from the new highway service centre into Boggy Creek).
- Sand shoaling and siltation, and the need for dredging for navigational and safety purposes, particularly the lower Nambucca River estuary and Warrell Creek.
- Needs for further community education around the importance of amenity and wildlife habitats, and on climate change threats and impacts.
- Illegal camping, e.g. on fire trail south of the Deep Creek footbridge and the associated disturbance to vegetation, littering, defecation, and lighting of fires.
- Inappropriate land use practices in the catchments, the abundance of blueberry farms and the use of pesticides in horticulture; and logging on highly erodible steep slopes in the upper catchments.
- Perceived impact from, or lack of understanding of level or risk from discharge and/or beneficial reuse of treated effluent from STPs.
- Frustration at Council's management of the coastline and estuaries to date, in particular, within the Deep Creek catchment which has no existing management program other than the entrance management policy.

These findings reiterate those of the Nambucca River Estuary Management Study (BMT WBM, 2006), identifying that many residents' concerns are concentrated about the ability of the (Nambucca River) estuary to sustain peak levels of waterway use and the combined impacts of sedimentation, decreasing water quality, overfishing and impacts of inappropriate development. Some management issues, such as shoaling, entrance management of Deep Creek, commercial fishing, 4WD access and dog accessible areas are controversial due to strong opposing viewpoints in the community. The above findings have been incorporated in to the consideration of key issues for the study area.

Summary of Community Preferences for Management Action

The community preferences for management action in the study area (Question 10 ranked by number of respondents selecting multiple choice management action in any location, n = 89) were focused on:

- Protecting and improving natural habitats/ wildlife (70% of respondents).
- Reducing litter, rubbish and marine debris (60%).
- Improving water quality (57%).
- Public education about coastal/ estuarine processes and sensitive ecosystems (54%).
- Addressing foreshore erosion in estuaries (52%).
- Addressing beach erosion (51%).
- Improving foreshore vegetation and weed removal (51%).
- Improving amenity value (49%).
- Addressing entrance management (43%).
- Planning for climate change and sea level rise threats (30%).

In specific locations, other key preferences for management action (top ten) not listed above (Question 10 ranked by number of respondents selecting multiple choice management action at specific location) include:

- All locations: better public education regarding cultural values.
- Warrell Creek: reducing aquatic weeds.
- North Valla Beach and South Valla Beach: improved swimmer safety.
- Nambucca Heads Beaches: improved swimmer safety and improving recreational facilities.
- Forster Beach; improving public access.
- Scotts Head Beach: improved swimming safety and improving parking.

Comments provided in Q11 also indicate a community preference for the following, unprompted management actions:

- Increased restrictions and regulations, and better signage regarding vehicles on beaches (6 responses).
- Increased enforcement and the banning or reduction of commercial fishing activities (five responses).
- Improved waterway navigation/ dredging (five responses).
- Increased restrictions and regulations, and better signage regarding dogs on beaches (four responses).
- In contrast, the prevention of further restrictions to off-leash dog areas and dogs on beaches.
- Improved regulation of the blueberry industry (two responses).

Summary of the Community's Vision

In determining the community's vision for the coastline and estuaries ten years from now (Question 12), good water quality was by far the most desired attribute (61% of respondents) followed by healthy estuarine vegetation (46%), stable beaches and foreshores (no erosion) (40%), abundant wildlife (32%) and healthy native vegetation (no weeds) (27%).

The above findings of the community survey have been incorporated into the development of the vision for the CMP (refer Section 2.1).

Results of the Community Survey

Responses to Question 14 (Contact details) and other identification information has been removed for anonymity.

Submissions Received from Individuals

Submissions received from individual community members are attached here. Identification information has been removed for anonymity.

From: Nambucca CMP Contact Form
To: Orla Seccull
Subject: [Contact & Lead Form]
Date: Thursday, 22 November 2018 12:10:50 PM

Name	Removed
Email (Optional)	
Phone (Optional)	
Message	I moved to Nambucca Heads one month ago. I use the beaches almost daily. I am concerned about possible pollution in the ocean, but don't have any evidence. Swimming Creek is EXTREMELY polluted (presumably by storm water). It empties into the Ocean intermittently, which means large doses of pollution hit the beaches where I swim regularly. Worse still, I have seen children swimming at the mouth of the creek, and I guess the parents were NOT aware of the pollution around corner. Given that it is a tourist area, it is highly likely that tourists would not notice the pollution around the corner from the mouth of the creek.

From: Nambucca CMP Contact Form
To: Orla Seccull
Subject: [Contact & Lead Form]
Date: Sunday, 6 January 2019 2:37:14 PM

Name	Removed
Email (Optional)	Removed
Phone (Optional)	Removed
Message	AS a resident of Hyland Park, my principal concern is for the environmental health of Deep Creek, in particular its branch which runs south behind the sand dunes towards the Nambucca Sewage Treatment Works. This small creek appears polluted & almost all its mangroves died a year ago when the creek entrance was closed & water levels rose to cover their roots. These trees have not regrown & the water appears discoloured & polluted. Water quality in Deep Creek needs to be regularly monitored as many people swim in it during the warmer months.

From: Nambucca CMP Contact Form
To: Orla Seccull
Subject: [Contact & Lead Form]
Date: Friday, 7 December 2018 4:08:31 PM

Name	Removed
Email (Optional)	
Phone (Optional)	
Message	I attended the community consultation and I've just tried to complete the survey After attending to both, all I can say is, God help our estuaries, because there's absolutely no hope that council can offer any improved future. This survey is an embarrassment. When council gets serious about its greatest assets and gives them deserved recognition, I'll gladly engage and offer valued advice.

From: Nambucca CMP Contact Form
To: Orla Seccull
Subject: [Contact & Lead Form]
Date: Friday, 21 December 2018 1:48:38 PM

Name	Removed
Email (Optional)	Removed
Phone (Optional)	Removed
Message	I would like to email to you the scientific report (referred to above) on the 'Nambucca Beds' which is a particular geology found on the steep slopes in the Nambucca upper catchment that is highly prone to erosion.

From: Nambucca CMP Contact Form
To: Orla Seccull
Subject: [Contact & Lead Form]
Date: Thursday, 29 November 2018 5:33:44 PM

Name	Removed
Email (Optional)	Removed
Phone (Optional)	Removed
Message	I am interested in the CMP as a Nambucca Heads resident, as an active bird watcher and environmentalist. I participate in the Shorebirds 2020 program and have written up bird surveys done in the Valla Nature Reserve and Deep Creek estuary and bird surveys done in Kingsworth Lake Reserve which is at the head of the tidal zone of Watt Creek. These reports are available if the team thinks they may be relevant.

Attachment to Nambucca Coast & Estuaries Survey

6 January, 2019

In my opinion this survey is slanted the wrong way. Instead of asking the public how it wants to exploit the precious environment we are fortunate to have here, eg whether we want to surf, picnic, fish, waterski, ride motor bikes, drive 4 wheel drive vehicles on beaches and tracks, Council should be advising us via scientific experts how to protect & maintain as intelligently as possible the unspoilt beauty & pristine condition of this area.

The emotional & mental health of our children & grandchildren depend on the protection of this coast & these estuaries for the future.

Let us be an educated public, not just one able to do whatever it feels like with these priceless resources!

Name removed

Address removed

From:	Removed
To:	Orla Seccull
Subject:	To add to my survey
Date:	Tuesday, 8 January 2019 4:49:46 PM
Attachments:	Forestry Viewmont logging.pdf

Hi Orla,

I wish to send you the attached Foresty Corp map that threatens to carry out intensive logging at the Viewmont State Forest bordering, and sitting between the Bowa Dam and the Bollanollas Nature reserve.

This is home to many endangered species as outlined on map and in my survey. I also believe a survey needs to take place as I believe important flora and fauna exist in this area.
It is poor planning on behalf of Nambucca Shire Council that has Valla/Deep Creek omitted from previous Coastal plans. The Local environment plan does not allocate Deep Creek as a natural waterway for my area but rather zoned as RU1 Land, implying Deep Creek it is owned by a landowner.
Valla Quarry is also a spectacular example of poor planning. I can provide oodles of info on that. This quarry is 40 metres from Deep Creek. The entrance of the Quarry is on a flat and it is this area that is flood prone, not the area where I live, which I saw identified on your map. Deep Creek when we have a large rain event(not often) can reach my fenceline. The deep sides to the creek manage this well. It is the flat land at the entrance to Valla Quarry and around "Valla Bridge" that floods.

Cheers

Name removed

Just for the record. I did chat to Council after the meeting held at Nambucca in December and not one of my questions was answered adaquetly. I wish to know why Council in their flood study, advised researchers to only go 1km upstream from the high tidal mark of Deep Creek". This is clearly stated in this study. The boundaries for catchment area fail to include one of the most important areas for the Bowra dam. Namely the whole area around Valla and the full course of Deep Creek catchment area. Not just magical machinations of Council. I have sent the NSW government maps of my area , including NSW Office of Environment and Heritage, which are inaccurate. ALL of Deep Creek and it's headwaters at the Dam area and Bolla nollas needs to be included in the catchment area.

--

From: Nambucca CMP Contact Form
To: Orla Seccull
Subject: [Contact & Lead Form]
Date: Tuesday, 15 January 2019 10:06:08 AM

Name	Removed
Email (Optional)	
Phone (Optional)	
Message	I would like to add this information to inform the Coastal Estuary and Management Survey recently closed: Details of issues you are concerned about: that 4 wheel drive and other motorised vehicles are permitted on certain Nambucca Shire beaches. 1) In my observation, the majority of vehicles do not have the necessary license to be on the beach. 2) The Council does not cooperate in regulating unlicensed vehicles, ignoring no go zones, exceedance of speed limits, dangerous and or damaging driving that impacts on the dunes, the beach, habitat and marine ecology, and health and safety of people using the beach for fitness/health and recreational purposes. Many are exhausting pollutants that can be detected for minutes after they have passed - so much for a healthy walk on the beach. To add to this, the presence of vehicles creates a stressful environment whether the vehicles are complying with regulatory requirements or not, as it is psychologically difficult to overlook their presence when their approach is often drowned by the ocean sounds. Pedestrians must be on constant guard that they or their children, their dog or possessions are not damaged by vehicles. This is a regular, observable and documented occurrence which is particularly rife during public holiday periods. The above damage is demonstrated by both licensed and unlicensed vehicles. A video report and accompanying statement of a vehicle, that included its registration details, joy riding on the sand dunes adjoining the Jagun Nature Reserve on North Villa beach, before returning and travelling at high speed , was ignored by Council regulating authorities despite many follow up inquiries. In my experience, Council ignores reports about dumping, and the unlicensed water extraction by Council itself from local streams. These are not allegations, but on record reports available for interrogation. Ideas for management: 1) In this day and age of declining natural environment, it is difficult to understand why vehicles are allowed on beaches. It is an unsustainable practice. There is no reasonable argument to support their presence when they are clearly only further eroding an already fragile

environment. There is no benefit to the community at large. There is no economic value from this kind of resident or tourist. I suggest that NSC lobbies the NSW government to remove Nambucca Shire beaches from legislated vehicle access.
2) Notwithstanding 1), more staff to regulate, the cost of which will quickly be overtaken by the fines issued. The word would soon get around that the Shire is serious about protecting its beaches for all users.
3) What about solid boom gates that photo the plate and need a beach license punched in to open.
Things you value about the coastline and estuaries and would like to see protected or enhanced:
1) The natural environment is highly valued by the majority of those who live in the area and accordingly those unadulterated features of the ocean and estuaries is what requires protection. Listed in this statement are clear examples of how the environment is damaged and neglected.
2) Campers and day trippers pollute, make fires behind the beach, litter, and waste by dumping putresibles into the creeks and ocean NB camping access is via vehicle.
3) Forestry NSW is permitted to clear fell and use highly destructive practices. After the recent license reapprovals (RFA's) by NSW Government, with even further reduced boundaries to tributaries, creeks, streams and rivers, the removal of forests that both attract rainfall and filter and control sediment from washing soil and nutrients down stream to the ocean is ignoring an obvious source of estuarine and coastal decline and a major contributor to climate change and species decline. Nambucca Shire Council needs to have a serious look at its responsibilities and priorities for estuarine and coastal health when responding to consultation on Forestry Agreements and all issues raised with Council concerning Forestry practices (that Council is able to influence). This kind of destruction adds bad upon bad to the effects of changing climate on estuaries and oceans alone. Nambucca Shire Council should also seriously review planning rules that allow the establishment of blueberry farms on slopes that run off into local water courses. Blueberry growing is renown for its high use of pesticides. It has been demonstrated within the Shire that pesticide pollutants have migrated into Deep Creek waters. Similarly there has been historical evidence of heavy metal contamination from quarry and mining throughout the Shire. i mention all these issues from beach drivers to campers to forestry, mining and farming practices because what was considered normal and acceptable for what seems like forever has become an environmental and cultural anathema. It is within the power of the Shire to benefit the broader community and protect the environment with action that logically brings reward to locals and visitors alike.

From:	Removed
To:	Orla Seccull
Subject:	Nambucca Coastline and Estuaries Coastal Management Plan (Draft)
Date:	Monday, 4 February 2019 8:39:58 AM

Good morning Orla

Please accept my apologies for the delay, work has been a tad hectic. The following is just a brief snippet, but does highlight how, if left unmanaged, our coastline and estuaries face serious consequences.

Nambucca LGA is facing a rapid increase in development, population and tourism growth. With this rapid growth natural resources, coastline, estuaries and infrastructure, unless managed will suffer.

Using Deep Creek as an example, the negative effect of this increase is already visible to those that have resided along or adjoining the water ways.

The dune areas adjoining Deep Creek opposite the caravan park provide a good example of the negative impact growth left unchecked can have. Erosion caused by unrestricted access has seen the demise of vegetation and native grass species along the bank, leading to numerous shrubs falling into the river system and loss of habitat, let alone dune loss.

Further upstream the significant death of mangroves caused by the last closure of the Deep Creek has residents asking if the impact from tourists and increased use may have contributed to the creek closuire. Council's own policy which prevents human intervention in reopening the creek must be questioned.

The area does have significant economic benefits to local businesses and it is recognised that this is positive.

On any given day through the holiday periods Deep Creek is well-used by locals and tourists alike, with kayaking, paddle boarding and families swimming. The estuary is a favourite for those that holiday in the Nambucca.

Unfortunately, the negative side to this is the use of jet skis and large boats that have steadily increased over the past few years. A dangerous combination, and unregulated activity that has many locals concerned. The increase use by these are adding to the negative human impact. The wake from Jet skis and larger boats towing tubes is causing further estuary bank erosion, noise from the jet skis adds a negative impact to the quite environment.

Vegetation removal along the river bank also seems to go unregulated by council. Unregulated attempts at river bank stabilisation through the use of concrete slabs must certainly be questioned.

I certainly hope that these type of issues are addressed in the draft plan.

I apologise for the delay in getting this brief to you, unfortunately being an emergency worker at this time of the year can get a little hectic.

The link I have added may give you an insight.. You will see in the back ground of one video unregulated jet ski activity beside and underneath the Valla foot bridge. This one area

I would be more than happy to discuss and show you first hand the impact being imposed on this one estuary of the Nambucca.

link removed

Kindest regards

Removed

Submissions Received from Government Agencies and other Stakeholders

Submissions received from Government agencies and key stakeholders other than community members are attached here.

Office of Environment & Heritage
NSW National Parks & Wildlife Service

Doc 18/914437

Mr. Michael Coulter
The General Manager
Nambucca Shire Council
P.O. Box 177
Macksville
NSW 2447

Attention: **Grant Nelson - grant.nelson@nambucca.nsw.gov.au**

Dear Michael,

Re: Integrated Coastal Management in NSW

The National Parks and Wildlife Service (NPWS) has statutory responsibility for the management of national parks and reserves in NSW. This network of protected areas incorporates approx. 48% of the NSW coastline, making NPWS one of the largest managers of coastal resources in the state. Within NPWS, the Landforms and Rehabilitation Unit has functional responsibility for liaising with reserve managers, other NSW Government agencies, LGAs and the community on a range of coastal matters/initiatives including the development of strategic documents and proposed coastal protection measures.

As you are aware, the *Coastal Management Act 2016* outlines a new framework for managing NSW coastal zone (incorporating coastal estuaries, wetlands and littoral rainforests). This new framework recognises that the sustainable management of NSW coastal resources will only be achieved through on-going collaboration between coastal land managers and by adopting a more integrated approach to managing coastal resources. The *Marine Estate Management Act 2014* and derived Marine Estate Management Strategy also highlight the need for increased cooperation and information sharing amongst coastal managers. NPWS is a key stakeholder in the implementation of the strategy, which includes several actions that cut across jurisdictional boundaries.

It is my understanding that Council is currently preparing, or considering the requirement for, a Coastal Management Program for areas under its jurisdiction. NPWS would appreciate the opportunity to contribute to the development of this program (as it relates to its specific interests) and is seeking to confirm the appropriate person/mechanism for relevant discussions to be initiated. NPWS is particularly interested in how proposed coastal development and activities may impact on:

- Threatened flora and fauna species and ecological communities;
- Marine mammals and rescue operations;
- European and Aboriginal cultural heritage;

- Community and visitor use of coastal reserves;
- Coastal landscape protection (e.g. beaches, foreshores and headlands); and
- Use, maintenance and provision of coastal infrastructure.

NPWS looks forward to positively contributing to Council's Coastal Management Program and I invite you to contact me at sophia.meehan@environment.nsw.gov.au or 02 6332 7681 should you have any queries on the extent and/or nature of involvement being sought. It would be equally appreciated if you could include both myself and Josh Chivers, Senior Project Officer (Coastal Landscapes) on relevant stakeholder lists so that potential areas for NPWS involvement can be determined. Mr Chivers can be contacted at josh.chivers@environment.nsw.gov.au or by phone 02 66507110.

Yours sincerely,

SOPHIA MEEHAN
Manager - Landforms and Rehabilitation
NSW National Parks and Wildlife Service
PO Box 2267
BATHURST NSW 2795

Forestry Corporation of NSW ABN 43 141 857 613
Corporate Office
121–131 Oratava Ave West Pennant Hills NSW 2125
(PO Box 100 Beecroft NSW 2119)
T 02 9872 0111
F 02 9871 6941
www.forestrycorporation.com.au

F2018/00964

Nambucca CMP Project Team
Hydrosphere Consulting
PO Box 7059
Ballina NSW 2478

orla.seccull@hydrosphere.com.au

Dear Ms Seccull

Thank you for the opportunity to engage with Nambucca Shire Council's Coastal Management Program. Forestry Corporation of NSW (Forestry Corporation) has a range of measures and programs in place to protect catchment values in coastal State forests and I have provided some background on these below.

The protection of catchment values when harvesting occurs in coastal State forests is maintained through the operation of the Integrated Forestry Operations Approvals (IFOA) granted under the *Forestry Act 2012*.

Planning for harvesting operations is carried out in accordance with the requirements of the IFOA which is administered by the Environment Protection Authority (EPA). Through the IFOAs, harvesting is strictly regulated under an associated licensing regime. The Environmental Protection Licence (EPL) prescribes the conditions under which harvesting and roading operations may be carried out so as to mitigate soil erosion and to protect the aquatic environment from pollution. It is based on empirical evidence drawn from scientific studies throughout the world as well as a number of catchment studies carried out within the coastal strip of NSW. Its efficacy is tested through regular auditing by the EPA and Forestry Corporation.

In addition, there is also a large body of scientific evidence from both Australia and overseas that shows that timber harvesting which complies with environmental protection prescriptions poses a much lower risk to water quality than many other land uses.

Forestry Corporation has adapted its forest management techniques to reflect world's best practice. It has done this by implementing management practices shown to be effective through research by organisations such as the Cooperative Research Centre (CRC) for Catchment Hydrology (now E-Water CRC), CSIRO and universities. In addition, as part of a continuous improvement framework, Forestry Corporation is committed to monitoring the effects that its activities may have on the environment, including aquatic habitats and water sources.

…/2

Consistent with both their management objectives and the relevant environmental legislation, Forestry Corporation has put in place a comprehensive, mandatory water quality monitoring program in a selected sample of NSW native forests. The aim of the water quality monitoring program is to determine whether licensed forestry activities have an identifiable impact on water quality and if so, to quantify the level of that impact. Results of the program have consistently shown that Forestry Corporation's activities do not have a significant adverse impact on water quality, and that the likelihood of impacts is greatly reduced in catchments where timber harvesting is conducted on only a small proportion of the catchment at any time.

Further, Forestry Corporation has implemented procedures and systems as part of its Environmental Management System (EMS) and has received independent certification (ISO 14001), a measure of world's best practice. Part of the EMS involves the auditing of various elements, especially targeting those elements that have greatest potential for environmental harm. Forestry Corporation has also been certified as compliant with the internationally accredited Australian Forestry Standard, a measure of world best practice in forest management. Such certifications ensure that NSW State forests continue to be sustainably managed and environmentally protected and provide solid evidence of the high environmental standards achieved in the catchment of the lake from which your products are marketed.

We welcome the opportunity to engage with you further during the development of this plan and would be happy to provide further detail to assist you in your understanding of our role in maintaining catchment health. Please contact Dr Peter Walsh, Soil and Water Specialist, on 02 6656 8824 if you require further information on any aspect of our work in the catchment or any additional details in relation to this letter.

Yours sincerely

Dean Kearney
Senior Manager Planning

20 December 2018

Orla Seccull
Senior Environmental
Consultant Hydrosphere
Consulting
Suite 6, 26-54
River St,
Ballina, NSW
2478

Sent via email: orla.seccull@hydrosphere.com.au

Dear Ms Seccull,

NAMBUCCA COASTLINE AND ESTUARIES COASTAL MANAGEMENT PROGRAM

Thank you for your letter of 26 November 2018 inviting Roads and Maritime Services to provide comment on the development of the Nambucca Coastline and Estuaries Coastal Management Program (CMP).

As a key agency with statutory and policy responsibilities related to the safety and accessibility of New South Wales waterways for recreational and commercial vessels, Roads and Maritime welcomes the opportunity to work closely with Council in the development of the CMP.

Roads and Maritime expects that the CMP will consider the full range of issues relevant to facilitating safe navigation, including ensuring that there is sufficient and well maintained maritime infrastructure and related facilities to meet demand into the future. This includes consideration of the needs of both local and visiting vessels.

In terms of existing information, it is suggested that Hydrosphere Consulting review the Mid-North Coast Regional Boating Plan released by Transport for NSW in 2015. The Plan provides a summary of waterway management and infrastructure issues within the waterways covered by the CMP and it was developed following community and stakeholder consultation. The Plan can be viewed at https://maritimemanagement.transport.nsw.gov.au/documents/mid-north-coast-reg-boating-plan.pdf.
As a number of actions in the Plan have now been implemented, Roads and Maritime can provide updates on specific issues as required.

For more information, updates and future requests for comment, please direct all enquiries to Andrew Mogg, Director, Maritime Infrastructure Delivery Office at mido@rms.nsw.gov.au.

Yours sincerely,

Andrew Mogg
Director
Maritime Infrastructure Delivery Office

NSW GOVERNMENT | Department of Primary Industries

OUR REF: C18/604

16 January 2019

Ms Orla Seccull
Nambucca CMP Project Team
Hydrosphere Consulting
PO Box 7059
BALLINA NSW 2478
Via email: orla.seccull@hydrosphere.com.au

Dear Ms Seccull

Re: Scoping study for the Nambucca Coastline and Estuaries Coastal Management Program

I refer to your letter of 7 November 2018 providing DPI Fisheries, a division within the Department of Primary Industries, the opportunity to provide input into the scoping study for the Nambucca Coastline and Estuaries Coastal Management Program (CMP). I apologise for the delay with my response.

DPI Fisheries is responsible for ensuring that fish stocks are conserved and that there is "no net loss" of key fish habitats upon which they depend. To achieve this, the Coastal Systems Unit assesses activities under Part 4 and Part 5 of the *Environmental Planning and Assessment Act 1979* in accordance with the objectives of the *Fisheries Management Act 1994* (FM Act), the aquatic habitat protection and threatened species conservation provisions in Parts 7 and 7A of the FM Act, and the associated and *Policy and Guidelines for Fish Habitat Conservation and Management (2013 Update)* (DPI Fisheries P&G) (https://www.dpi.nsw.gov.au/fishing/habitat/protecting-habitats/toolkit). In addition, DPI Fisheries is responsible for ensuring the sustainable management of viable commercial fishing and aquaculture; quality recreational fishing; and to promote the continuation of Aboriginal cultural fishing within NSW.

The Department of Industry, which includes DPI Fisheries, is part of the Marine Estate Management Authority. The Authority oversees the *Marine Estate Management Act 2014* which provides for the coordinated management of the marine estate. A key initiative of the Authority is the NSW Marine Estate Management Strategy (https://www.marine.nsw.gov.au/__data/assets/pdf_file/0007/815596/Marine-Estate-Management-Strategy-2018-2028.pdf). The Marine Estate Management Strategy:

- provides for an overarching, strategic approach to the coordination and management of the marine estate
- identifies management initiatives to address the priority threats based on the findings of the NSW Marine Estate Threat and Risk Assessment (https://www.marine.nsw.gov.au/key-initiatives/threat-and-risk-assessment)
- seeks to balance economic growth, use and conservation of the marine estate.

Project area

DPI Fisheries understands that there are no geographical or size requirements for CMPs and that where upstream areas impact on the coastal zone, then these areas should be considered for inclusion in the CMP. These factors should be considered when determining the CMP boundaries, particularly in the case of the Nambucca River estuary where upstream activities and environmental issues affect the coastal zone.

Fisheries resources and DPI Fisheries P&G

Key fish habitats are defined within the DPI Fisheries P&G and are graded by 'type' on the basis of their sensitivity, or their importance to the survival of fish (refer to section 3.2 of the DPI Fisheries P&G for further information). The area covered by the proposed CMP includes a range of important key fish habitat types. The area is also important for the recreational and commercial fishing sectors and for Aboriginal cultural fishing. Overall, the CMP should aim to conserve the fisheries resources and key fish habitats that underpin these important uses.

Where the CMP recommends or allows for works or activities within the key fish habitat or adjacent to key fish habitat, then these activities should be planned, designed and undertaken in a manner that is consistent with relevant policies and guidelines specified within the DPI Fisheries P&G.

Priority Aquaculture Oyster Lease

The CMP area includes Priority Oyster Aquaculture Areas. The CMP should aim to maintain and improve water quality to ensure the ongoing sustainability of aquaculture operations within the area. The water quality guidelines for oyster aquaculture areas are detailed in the NSW Oyster Industry Sustainable Aquaculture Strategy (https://www.dpi.nsw.gov.au/fishing/aquaculture/publications/oysters/industry-strategy).

Threatened Fish Species

Parts of the CMP area are mapped as known or expected habitat for threatened fish species. DPI Fisheries threatened fish species distribution maps can be found here: https://www.dpi.nsw.gov.au/fishing/species-protection/threatened-species-distributions-in-nsw/freshwater-threatened-species-distribution-maps.

The CMP scoping study should identify areas mapped as known or expected habitat for threatened fish species with the intention of protecting these areas from activities or developments that would pose a significant impact to threatened fish species.

Marine Estate Management Strategy

The Marine Estate Management Strategy 2018-2028 (https://www.marine.nsw.gov.au/__data/assets/pdf_file/0007/815596/Marine-Estate-Management-Strategy-2018-2028.pdf) identifies management initiatives to address priority threats based on the findings of the NSW Marine Estate Threat and Risk Assessment (https://www.marine.nsw.gov.au/key-initiatives/threat-and-risk-assessment). It is important that the CMP scoping study considers the Threat and Risk Assessment, in particular, the threats and risks relevant to the CMP area.

In addition, the CMP scoping study should consider the relevance of the principles and management initiatives to manage priority threats to the marine estate as outlined in the Marine Estate Management Strategy. Where relevant management initiatives or actions may not be able to be undertaken immediately, the scoping study should investigate how the CMP will enable such management initiatives to be incorporated into the CMP in the future. Examples of relevant initiatives include an estuary-wide domestic foreshore structure strategy, an estuary-wide bank management strategy, diffuse source water pollution management, and estuary-wide bank management and marine vegetation management plans.

Conclusion

DPI Fisheries looks forward to working with Nambucca Shire Council and it representatives in developing the CMP. If you have any further enquiries, please contact me on 02 6626 1375 or jonathan.yantsch@dpi.nsw.gov.au.

Yours sincerely

Jonathan Yantsch
Fisheries Manager, Coastal Systems (North Coast)
Aquatic Environment, Primary Industries NSW

NAMBUCCA RIVER OYSTERS

4 Thistle Street

Nambucca Heads NSW 2448

License No 12386

ABN:48390596016

Mobile No:0403338501

Jean Ford

In response to the Nambucca Coastal and Estuaries Survey

I would like to see Gumma take on the same transformation as the project that Kempsey Shire did at Boyters Lane it has been a proven method and it works

Government approved it and it has won awards so funding should be a given for our Council.

The biggest problem is that the owners are not willing to part with this land and if nothing is done to stop the acid ,heavy metals and silt from going into our river we will have the biggest even fish kill oyster kill and crabs kills.

This has been an ongoing problem for years with every bit of funding that has been thrown at it unsuccessful.

The fisherman pay a fee to be able to fish in our river as do the oyster farmers yet we don't get support to have clean water.

In 2006 this project came up because government made Council take this on to get funding it has run out and needs to be up dated again for more funding.

This is all well and good but if things do not chance truism oyster farming fishing will no longer happen in the Nambucca River.

NEWS

Wetland rehabilitation project a winner

ENVIRONMENT

THE transformation of a degraded dairy farm into a thriving coastal wetland that has delivered ecological, social and economic benefits for the South West Rocks community, has won Kempsey Shire Council an environmental excellence award.

The Boyters Lane Wetland Rehabilitation Project on the lower Macleay River estuary was named the overall winner of the Natural Environment Protection and Enhancement: On-Ground Works category at the NSW Local Government Excellence in Environment Awards on Monday, December 3.

Kempsey Shire Council outperformed Bathurst, Tweed Heads and Ryde councils to win the award – which recognises "on ground" initiatives to conserve, protect and enhance natural environments – and was also crowned the winner of the Division A category for council areas with less than 30,000 people.

Director operations and planning Robert Fish said the long-term rehabilitation project was a great example of Council working with the local community to achieve results.

"It's projects like this that bring to life our community's values of healthy environment and biodiversity, creating a wealth of experience and working together to make the Macleay Valley a wonderful place to live.

"The site has some fantastic examples of fresh and salt water wetland areas that have regenerated since the rehabilitation project commenced. With small pockets of aquatic and terrestrial ecosystems, the site is home to many fauna species.

Continued below

TRANQUIL: An aerial view of the award-winning Boyters Lane Wetland rehabilitation site. **Photo: Kempsey Shire Council supplied.**

'Severely degraded 25 hectares'

CONTINUED from above

"In particular birds that are very popular with bird watchers," Mr Fish said. He acknowledged the efforts of council's senior natural resources officer, Ron Kemsley, and his drive and passion for the project.

"Ron Kemsley has done an outstanding job for the community in coordinating this project in partnership with the South West Rocks Community Dune Care volunteers. Many thanks also to all others who have been involved through the life of the project, including the significant volunteer effort."

Council bought the severely degraded 25-hectare site south of South West Rocks in 2002.

A detailed environmental assessment was undertaken which identified the area as an important habitat refuge for a range of fauna, including migratory and wading bird species.

The extensive rehabilitation began in 2005 and included planting more than 15,000 native trees and shrubs, protecting and improving eight hectares of mangrove and saltmarsh, and constructing two kilometres of walkways, bird hides and an environmental information hut.

More than 230 species of birds have been detected at the site, including some endangered species.

PROUD: Adam Spencer presents the awards to Erin Fuller, and Ron Kemsley.

More for families, tourists to enjoy

CONTINUED from above

More than 230 species of birds have been detected at the site, including some endangered species. The wetland is also providing an important fish nursery for estuarine species within the broader Macleay River system.

More visitors and greater community interaction with the environment has led to the approach now being applied in other council-managed environmental rehabilitation projects. Council also plans further improvements to the site.

Forestry Corporation of NSW ABN 43 141 857 613
Corporate Office
121–131 Oratava Ave West Pennant Hills NSW 2125
(PO Box 100 Beecroft NSW 2119)
T 02 9872 0111
F 02 9871 6941
www.forestrycorporation.com.au

F2018/00964

Grant Nelson
Coordinator of Strategic Planning and Natural Resources
Nambucca Shire Council
PO Box 177
MACKSVILLE NSW 2447

grant.nelson@nambucca.nsw.gov.au

Dear Mr Nelson

Thank you for providing Forestry Corporation of NSW (Forestry Corporation) with the opportunity to comment on the 2018 report entitled Land and Soil Hazards on the Nambucca Beds, Northeast NSW by Michael Eddie.

The report discusses the method used by Forestry Corporation to assess the soil erosion and water pollution hazard associated with our forestry operations. This method was developed by an expert panel that consisted of representatives from CSIRO, the NSW Office of Environment and Heritage, the NSW Department of Primary Industries, the Queensland Department of Primary Industries, Forestry Corporation and an independent soil scientist and is considered by those experts to provide an appropriate level of environmental protection. There was no new information contained in the report you reference that had not already been fully considered by the panel in developing the methodology used by Forestry Corporation.

As noted in our submission to council last year, which is attached for reference, timber harvesting in coastal State forests is strictly regulated by the Integrated Forestry Operations Approval (IFOA) granted under the *Forestry Act 2012*. The Environmental Protection Licence (EPL) associated with the IFOA prescribes strict conditions under which harvesting and roading operations may be carried out so as to mitigate soil erosion and to protect the aquatic environment from pollution. It is based on empirical evidence drawn from scientific studies throughout the world as well as a number of catchment studies carried out within the coastal strip of NSW. Its efficacy is tested through regular auditing by the Environment Protection Authority (EPA) and Forestry Corporation.

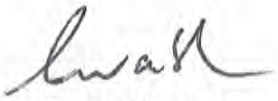
When planning forestry operations in the Nambucca River Catchment, Forestry Corporation takes a conservative approach when applying the soil erosion and water pollution hazard assessment method.

It should be noted that there is a large body of scientific evidence from both Australia and overseas that shows that timber harvesting that complies with environmental protection

prescriptions poses a much lower risk to water quality than many other land uses. Most recently, research carried out by the University of New England and published earlier this year found the best practice measures used by Forestry Corporation to protect waterways are effective and working.

Please contact me on 02 6656 8824 if you require any further information on any aspect of our work in the catchment or any additional details in relation to this letter.

Yours sincerely



Dr Peter Walsh
Soil and Water Specialist

Encl.

Feedback from representatives of Gumma IPA and Nambucca Heads LALC, July 2019

Council staff informally met with representatives from Gumma Indigenous Protection Area and the Nambucca Heads LALC in late July 2019. Some points discussed include:

- Climate Change Adaptation was discussed in reference to:
    - Mapping of potential impacts to SLR.
    - Mapping of wild/ cultural food resources particularly interested in areas where Council need to undertake bank management works. The area in front of Wellington Drive in Nambucca was specifically mentioned. Council is undertaking works at this location this year.
- Existing and planned grants and studies involving Gumma IPA and the Nambucca Heads LALC:
    - Waste management - an EPA grant has been received by the LALC along with the Marine Science Centre to implement waste management activities in the lower estuary [Nambucca River estuary], for example, litter socks, in consultation with Council.
    - Pippi distribution - a study is being undertaken by DPI Fisheries/ Marine Science Centre/ DPI on the distribution of pipis within a study area extending from South Beach National Park [Gaagal Wanggaan National Park] northwards into the Coffs Marine Park [Solitary Islands Marine Park].
    - Dolphin monitoring – this project identified feeding paths and nurseries routes; oyster racks as a foraging area; and potential noise impacts such as piling of new highway bridge.
- Preferences and recommendations for management by Gumma IPA and Nambucca Heads LALC:
    - That Warrell Creek be closed to commercial fishing due to the estuary's value as a cultural food resource and nursery as well as heavy use by recreational users.
    - Additional enforcement of recreational powered vessels is required. It was suggested speed restrictions apply within 15m of the bank to reduce the impact of wash on bank erosion (e.g. in Warrell Creek).
    - Delivery of more cultural/ environmental stories along foreshore areas (e.g. implementation of the Masterplans foreshore walk).
    - Avoiding monocultures of landscaping in public areas.
    - Include more bush foods.

Appendix C. STAKEHOLDER ENGAGEMENT STRATEGY

C1. OVERVIEW

Stakeholder engagement is an important component in developing a CMP, with varying levels of consultation required across the CMP Stages. This strategy aims to inform all relevant stakeholders of the project, provide background information on the CMP process and encourage input from interested parties for consideration in the CMP. The strategy is intended to facilitate identification of key uses and stakeholder values within the study area and seek information on stakeholder concerns, issues, management priorities and aspirations.

The strategy recognises that individuals have varying opinions and that there are likely to be inconsistencies and incompatibilities in stakeholder priorities. This strategy aims to provide an avenue for all interested stakeholders to be heard and provide sufficient information such that the project team can make informed decisions in delivering an optimised CMP.

This stakeholder engagement strategy consists of the following key communication mechanisms:

- A project website containing up-to-date information.
- Targeted letters of consultation to relevant public authorities, aboriginal organisations and registered parties and special interest groups.
- Meetings and teleconferences.
- Community questionnaire (online and hardcopy).
- Drop-in and information sessions.

C2. TARGET STAKEHOLDERS

The key stakeholder groups targeted as part of this strategy are listed below. This may not be a complete list with additional stakeholders identified during the roll-out of this strategy to be contacted and provided with the opportunity to contribute.

- Local Government:
    - Bellingen Shire Council (BSC).
    - Coffs Harbour City Council (CHCC).
    - Kempsey Shire Council (KSC).
    - Nambucca Valley Council (NVC).
- Committees:
    - Nambucca River Creeks, Estuaries and Coastline Management Committee.
    - Interagency Committee.
- State Government and other Agencies:
    - Marine Estate Management Authority.
    - Marine Rescue Nambucca.
    - North Coast Local Land Services.
    - NSW Department of Planning, Industry and Environment (DPIE - Crown Lands; Property Management).
    - NSW Department of Planning and Environment.

  - NSW Department of Primary Industry (Fisheries, Agriculture, Water).
  - NSW Forestry Corporation.
  - NSW DPIE – Energy, Environment and Science (EES)
  - DPIE - National Parks and Wildlife Service (NPWS).
  - NSW State Emergency Service.
  - Transport for NSW - Maritime.
- Aboriginal organisations and registered parties:
  - Nambucca, Bowraville and Unkya LALCs.
  - NTSCorp.
  - Registered parties as advised by NTSCorp.
  - Wanggaan (Southern) Gumbaynggirr Nation Aboriginal Corporation RNTBC (Native Title holders)
- Businesses and commercial interests:
  - Bowraville Chamber of Commerce and Industry Inc.
  - Macksville Chamber of Commerce and Industry.
  - Nambucca Heads and Valla Chamber of Commerce.
  - Professional Fishermen's Association.
  - Nambucca Shellfish Coordinator.
  - Coastal caravan parks.
  - Nambucca Tourism Association.
  - Special Interest Groups:
  - Nambucca Valley Landcare.
  - Nambucca Valley Conservation Association.
  - Scotts Head Dune Care.
  - Nambucca River User Group.
  - Scotts Head Community Group.
- Community/Sporting Clubs/Reps
  - NSW Surf Life Saving - (Nambucca Heads SLSC, Macksville – Scotts Head SLSC).
  - Nambucca River Dragons (Dragon boaters).
  - Nambucca Offshore Fishing Club.
  - Scotts Head Fishing Club.
  - Valla Beach Tavern Fishing Club.
  - Identified recreational fishing advocates.
- Local High Schools:
  - Bowraville Central High School.
  - Macksville High School.

  - Nambucca Heads High School.
- Local Residents/ Community Members.

C3. PROPOSED ENGAGEMENT ACTIVITIES

Table 15 summarises the proposed Nambucca CMP stakeholder engagement strategy.

Table 15: CMP Stakeholder engagement strategy

Target Audience	Consultation Tools	Timing	Desired Outcome	Hydrosphere Consulting Responsibilities	NVC Responsibilities	Comments/ Status
Local Government						
Nambucca Valley Council	Project team inception meeting (with DPIE - EES)	Stage 1	Receive feedback on the proposal and discuss/refine the program and methodology. Capture information from Council and obtain any data that may be relevant. Carry out a land-based field inspection of the estuaries and coastline.	Agenda, attendance, minutes/actions arising.	Arrange venue, attendance.	Complete 3/7/2018.
	Emails and teleconferences (as required). Liaison with Council staff in the following departments: • Agriculture • Tourism • Development • Flooding • Infrastructure and Sewerage	Ongoing and as needed for resolution of specific issues	Ensure consistency with existing programs and identify opportunities to collaborate or provide assistance in delivery. Respond to requests for information.	Ongoing resolution of issues to keep project on track.	Introductory email to all Council staff and Councillors. Suggest specific managers for teleconferences. Ongoing resolution of issues to keep project on track.	Introductory email sent 9/11/18.
	Progress update/ client contact (monthly)	Ongoing	Communicate progress and issues to be resolved.	Provide progress report by email.	Ongoing resolution of issues to keep project on track.	Ongoing
	Council meeting	Stage 4	Presentation of the draft plan to Councillors for endorsement to go on public exhibition. Provide Councillors with information that they can take to their constituents, forewarn them of contentious issues, etc.	-	Prepare Council meeting notes and attend Council meeting to obtain approval for public exhibition.	-
Coffs Harbour City Council, Bellingen Shire Council and Kempsey Shire Council	Targeted correspondence (letter via email)	Stage 1	Notify of project, introduce project team and key contacts. Advise of key outputs and dates. Request input on plan development.	Prepare draft letter to GM for inclusion on NVC letterhead.	-	Complete.
Committees						
Nambucca River, Creeks, Estuaries and Coastline Management Committee (represented by key local stakeholder groups including government organisations, Councillors, the three LALCs and special environmental and interest groups).	Assessment of representation	Stage 1	Key agencies to be represented on the Committee.	Ensure all key agencies are represented.	Provide list of Committee representatives.	Complete Oct 18. DPIE - Crown Lands representative added to Committee Nov 18.
	Committee progress meeting	Stage 1 – November 2018	Provide project update.	n/a	Provide update of CMP progress to Committee.	Complete.
	Committee progress meeting	Stage 3	Discuss key findings of Stage 2. Discuss the risks, cost and benefits of potential management actions and seek early buy-in on preferred actions by those stakeholders likely to be responsible for implementation.	Presentation of stage 2 findings and potential management actions.	Provide update of CMP progress to Committee.	-

Target Audience	Consultation Tools	Timing	Desired Outcome	Hydrosphere Consulting Responsibilities	NVC Responsibilities	Comments/ Status
	Committee progress meeting	Stage 4	Present Draft CMP for Public Exhibition. Communicate progress, discuss issues and resolve any concerns. Seek concurrence and feedback.	Presentation of draft CMP. Prepare issues to be presented and discussed.	Arrange venue, attendance, meeting minutes.	-
Interagency Committee	Introductory email.	Stage 1 - official notification of project	Official notification of the project during early stages. Identify interest in further consultation.	n/a	Introductory email.	Completed Sep 18. No interest in further consultation identified.
State Government and other Agencies						
DPIE - EES	Inception Meeting (with NVC)	Stage 1	Receive feedback on the proposal and discuss/refine the program and methodology. Capture information from Council and obtain any data that may be relevant. Carry out a land-based field inspection of the estuaries and coastline.	Agenda, attendance, minutes/actions arising.	Arrange venue, attendance.	Completed July 18.
	Teleconferences and emails (as required)	All stages	Respond to requests for information.	Ongoing resolution of issues to keep project on track.	-	Ongoing.
Other State Government and other Agencies (see list above)	Initial contact (phone)	Stage 1	Obtain contact details, briefly introduce project.	Teleconferences.	Provide contact details of existing contacts.	Complete.
	Targeted correspondence (letter via email)	Stage 1 (after webpage launch)	Notify of project, introduce project team and key contacts. Advise of key outputs. Request input on plan development.	Draft introductory email. Identify issues, ideas and areas of concern. Documentation of consultation.	-	Completed Nov 18.
	Targeted correspondence (phone/ email)	All stages, particularly Stage 3 (to discuss the feasibility of planned management actions)	Obtain input into study. Discussion RE feasibility of potential management actions (Stage 3), responsibilities and funding.	Identify issues, ideas and areas of concern, documentation of consultation.	Attend telephone conferences, respond to emails as required.	Ongoing.
		Stage 4	Involvement in official notification and review of draft CMP.	-	Forward draft CMP for comment.	-
	Targeted correspondence (letter via email)	Stage 4 (prior to certification)	Gain written agreement from public authorities for any actions to be carried out by, or on land or assets owned or managed by a public authority under the *Coastal Management Act 2016 15(4)*b.	Initial phone discussions, prepare draft letter for inclusion on NVC letterhead.	Approve content and send written request for concurrence.	-

Target Audience	Consultation Tools	Timing	Desired Outcome	Hydrosphere Consulting Responsibilities	NVC Responsibilities	Comments/ Status
Aboriginal organisations						
Local Aboriginal Land Council's (Nambucca, Unkya and Bowraville) NTSCORP (representatives of for the Gumbaynggir Nation) Wanggaan (Southern) Gumbaynggirr Nation Aboriginal Corporation RNTBC (Native Title holders)	Targeted correspondence (letter via email) Follow up phone calls and emails	Stage 1 - official notification of project (after webpage launch) Ongoing – notification of key milestones	Official notification of the project during early stages. Discuss proposed plan/management process, invite input and gauge the level of interest in further participation. Identify individuals willing to relay information on local Aboriginal heritage. Determine ability for river system to sustain key cultural practices and how management arrangements may have to change to ensure this. Notify and invite community to attend public information/ meeting events. Provide contact details for further information.	Initial phone contact. Draft introductory letter.	Provide contacts, attend meetings.	Completed Nov 18. Two registered parties identified. No other interest in further consultation identified for Stage 1.
	Presentation/meetings (pending interest as determined during Stage 1)	Stage 1	Engage community in project, identify community issues and concerns and facilitate ideas.	Prepare visual materials/presentation, facilitation.	Arrange venue, attendance.	N/A
Businesses, Comm**ercial Interests, Special Interest Groups and Community/ Sporting Clubs**						
Targeted Stakeholders as per list above	Initial contact (phone)	Stage 1 (after webpage launch)	Obtain contact details, briefly introduce project.	Teleconferences.	Provide contact details of existing contacts.	Complete Nov 18.
	Targeted correspondence (letter via email)	Stage 1	Notify of project, introduce project team and key contacts. Advise of key outputs and dates. Request input on plan development.	Draft introductory email. Identify prompts RE issues, ideas and areas of concern. Documentation of consultation.	-	Complete Nov 18.
High School						
Bowraville Central High School; Macksville High School, Nambucca Heads High School	Targeted correspondence (letter via email)	Stage 1	Notify of project, introduce project team and key contacts. Advise of key outputs and dates. Request input on plan development. Encourage student and guardian involvement in community survey.	Initial phone contact. Draft introductory letter.	-	Complete Dec 18.

Target Audience	Consultation Tools	Timing	Desired Outcome	Hydrosphere Consulting Responsibilities	NVC Responsibilities	Comments/ Status
Local Res**idents/ Community Members**						
General Community	Webpage	Commence in stage 1 Ongoing – project updates provided at key stages	Advertise project. Provide the community with links to information, plans and strategies already prepared (with significant consultation). Advertise key milestones dates/events, especially the survey, public exhibitions and drop-in sessions. Encourage community involvement. Provide a contact pathway and feedback form/communication portal.	Prepare content, host webpage, format and maintain material.	Approve content.	Complete and published Nov 18.
	Media releases	All stages		Prepare content.	Approve content, release approved content to media.	Ongoing. Media release introducing project and Stage 1 completed Nov 18.
	Community survey (primarily online and paper-based)	Stage 1	Engage the broader Nambucca community and obtain input into study. Gather representative community information regarding the estuaries, issues, priorities and opportunities and suggestions, etc.	Design survey (using survey monkey). Host survey on webpage. Collate paper-based surveys. Analyse and report results.	Provide input on content. Approve content. Distribute and collect paper-based copies to/ from Council chambers and libraries.	Completed Jan 18.
	Public drop-in session #1 (open session, formal presentation and Q&A session)	Stage 1 - during community survey period	Engage community in project, identify community issues and concerns and facilitate ideas.	Prepare visual displays, handouts, feedback forms, presentation, facilitation	Arrange venue, attendance.	Completed Dec 18.
	Public Display (Draft CMP)	Stage 4	Communicate proposed plan to public, provide avenue for community to have input into future actions, and obtain feedback from public.	Display of documentation on webpage, manage exhibition, receive submissions, forward acknowledgements, summary of submissions received.	Approval for public display, display of documentation at community offices and link on website.	-
	Public drop in session #2 (open session, formal presentation and Q&A session)	Stage 4	Present and discuss proposed plan/management actions to community, fine-tune community input, garner community support, and obtain feedback from public.	Prepare visual displays, handouts, feedback forms, presentation, facilitation.	Arrange venue, attendance.	-

Appendix D. STATUS OF MANAGEMENT ACTIONS

This Appendix outlines the status of relevant management actions from previous relevant management plans including:

- *Nambucca River Estuary Management Pan (BMT WBM, 2008)*.
- *Coastal Zone Management Plan for the Nambucca Shire Coastline (Umwelt, 2012)*.
- *Swimming Creek Plan of Management (NSC, 1995).*
- *Nambucca River Master Plan and Master Plan Compendium (RDM et al., 2010)*.
- *Deep Creek Entrance Management Policy (NSW, 2013)*.
- *Gumma Gumma Wetland Restoration Plan (NSC, 2015)*.
- *Nambucca Ecohealth Project 2016/17 (Mika et al., 2018).*
- *Lower Nambucca Estuary Water Quality Study: Management Strategy* (GECO Environmental, 2005).
- *A Climate Risk Adaptation Strategy for Nambucca, Bellingen and Kempsey – Appendix 1: Nambucca Allocation of Strategy Actions (Climate Risk, 2010).*

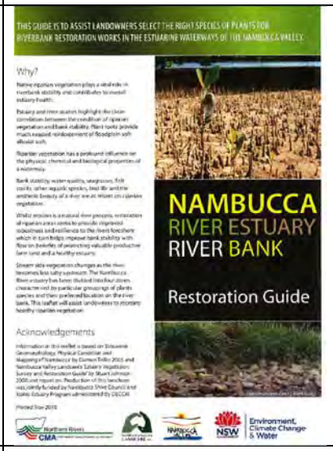
All management actions have been allocated a status (i.e. complete, not complete, ongoing, not commenced, unknown). The status of 'ongoing' refers to the nature of the action requiring constant implementation (i.e. weed & pest management) while 'commenced' indicates that the action is currently being completed or in some cases will be completed following the outcome of another action or external factor.

Coastal Zone Management Program

Scoping Report – Implementation of Actions 2008-2018
Nambucca Shire Council

NAMBUCCA SHIRE COUNCIL

NSW GOVERNMENT Office of Environment & Heritage

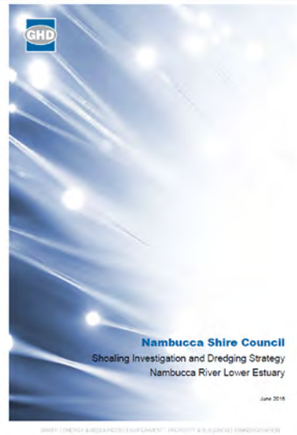
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Bank Erosion	Management Strategy 1	Improve overall riverbank condition (including riparian habitats) on all major streams and waterways within the Nambucca Valley	Council; Landcare; Local Land Services; Office of Environment and Heritage; NSW Department of industry Fisheries	High	Infinite and ongoing	Funds for bank stabilisation works are made available each year	Fish Habitat Action Grants (FAG) NSW DPI; Office of Environment and Heritage (Coast and Estuary Grants); RMS & Pacifico (inkind); Landcare	ongoing	Riverbank stabilization works ongoing. Stabilisation works undertaken along River Street, Ferry Street, Stuart Island, Lower Nambucca; Wirrimmbi; Warrell Creek; Bellvue Drive; Macksville Foreshore; Riverside Drive; Wilson Road; Road Rodeo Drive; Deep Creek.	 Photo: Bank Stabilisation at Wirrimbi 2017	Mapped location available for some areas. A review of the Bank Stabilisation works and mapping is required is required.
		1.1	Seek Grant Funding for River bank rehabilitation	Council, Landcare and Natural resource agencies	High	n/a	ongoing	Environmental Levy; Fish Habitat Action Grants (FAG) NSW DPI; Office of Environment and Heritage (Coast and Estuary Grants); RMS & Pacifico (inkind); Landcare	ongoing	Council has received grant funds from OEH; Landcare; DPI Fisheries (fish habitat action grants);	As above	Various locations.
		1.2	Raise Public awareness in relation to Riverbank Management Options	Council, OEH; lLandcare	High	n/a	ongoing	Environmental Levy; Fish Habitat Action Grants (FAG) NSW DPI; Office of Environment and Heritage (Coast and Estuary Grants); Landcare	ongoing	Council in association with other agencies has produced signs for bank works; a brochure on riparian bank management;		various
		1.3	Address knowledge gap in respect to shoaling within the estuary and its relationship to Erosion	Council; Crown Lands; NSW Maritime; DPI Fisheries	High	n/a	n/a	Crown Lands; Environmental Levy;	incomplete	Council has prepared a shoaling investigation in the lower estuary. It did not include a significant investigation into erosion		
Nambucca River Estuary Management Plan	Development Impacts	Management Strategy 2	Minimise the environmental impact of new development by integrating best practice water management approaches (encompassing design, construction and operation) into Council's planning, approval and regulatory systems	Council	High	Staff Time	$0	Environmental Grant Streams	Complete	A range of Urban Water Sensitive Design, and Best Practice incorporated into Council's NLEP2010 and DCP2010 and other Policies. Fact sheets prepared and placed on Council's website.		Refer to Nambucca DCP 2010 https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-OSF-44-28-00
		2.1	Incorporate best practice soil and water management principles within Development Control Plans	Council	High	Staff Time			complete	Councils Development Control plan has been appropriately updated.		
		2.2	Conduct workshops for the local construction industry on soil and water management	Council	High	Staff time			complete	Workshop undertaken at Local industry night during the preparation of the LEP and DCP.		
Nambucca River Estuary Management Plan	Water Quality	Management Strategy 3 3.1	Reinstate tidal flow through the Stuarts Island Causeway, whilst minimising risk to swimmers utilising the Bellwood Swimming Hole	Council	High	$100,000	$0	Fish Habitat Action Grant	Complete	Culvert installed.		yes

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Education and Awareness	Management Strategy 4	Raise community awareness about the sensitivities and values of Nambucca River Estuary and the potential for boating and water sports to impact on these values	Council	High	$2-3000 per sign	$0	Environmental Levy.	Ongoing	Two prints of Water User and Good Boating pamphlets printed and distributed. Interpretive information provided at key boating locations such as Stuart Island. Information/ signage is dated/ tired and requires renewal . Council resolution to install sign at Deep Creek. New sign to be installed at renewed Rotary Lookout in Nambucca Heads.	 Warrell Creek Signage.	no
		4.1	Public Displays at key community areas & brochures and education material for school and interest groups	Council	High	As above	n/a	Environmental Levy	Ongoing	As above.		no
		4.2	Signage to alert boat users of impacts on the environment.	Council	High	As above	n/a	Environmental Levy	Not complete	No action taken in respect to this matter at this point in time	n/a	no
Nambucca River Estuary Management Plan	Water Quality	Management Strategy 5	Support sustainable aquaculture industries within the Nambucca River estuary by application of the highest levels of catchment and waterway management to ensure that the estuary's water quality is sufficient to maintain this industry, in clearly identified areas	Council/ Natural Resource agencies; Oyster Industry	High	$30 per sample	$0	The environmental Levy contributes an annual budget to Water Quality Monitoring in the LGA. For the 2018/19 period it is $10,000	Ongoing	Two water monitoring projects completed (Newee Creek and Nambucca River). Water quality improvement project completed at Gumma Swamp, ongoing monitoring being undertaken. Oyster industry completes its own water quality testing Ecohealth Monitoring Program recently completed 2018) Data Loggers installed in Gumma Gumma Creek and Watt Creek currently sampling water flows and a range of other matters. Water quality monitoring undertaken at Deep Creek during closed periods. Urban Stormwater Management Project presently underway at Dawkins Park in Macksville (2018)	 GPT constructed at Freshwater Creek (2010)  Water Quality monitoring in the upper catchment (2018)	Refer to other individual reports
		5.1	Integrate State government policy requirements for aquaculture into Council LEP or DCP as appropriate	Council	High	n/a	Staff Time	Council	n/a	Staff investigated this matter as part of the preparation of the Nambucca LEP 2010. Draft maps were prepared for incorporation into the LEP. The State government preferred not to include as part of the LEP.		
		5.2	Update LEP and DCP to incorporate best practice soil and water management requirements	Council	High	n/a	Staff Time	Council	Complete	Councils Development Control plan has been appropriately updated.		
		5.3	Initiate targeted water quality Monitoring	Council	High	n/a		Environmental Levy; OEH, various natural resource agencies		As above.		

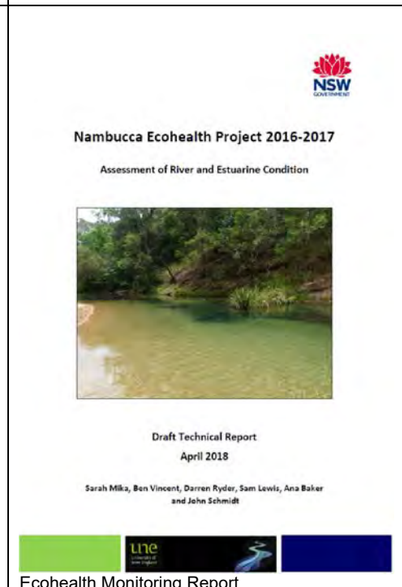
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		5.4	Identify risk and impact of sewage spill from existing pump stations with a view to upgrading priority systems	Council	High	n/a		Council	ongoing	Council is developing a Pollution Reduction Program with the EPA. Council has improved telemetry at pump stations; Council has increased overflow storage at priority stations, Council has targeted awareness campaigns such as media releases to discourage non-biodegradable wipes from being flushed; Council is presently investigating resourcing in this are to support more improvements to monitoring	  Pump choke caused by non-biodigradable wipes.	
		5.5	Investigate options to Phase out Macsksville STP outlet from direct discharge into estuary to improve oyster harvest zone classification	Council	High	$100 - $150,000 for design feasibility; $500,000 + for implementation	n/a	OEH; LLS; Council; DPI;	Not commenced	nil		
		5.6	Encourage employment of dedicated officer for the sourcing of funding for implementation of strategies and actions to protect the Nambucca's Waterways	Council	High	$70,000 + on-costs	n/a	Council and various natural resource agencies	Ongoing	Council has created a role in Council for the sourcing of grant funds to support all areas of Council's responsibilities including natural resource management. Council partners with other natural resource agencies such as Nambucca Valley Landcare and Local Land Services to support implementation of actions in our plans and strategies		
		5.7	Support programs focussed on assisting agricultural industries improving there management systems.	Council and DPI Agricultural	High	n/a	n/a	Council and various organisations	ongoing	The Nambucca River Oyster Growers have developed their own Environmental Management System. Horticultural industries are preparing best practice guides;		
		5.8	Confirm and re-enforce approaches to management for chemical and oil spill responses within the Nambucca River Estuary	Council om conjunction with the Newcastle Port Corporation	High	n/a	n/a		Not commenced	Not Commenced		

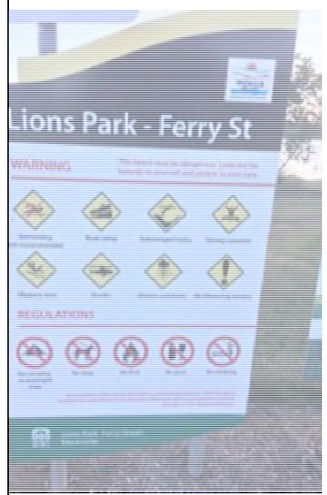
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Environmental Landuse Planning	Management Strategy 6	Protect habitats of high ecological and estuarine conservation value (eg saltmarsh, wetlands, littoral rainforests, riparian zones and floodplain wetlands), through appropriate landuse planning and development controls	Council	High	Staff Time	$0	Planning and Environmental Related funding programs	Ongoing	All major and minor waterways now zoned under NLEP2010. Valla Urban Growth Area mapped over 70HA of sensitive land as Environmental Management. LEP 2010 Gazettal	 Nambucca DCP 2010 – extract from Valla Growth Area	Refer to Nambucca LEP 2010 Maps. https://www.planningportal.nsw.gov.au/find-a-property
		6.1	Amend the Nambucca LEP and DCP to protect High Value Habitat including Endangered Ecological Communities; and Fish Habitats	Council; OEH, DPI Fisheries	High	Staff Time	Staff Time	Department of Planning and the Environment	ongoing	New urban Growth areas released with Environmental protection zones included; Nambucca LEP 2010 mapped wetlands, saltmarsh, mangroves appropriately;		
		6.2	Inform private landholders of the presence of High Value Habitats on their land.	Council; OEH	High	$20-$30,000	$40,000 + in-kind support by OEH	OEH saving our species program	Complete	In 2015 Council mapped all potential Endangered Ecological communities. As part of this exercise landholders with Potential EEC's on their land were notified and invited to contribute to the project by allowing their property to be used for Ground trothing purposes.		
		6.3	Encourage protection of High Value Habitats Particularly Riparian Vegetation	Council; LLS; DPI Fisheries and OEH	High	Staff Time	Staff Time	Presently Biodiversity Conservation Trust; OEH; and DPI Fisheries	Ongoing	Landcare provides a Land For Wildlife Program in the Nambucca Valley support landholder property bases conservation agreements. Council has offered funding for this program in the past. A potential future project may be Shire Wide Stewardship site Feasibility assessment, highlighting properties in the shire that may have significant natural resource value if protected into perpetuity.		

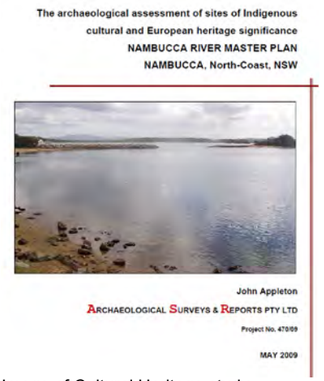
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Environmental Landuse Planning	Management Strategy 7	Incorporate riparian protection zones within Council's planning framework to safeguard them from potential future development and land-use change	Council	High	Staff Time	$0	Planning and Environmental Related funding programs	Complete	Wetlands, saltmarsh, mangroves also zoned appropriately as Environmental Management or Environmental Protection under NLEP2010. LEP 2010 Gazettal	 Nambucca LEP 2010 Land Zone Map extract	Refer to Nambucca LEP 2010 Maps. https://www.planningportal.nsw.gov.au/find-a-property
		7.1	Mandatory clauses inserted in the LEP to protect the ecological and geomorphic function of all Nambucca Shires streams and riparian lands.	Council; Department of Planning and Environment	High	Minimal	n/a	Planning and Environment related grant funding	Not Complete	The Water Management Act, Coastal Management SEPP provide consideration to Development near to watercourses or streams. No special provisions were added to council's LEP outside of the state government requirements.		
		7.2	Riparian Corridor Management Study preparation or implementation	Council; OEH	High	$50-$70,000	n/a	OEH, Environmental Levy, DPI Fisheries,	Ongoing	Council and other agencies have prepared a number of investigations examining riparian condition and recommendations. These include River Reach Plans (landcare), as well as riparian conditions mapping.		
		7.3	A shire wide stream and riparian lands map be created	Council; OEH	High	$15-$20,000	n/a	OEH; DPI Fisheries;	Complete	Council has riparian condition mapping prepared as part of Estuary Management Study for the Nambucca River. This mapping has recently been undertaken for all major creeks and the Nambucca River (2019)		
		7.4	Council to consider integration of the Standard LEP 'Preservation of Trees' provisions	Council	High	nil	n/a	n/a	Complete	Council has considered tree preservation provisions with the Nambucca LEP 2010 during its initial drafting. Site specific tree preservation controls are active in an area at Valla in accordance with Council's DCP.		
Nambucca River Estuary Management Plan	Enhance Habitat of high ecological Value	Management Strategy 8	Enhance condition of habitats of high ecological and/or conservation value e.g., saltmarsh, wetlands, littoral rainforests, riparian zone and floodplain wetlands	Council; OEH; Fisheries and other agencies with Natural Resource responsibilities	High	$50-70,000 for a Riparian Study; $15-20,000 for some Stream Order mapping and priority mapping	Various depending on site and scale of issues	Council's Environmental Levy, OEH; Fisheries and other agencies with Natural Resource responsibilities	Ongoing;	Projects to improve habitat have been undertaken at various locations: - Stuart island - Watt Creek - Deep Creek - Macksville - Sand Island - Lower Nambucca - Wirmrimbi - Various coastal wetlands and Riparian areas updated monitoring program required	 Riparian zone enhancement at Deep Creek Valla	Some mapping available however it is not comprehensive and requires updating.

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		8.1	Rehabilitate areas of high ecological value where degredation has occurred. Management priorities should be based on the area and condition of remnant vegetation and adjacent landuses: - Develop GIS based mapping resources - Develop appropriate plans to facilitate the process of rehabilitation - Development of appropriate record keeping techniques	Council	High	$30-$50,000	Various	Council; Saving our species	Ongoing	Council has prepared vegetation mapping for the shire including, indicative Endangered Ecological Community Mapping; Broad Landcover mapping; Koala Habitat Mapping; Site specific management areas are target by staff as issues are identified.		
		8.2	Development of a program of weed control with the estuary in conjunction with the North Coast Weeds Advisory Committee	Council; North Coast Weeds Advisory Committee	High	n/a	n/a	North Coast Weeds Advisory Committee	ongoing	The North Coast weeds Advisory committee has developed a number of policies and programs to support weed management in the region.		
Nambucca River Estuary Management Plan	Shoaling awareness and implications	Management Strategy 9	Raise community awareness of coastal/estuary processes to increase the level of understanding of shoaling mechanisms and associated implications as well as the consequences of intervention measures	Council	High	$20,000	$0	Environmental Levy; Rescuing our Waterways Program (Crown)	Complete	Shoaling investigation prepared by GHD in 2016. In the investigation included a community forum and community consultation which included an education component. Sign to be placed at Rotary Lookout with historical information regarding shoaling and other matters. Next phase would be a river sediment size investigation, to determine source of lower estuary sediments, particle size and composition.	 Study image	Yes within study
Nambucca River Estuary Management Plan	Maintain and Enhance River condition to support recreational boating and water sports	Management Strategy 10	To maintain and enhance the condition of Nambucca Valleys waterways to allow for responsible recreational boating and water sports activities	Council; RMS; Oyster Growers; DPI Fisheries	High	Variable costs	$0	RMS Boating Now; Environmental Levy; Fish Habitat Action Grants; Fisheries; Recreational Fishing Trust;	Ongoing	River User Group Formed; Collaboration on various boating Now projects with River User Group; Offshore Fishing Club and other appropriate organisations. Various activities undertaken to support riparian improvements, bank stabilisation, riparian revegetation and the like. Supported GUMMA IPA and Coffs Marine Research annual clean up days while active.	 River clean up day 2011	Some mapping available

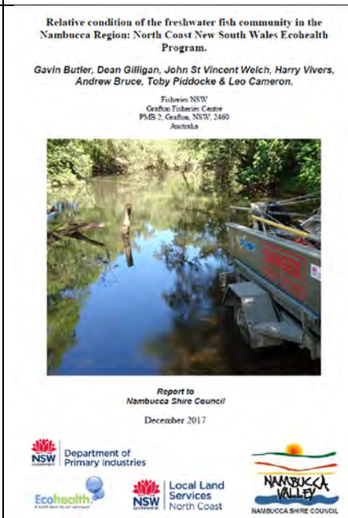
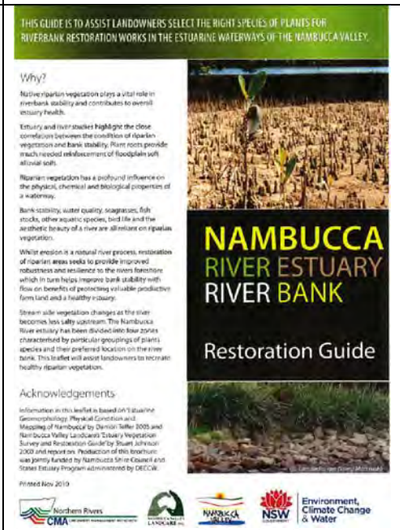
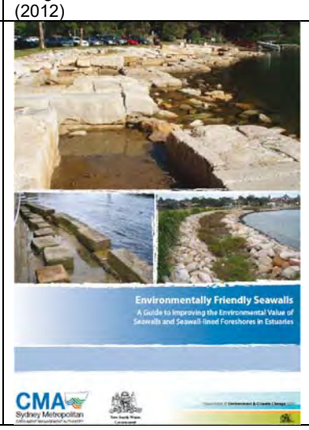
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Access Points to the river including Boat Ramps and associate facilities	Management Strategy 11	Rationalise and improve access points, boat ramps and associated facilities to protect existing estuarine values and to provide quality public foreshore access to the estuary	Council; RMS	Medium	1 million +	ongoing	S94 contributions; Environmental Levy; Boating Now	Ongoing	Council has undertaken improvement works at various locations in the Nambucca River and other areas through access to both the Better Boating and Boating Now programs. To date the following activities have been completed: - Ferry Street boat ramp and floating pontoon improvements - Stuart Island amenities; Floating Pontoon, parking, general functional improvements; - Shelly Beach amenities and Boat Ramp Re-surfacing Current funding available for: - Deep Creek boat ramp improvements; - Gordon Park amenities, parking; Jetty and boat ramp improvements - RSL CarkparK Boatramp Improvements Future Projects funded for Weir Reserve; Gumma Reserve and a Canoe Trail between Grassy Park and Devils Elbow.	 Lions Park Macksville Boat Ramp Improvements, Floating Pontoon and Fish Cleaning Table.	Yes, Main boatramps Mapped on Councils website and RMS website; http://nambuccashire.maps.arcgis.com/apps/webappviewer/index.html?id=4f950c384f794d6394f8e12d3c67cf04&query=Boat%20Ramp%20Locations,Boat_Ramp_ID,1 http://www.rms.nsw.gov.au/maritime/projects//boating-now/map/index.html#?z=12&lat=-30.681011490717495&lon=152.9882761525024
		11.1	Repair or improve existing public boat ramps, as detailed in the table of the Estuary Management Plan contained in the appendix of this document.	Council; RMS; Offshore Fishing Club	Medium					As above:		
		11.2	Investigate the need for future boat ramps and associated recreational activities at : - Tewinga or wirrimibi - Henstock Reserve (Warrell Creek) - Welshes Park (Talarm)	Council; Boating, fishing or kayak clubs; RMS;	Medium	n/a	n/a	Environmental Levy; Boating Now; DPI Fish Habitat funding; Recreational Fishing Trust	ongoing	Council has investigated formalising facilities at Tewinga and the proposed informal ramp used at present does not present safe site lines/ distances to Rodeo Drive particularly if towing a boat trailer. Henstock reserve has not been investigated further; Council has a draft budget in the 19/20 period to examine improvements to Welshes Park		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		11.3	Review Council Plans of Management for various Council reserves including Shelly Beach and Boultons Crossing; - Certification of existing on site effluent system; - Regarding of unstable bank in front of camping area; - Closure of the northern access to vehicles; - Installation of bins; - Consider relocation of access road away from creek; Shelly Beach - Illumination of the navigation markers/ leads - Connection of amenities to power;	Council; DPI Crown Lands;	Medium	$17,000	n/a	Environmental levy; Boating Now; RMS; various natural resource agencies	ongoing	The existing on site system at Gumma Reserve has appropriate Council approvals; Council received funding under the boating now program to replace the amenities and the associated management system as well as undertake improvements to the boat ramp and the foreshore infront of the camping ground. These activities will be undertaken in the 19/20 financial year. It is understood that the offshore fishing club has made several enquiries with the offshore fishing club to illuminate or replace the leads. The boat ramp and amenities at shelly beach was recently upgraded under the boating Now program. No power was connected to the area as part of this process.		
Nambucca River Estuary Management Plan	Water Quality Monitoring	Management Strategy 12	Integrate and improve upon existing water quality monitoring activities occurring within the estuary to provide a better indicator of overall estuarine health, whilst addressing all existing licence and operational requirements	Council; OEH	Medium	$40,000 establishment cost; $50-60,000 annual fee	$0; annual allocation made to water quality monitoring from the Environmental Levy. $10,000 allocated in the 2018/19 period.	Environmental Levy; Various Natural Resource agency grants	Ongoing	Two water monitoring projects completed (Newee Creek and Nambucca River). Water Quality Monitoring Project ongoing at Dawkins Lake, Gumma Swamp, and Deep Creek During closed conditions; Monitoring is continuing at Gumma Swamp. Ecohealth Monitoring Program completed in 2017/18 period 31 monitoring sites established as part of this program. A better system of recording monitoring results would be beneficial. During the 2017/18 year results were received at Dawkins Park; Deep Creek, Ecohelath sites and Scotts Head. No formal recording system is maintained.	 Ecohealth Monitoring Report	Yes refer to Ecohealth Monitoring report. Not available on Councils Website at the time of writing this report.
		12.1	Review current monitoring scheme			$10,000	n/a	OEH; Environmental Levy' other Natural Resource Agencies	ongoing	As above		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		12.2	Determine feasibility of establishing a water quality database for storage and use of water quality data;						Not Complete	As above		
		12.3	Support a high level ecohealth monitoring program.	Council; OEH	Medium	$60,000/ year	$100,000+	Funding shared between Environmental Levy and OEH	Complete	An ecohealth monitoring program completed the initial year during the 17/18 period. Future follow up monitoring should be undertaken at every 2-3 years.		
Nambucca River Estuary Management Plan	Recreational Use of Lower Estuary for swimming and other activities	Management Strategy 13	Improve swimmer safety in the lower estuary (particularly at the V-wall) by a variety of means including improved signage / safety equipment, provision of new swimming areas and/or improving the safety aspects of existing swimming areas	Council; RMS	Medium	$5 million +	$0	Environmental Levy; RMS	Ongoing	The Nambucca River Master Plan makes further recommendations in regard to safety in this area. Swimmer Safety Signage has been erected at all popular swimming locations in accordance with Australian Standards.	 Image of safety Sign	
		13.1	Provide/ Improve Signage at the V-wall and at Shelly Beach Ramp	Council; RMS	Medium	$2500/ sign	$40,000+	Council	Complete	Council installed safety signage at all public foreshore locations		
		13.2	Improve the quantity and accessibility of safety and rescue equipment near the v-wall and along the breakwall.	Council; DPI Crown lands	Medium	$5000	n/a	DPI Crown Lands	Not Complete	Theft and Vandalism recognised as a concern.		
		13.3	Identify suitable options for restricting flow through the v-wall to improve swimmer safety;	Council; DPI Crown lands; OEH; NSW RMS;	Medium	Feasibility $150,000+ Environmental Assessments $200,000; Construction $3-5 million	n/a	DPI Crown Lands	Not Complete	The Nambucca River Masterplan concluded that the hole in the v-wall is to remain open. No further action has been taken in respect to this item.		
		13.4	Consider the creation of alternative safe swimming locations in the lower estuary; including enclosing a swimming area to ingress of sharks	DPI Crown Lands	Medium	Feasibility Study $50,000; Environmental Assessments $50,000; Construction $300,000	n/a	DPI Crown Lands; Council	Not Complete	As above;		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Shoaling and knowledge	Management Strategy 14	Address localised shoaling and erosion problems and improve navigable access where practical and most needed in the lower estuary giving consideration to the likely effectiveness, costs and benefits of works as well as the potential impacts	Council; Crown Lands; RMS	Medium	Dependent on issue scale and location	$0	Rescuing our Waterways Program (NSW Crown Lands)	Ongoing	The Nambucca River Master Plan identified the application and approvals process to be followed to gain the necessary approvals and licences to dredge the river. The Master Plan concluded (after community consultation) that the Nambucca River need only support the existing style of boats not deep hulled boats. Shoaling Investigation completed in 2016 and identified priorities and potential costs.		Shoaling investigation (not available on Councils website at the time of preparing this report).
		14.1	Address shoaling and erosion problems associated with navigation issues in the lower estuary if critical navigation issues arise	DPI Crown Lands; DPI Fisheries; and OEH	Medium	n/a	n/a	Rescuing our Waterways Program (NSW Crown Lands)	Not complete	As above		
		14.2	Support Development of state-wide regional strategy or legislation relation to entrance dredging	Council	opportune			To be resolved at state level.		The Nambucca River Masterplan identified that the social benefit of deeper channels may not be sufficient justification for the continued economic burden of dredging.		
Nambucca River Estuary Management Plan	Heritage Conservation	Management Strategy 15	Ensure proposals that affect the estuary and surrounds afford an appropriate level of protection to items and areas of Aboriginal and European cultural heritage	Council; OEH; NTSCOPR; Local Aboriginal Lands Councils	Medium	$100,000	$0	Office of Environment and Heritage; Environmental Levy	Ongoing	As a component of the Nambucca River Master Plan a detailed Aboriginal and Cultural Heritage Study was completed. The recommendations from the study will be addressed in any future works or projects in areas of significance. Council undertakes appropriate consultation with relevant bodies when designing work/ projects in the lower estuary.	 Image of Cultural Heritage study	AHIMS register maintained by OEH; http://www.environment.nsw.gov.au/awssapp/Login.aspx?ReturnUrl=%2fawssapp Nambucca LEP 2010 maps other Heritage items and conservation areas. https://www.planningportal.nsw.gov.au/find-a-property
		15.1	Complete a heritage study for the shire and add items to LEP and GIS	Council; NSW Heritage Office; LALC's	Medium	$100,000	n/a	OEH; NSW Heritage Office	Not complete	Heritage studies have been complete for some areas of the shire Eg, the lower estuary and the town centres at Macksville and Bowraville. Councils LEP includes mapped heritage items and conservation areas as appropriate.		
		15.2	Ensure appropriate heritage information is linked to the LEP. The LEP should act is trigger for appropriate consideration during decision making	Council; NSW Heritage Office; LALC's	Medium	minimal	n/a	Council	Complete	The Nambucca LEP 2010 was prepared with Heritage consideration in mind, however for various reasons based on state government assessment, the LEP list of items should not be considered comprehensive.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Tourism	Management Strategy 16	Promote the values of the estuary in ways that promote its sustainable use and also support the valuable tourism industry of the Nambucca Shire	Council, Tourism Association; RMS	Medium	$30,000 for tourism survey and brochure; $150,000 for Foreshore Masterplan	Annual allocation towards tourism promotion and actions	Tourism industry; OEH; Environmental Levy;	Ongoing	The local Tourism Organisation and Council addressed the values and importance of the estuary in its Tourism Strategy. A new tourism strategy is presently being prepared in 2018. The Nambucca River and other natural areas have been identified as a significant asset to Tourism in the Nambucca Valley. Various surveys have been undertaken since 2008; Various brochures have been developed since 2008; The Nambucca River Foreshore Masterplan was completed in 2009	 Extract from Nambucca River Masterplan (2010)	Nambucca River Masterplan located on Council's Website. https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-SYL-75-60-41
		16.1	Conduct a market survey of tourism to the region and identify their travel habits and reasons for visiting the Nambucca Valley.	Council, Tourism Association; RMS	Medium	$18,000	n/a		Not complete	This action was also included into the Tourism Strategy (2018). This action will now be followed through the implementation of this plan.		
		16.2	Develop educational brochures for local community and tourists in relation to existing uses and values of the Nambucca River	Council	Medium	$10,000	n/a	Various	ongoing	Council has prepared a brochure titled enjoy the Nambucca River. Through funding received from the RMS under the Boating Now program, Council is preparing brochures to support a network of kayak trails throughout the estuary.		
		16.3	Prepare a masterplan for all foreshore lands in the lower estuary	Council	Short	$150,000	n/a	various	complete	Council prepared the Nambucca River Foreshore Masterplan in 2009. Actions from this plan are presently being implemented.		
		16.4	Ensure Foreshore concept designs are included in any masterplanning processes for towns and villages	Council	When masterplanning processes are undertaken	unknown	n/a	Various	ongoing	Council prepared masterplans or revitalisation plans for Nambucca Heads and Macksville. Original landscape plans for the Macksville foreshore are proposed to be re-visited in the 19/20 period.		
Nambucca River Estuary Management Plan	Research	Management Strategy 17	Initiate [recreational] fishing catch [creel] surveys on the Nambucca River estuary, which identify key fishing locations, fishing effort, catch quantities, [target species] and species caught	DPI Fisheries in association with Local organisations	Medium	Minor (most of the effort is at the expense of the volunteers.	$0	Department of Industry (NSW Fisheries)	Not commenced	No action taken at this time by Council. However it is understood that several other investigations have been or are being undertaken in the area by other organisations such as the Marine Science Centre (SCU Coffs Harbour) and the Department of Industry (fisheries)		NIL

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Research	Management Strategy 18	Obtain better understanding of fisheries habitat values and trends in fish communities over time in different parts of estuary	DPI Fisheries in association with Local organisations such as the Marine Science Centre	Medium	Partner opportunities with fisheries or research bodies such as Universities	$0	Department of Industry (NSW Fisheries)	Ongoing	It is understood that several other investigations have been or are being undertaken in the area by other organisations such as the Marine Science Centre (SCU Coffs Harbour) and the Department of Industry. The Ecohealth Monitoring Report Prepared by Council has resulted in fish monitoring in the upper catchment areas of the estuary	 Fish Survey undertaken as part of the Ecohealth reporting (2017)	NIl
Nambucca River Estuary Management Plan	River Bank Management	Management Strategy 19	Incorporate river health goals and best practice design into future bank protection works (eg construction of future foreshore retaining walls) through an integrated and streamlined approvals process	Council; Fisheries; RMS	Medium	Minimal	$0	NSW Fisheries; OEH; Environmental Levy;	Ongoing	Council's Riverbank protection works have developed overtime and Council with the assistance of other agencies is now undertaking bank stabilisation using contemporary methods that often incorporate fish habitat and riparian improvements. A guideline on Riverbank protection works has been prepared by Council and other Agencies. It requires updating to reflect current/ new legislaition. Infrastructure SEPP, Coastal SEPP, and Fisheries Management Act control riverbank works through various process.	 Image from River Bank Restoration Guideline (2012)	Nambucca River Bank Restoration Guide. https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-SYL-75-60-41
		19.1	Develop a range of engineering guidelines to be made available for undertaking foreshore works.	Council; OEH; DPI Fisheries	Medium	n/a	n/a	Council; OEH; DPI Fisheries	Complete	As above. OEH has also prepared Guidelines ' Environmentally Friendly Seawalls' which provides advice on foreshore works and alternative design solutions		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		19.2	Review approval process for foreshore structures to ensure that all proposed structures go through an appropriate process	Council; DPI Fisheries; DPI Crown Land; OEH	Medium	n/a	n/a	n/a	Commenced	DPI Fisheries are reviewing the approval process for private and public foreshore works. Nambucca Council has been invited to participate in the process. The project is being funded by NSW DPI under the Marine Estate Management Plan process.		
Nambucca River Estuary Management Plan	Climate Change and Risk	Management Strategy 20	Ensure climate change and sea level rise implications are incorporated into the current LEP and forward planning	Council; OEH; NSW Planning	Low	$220,000	Council has an annual allocation to Climate Change mitigation and Adaptation. For the 2018/19 year the budget will be $94,000 approximately	Environmental Levy; OEH	Ongoing	Council has commenced a Clean Energy Committee which oversees Coucnil's Climate Change Adaptation actions. Incorporated in NLEP2010. Flood Studies, Coastal Hazard Studies, Growth Area Planning and other Strategic Planning Documents have given consideration to effects/ impacts of Climate Change. Council has prepared and endorsed a Climate Change Risk Assessment and Adaptation Plan. Council is presently preparing a Policy on Climate Change	 Image of Flood inundation mapping in Wellington Drive from Coastal Zone Management Plan (2012)	Various Studies Available on Councils Website: https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-SYL-75-60-41 Climate Change Risk and Adaptation Plan https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-TEP-45-30-01
		20.1	Council to develop a position on Climate Change and Sea Level Rise and adopt this into the planning procedures	Council; OEH	immediate	n/a	n/a	n/a	Complete	Council has endorsed climate change scenarios for sea level rise into flooding planning and policies and Coastal Management Strategies.		
		20.2	Obtain sufficiently accurate land height information to generate inundation maps under a variety of sea level rise scenarios	Council; OEH	Medium	$100,000	n/a	OEH; DPI Crown Lands	Not Complete	Council has acquired LIDAR information for the shire, which provides accurate information on landform and height. Council is yet to undertake inundation mapping; however Coastal Risk Australia does have mapping available. This has been examined as part of the preparation of Councils Coastal Management Program. This mapping may be suitable for the interim.		Coastal Risk Australia inundation mapping: http://coastalrisk.com.au/viewer
		20.3	Consider impacts of higher mean sea levels on flood inundation levels with the estuary and broader coastline as appropriate	Council; OEH	Long Term	Flood Studies $50,000 Coastal Studies $70,000	n/a	OEH; Council	Complete	Current flood studies and coastal strategies examine the impacts of 2050 and 2100 sea level rise changes. These documents were endorsed by Council.		
		20.4	Include Sea level Rise Scenarios within LEP provisions	Council; OEH; Department of Planning and Environment	Long Term	n/a	n/a	Council; OEH; Department of Planning and Environment	Complete	Council's LEP includes provisions that require decision making give consideration to the effects of Sea level rise. Councils Policy indicates that Council taken into consideration the effects of climate change when assessing private or public works.		
		20.5	Develop Strategies to relocate existing assets that are likely to be inundated as a result of sea level rise.	Council	Long Term							

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Planning and Conservation	Management Strategy 21	Protect habitats of moderate or local ecological value (eg areas of native regrowth)	Council and various natural resource agencies as well as private landholders	Low	N/A	$0	Planning/ conservation Funding opportunities	Ongoing.	Council and other agencies have undertaken various activities in the LGA in respect to both high moderate and low ecological value. Council rezone large areas of land in the Valla Growth Area as E3 Environmental Management to improve connectivity and riparian areas. Often considered through Development applications on private land or LEP amendments	Image of Valla Urban Growth Area Zoning	Nambucca LEP 2010 maps other Heritage items and conservation areas. https://www.planningportal.nsw.gov.au/find-a-property
Nambucca River Estuary Management Plan	Protection and Conservation	Management Strategy 22	Enhance condition of habitats of moderate or local ecological value	Council in conjunction with Landholders, Department of Lands, OEH and LLS	Low	N/A	$0	Various natural resource funding opportunities; Environmental Levy	ongoing	Council and other agencies have undertaken various activities in the LGA in respect to both high moderate and low ecological value. These actions may be the result of activities to support other actions such as bank stabilisation works. Council contribute an allocation from the Environmental Levy to Restoration and Rehabilitation activities. Councils Environmental Levy contributes an annual allocation to Riparian Bank Stabilisations	Photo of Public Reserve re-vegetation	NIL
Nambucca River Estuary Management Plan	Governance	Management Strategy 23	Ensure adequate representation of all key local stakeholder groups is maintained on the Estuary and Coastline Management Committee (ECMC) and that stakeholder input is encouraged in the implementation of the Plan	Council	Low	minor	$0	Environmental Levy	ongoing	Actioned and ongoing. The past few years due to changes to Council structure the Estuary Committee has been meeting less frequently. It is the intent of staff to continue increase the frequency of these meetings as resources permit. The committee has amended its name to better reflect its objectives it is now titled the Nambucca Rivers, Creeks, Estuaries and Coastline Management Committee.	 Image of Committee Meeting at a site inspection in 2018	NIL
Nambucca River Estuary Management Plan	Governance	Management Strategy 24	Ensure all foreshore structures are appropriately licenced, designed and maintained to protect foreshore amenity and access	Department of Industry (Crown Lands)	Low	Internal to Crown Lands	$0	NIL	ongoing	Licensing with Crown Land often presents a significant project hold point for Council projects.	 Image of Council Foreshore Structure Licensed and approved by the Crown. (Macksville Foreshore) (2016)	NIL

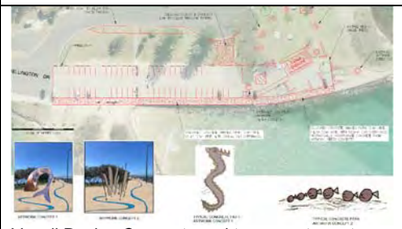
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Estuary Management Plan	Governance; Asset Planning and Tourism	Management Strategy 25	Improve recognition of Crown Land areas in the lower estuary, particular those around existing facilities that may promote greater connectivity and tourist related usage of the area	Council and Department of Industry (Crown Lands)	Low	Variable depending on item and location	$0	RMS Boating Now & cycleway program, LLS, S94 contributions, Environmental Levy;	ongoing	Cycleway partially complete between Nambucca Heads and Macksville. Planning for continuation of this link is underway. Riverbanks between Anzac Park and Bellwood Park are now connected via recycled timber pedestrian/ cycle bridge. Other cycleways, boardwalks and continually being constructed or repaired to maintain connectivity throughout the coastal areas. Boardwalks now connect the majority of the lower estuary. Department of Lands, National Parks and Wildlife Service engaged with the Nambucca River Master Plan and with the new Gaagal Wanggaan (South Beach) National Park.	 Photos of Boardwalk Areas in the Lower Estuary (2008).	Cycleway Guide for Nambucca and surrounds. http://www.ourlivingcoast.com.au/wp-content/uploads/2015/09/CyclingGuide_Nambucca.pdf
Nambucca River Masterplan	Restoration and Conservation	Precinct 2 - Stuart Island	Re-vegetation of eastern edge of island, northern end of the island; drainage line near SLC shed; New Park planting and re-vegetation Planting; weed management; new shade tree plantings	Council; Various Natural Resource Agencies	Feb-12	$27,000	$0	OEH and Environmental Levy	Complete	OEH ($40,000 estimated budget 50:50 Environmental Levy); Resulted in protection of saltmarsh and Beach-stone Curlew Habitat and Riparian Areas. Ad-hoc vehicle access to the island removed; OEH ($100,000 estimated budget 50:50 Environmental Levy) for bank stabilisation and artificial fish habitat (reef balls) on the Golf Club Side of the island. Ongoing maintenance to be undertaken as necessary	  Revegetation on Stuart Island and reef Ball installation	NIL
Nambucca River Masterplan	Heritage	Precinct 2 - Stuart Island	New interpretive material to burial site as part of "Cultural Route"	Council; NLALC	Feb-12	$2000	ongoing	Environmental Levy; OEH Heritage Program	Ongoing	NLALC engaged to prepare timeline and other information for the island. The information is still being prepared	NIL	
Nambucca River Masterplan	Placemaking	Precinct 2 - Stuart Island	New entry sign to Stuart Island park	Council; NLALC	Feb-12	$2000	ongoing	Environmental Levy; Boating Now; OEH	Ongoing	NLALC engaged to prepare timeline and other information for the island. The information is still being prepared		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 2 - Stuart Island	New loop road & boat trailer parking; New Parking	Council; RMS	Feb-12	$300,000	$0	Council; Boating Now	Complete	Boating Now funds received ($198,000); Internal Road sealed and new Trailer Parking Provided; New day parking provided.	 Stuart Island Trailer Parking and sealed inner loop.	
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 2 - Stuart Island	Bollards/post and rail to loop road and carparking	Council; OEH; RMS	Feb-12	$8000	$0	Council; Boating Now	Complete	Boating Now funds received ($198,000); Bollards used to remove ad-hoc access to various parts of the island. Some bollards to be removed at establishment of Vegetation.	 Bollards used to protect open space and sensitive areas.	
Nambucca River Masterplan	Infrastructure and accessibility; Placemakling	Precinct 2 - Stuart Island	New picnic facilities to Stuart Island Park - shelters and furniture	Council; Boating Now	Feb-12	$30,000	$0	Council; Boating Now	Complete	Boating Now funds received ($198,000); Recycled bridge timbers used to build shelters and seating. 1 BBQ provided	 Recycled bridge timber shelters Stuart Island (2016)	
Nambucca River Masterplan	Placemakling	Precinct 2 - Stuart Island	Upgrade existing brick building to more coastal character	Regional and local community infrastructure program	Feb-12	$70000	$0	Council	Not Complete	Mural provided on external wall no other modifications. Further action unlikely.	Photo of Mural	
Nambucca River Masterplan	Infrastructure and accessibility;	Precinct 2 - Stuart Island	New toilet block to Stuart Island park	Council; RMS	Feb-12	$80,000	$0	Council; Boating Now	Complete	New toilet block provided near existing brick building. $100,000 funded via Boating Now and Council 50;50.	 Amenities at Stuart Island (2014)	
Nambucca River Masterplan	Stormwater Management	Precinct 2 - Stuart Island	Vegetated stormwater basin (earthworks, planting) 300m2	Landcare/ Coast Care	Feb-12	$2,500	$0		Not complete;	Not considered necessary.		

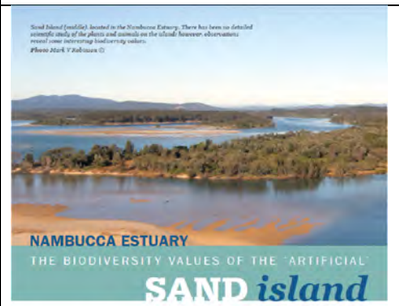
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan	Infrastructure and accessibility; Placemakling	Precinct 2 - Stuart Island	Remove old jetties & upgrade existing ramps	Council; Boating Now	Feb-12	$6000	$0	Council; Boating Now	Complete	Boating Now funds received ($198,000) 50:50 funding with Council. Old wharf removed and replaced with new. Boat ramp still functional minor works complete to adjoining banks.	 Replacement wharf at Stuart Island (2016)	
Nambucca River Masterplan	Infrastructure and accessibility; Placemakling	Precinct 2 - Stuart Island	New fish cleaning facilities	Recreational Fishing Trust	Feb-12	$5000	$0	Recreational Fishing Trust	ongoing	Grant application made in early 2018 awaiting funding announcement.		
Nambucca River Masterplan	Restoration and Conservation	Precinct 3 – Bellwood Park	Weed removal & revegetation to vegetation west of caravan park	Environmental Trust	Feb-12	$6000	$0	Environmental Trust and various natural resource grants	Ongoing	Project funded through Our Living Coast on-ground works.		
Nambucca River Masterplan	Placemaking; Wayfinding	Precinct 3 – Bellwood Park	New park entry sign	Council; Regional Tourism; Regional Development	Feb-12	$2000	$0	Various tourism and regional development grants;	Ongoing	Park identification sign added to new amenities; Additional Entrance Sign Could be added		
Nambucca River Masterplan	Landscaping	Precinct 3 – Bellwood Park	Feature planting at park entry sign	Council	Feb-12	$5000	$0	Environmental Levy; General Budget	Ongoing	Landscaping undertaken at various locations through Bellwood Park	 New landscaping (2018)	

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan	Riparian Management; Restoration and Rehabilitation	Precinct 3 – Bellwood Park	Weed removal, installation of boulders & revegetation to creek; Weed removal & revegetation to Freshwater Creek	Council	Feb-12	$19,500	$0	Environmental Restoration grants; Environmental Levy	Ongoing	Project completed under Our Living Coast on-ground works. Additional grant funds have been requested through OEH coastal program to extend and revisit works. We are presently awaiting the outcome of the grant application.	 Fringe planting near Freshwater Creek (2010)	
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 3 – Bellwood Park	New pathway to park (2.2m wide)	Council	Feb-12	$37,000	$0	Cycleway funding	Not complete	May be unnecessary. Extensive footpath network already exists in park. To be considered when existing assets are subject to replacement.		
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 3 – Bellwood Park	Mooring poles	Council; RMS	Feb-12	$9000	$0	Boating Now	Not complete			
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 3 – Bellwood Park	Bridged crossing to creek	Council, RMS	Feb-12	$15000	$0	Council; RMS	Not complete	Intended to provide link to new boardwalk. Council has extensive area of existing boardwalks to maintain. Extending to this area would create maintenance/asset management issues. May be unnecessary.		
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 3 – Bellwood Park	New boardwalk east of caravan park (2.2m wide)	Council, RMS	Feb-12	$860,000	$0	Council, RMS	Not complete	Council has extensive area of existing boardwalks to maintain. Extending to this area would create maintenance/asset management issues. May be Unnecessary		
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 3 – Bellwood Park	Upgrade existing toilets	Council	Feb-12	$30,000	$0	Council; S94 Contributions	Complete	Completed with funds from the General Budget and s94 contributions. Approximately $160,000.	 New amenities Bellwood Park	
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 3 – Bellwood Park	Upgrade existing shelters	Council	Feb-12	$30,000	$0	Council; S94 contribution	Not complete	Tied to Council's Asset management Plan and subject to funding. Existing shelters are dated but functional		
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 3 – Bellwood Park	New pavement to park shelters	Council	Feb-12	$14,000	$0	Council; S94 contribution	Not complete	Extensive footpath network already exists in park. To be considered when existing assets are subject to replacement.		
Nambucca River Masterplan	Placemaking	Precinct 3 – Bellwood Park	New structures to park entries (simple arbor)	Council	Feb-12	$6000	$0	Council; S94 contribution	Not complete;			
Nambucca River Masterplan	Placemaking	Precinct 3 – Bellwood Park	Installation of 'water play' area	Council	Feb-12	$180,000	$0	Various recreational; community facility and tourism grants	Not complete	External funding received several years ago. Council did not accept the funding for various reasons. Council resolved not to proceed.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan	Placemaking	Precinct 3 – Bellwood Park	New playground (dry play area)	Council, S94 contributions ;	Feb-12	$120,000	$0	Various recreational; community facility and tourism grants	ongoing	Park upgrades have occurred in stages; Fitness area; childrens playground received some new facilities in 2018.	 New playground facilities (2018)	
Nambucca River Masterplan	Placemaking	Precinct 3 – Bellwood Park	Sculptural water themed element to park	Council	Feb-12	$15,000	$0	Council; Regional Arts and Cultural grant programs	Ongoing	Subject to external funding; OEH cultural way grant application made in 2018 Council is awaiting the results.		
Nambucca River Masterplan	Coastal Management	Precinct 3 – Bellwood Park	Removal of existing timber wall	Council; OEH	Feb-12	$3000	$0	OEH Coast and Estuary Program; Environmental Levy;	Ongoing	Funding application made under OEH Coastal Program in 2018 Council is awaiting the results.		
Nambucca River Masterplan	Placemaking; Climate Change Adaptation	Precinct 3 – Bellwood Park	Installation of new shade trees to park; New street tree planting along Riverside Drive (25 litre stock)	Council	Feb-12	$3000	Ongoing	General Budget; and Environmental Levy.	Ongoing	Shade trees have been planted. Also grant funding received for shade structure over the childrens playground. To be installed (2018) Shade trees will be progressively planted as necessary.		
Nambucca River Masterplan	Maintenance	Precinct 3 – Bellwood Park	Installation of turf to park (eroded areas)	Council	Feb-12	$22,000	Ongoing	General Budget	ongoing	Turf installed around completed works sites. Further work to be undertaken.		
Nambucca River Masterplan	Riparian Management; Restoration and Rehabilitation	Precinct 3 – Bellwood Park	Weed removal and revegetation of drain at western edge of park	Council/ OEH	Feb-12	$4000	N/A	General Budget; Environmental Levy; Various Natural Resource Management Grants	Ongoing	Some revegetation and weed management activities have been undertaken. Subject to external funding; OEH cultural way grant application made in 2018 Council is awaiting the results.		
Nambucca River Masterplan	Placemaking and Wayfinding	Precinct 7 – V-Wall	Install themed entry signage on arrival at V Wall precinct	Council; DPI (Lands)	Mar-12	$4000	N/A	General Budget; Various Placemaking grants; DPI (Crown)	Not Complete	Subject to external funding; Council has recieved $500,000 in funding to support placemaking at the V-Wall. Council has also applied for OEH funding to support the development of the cultural way.		
Nambucca River Masterplan	Riparian Management; Restoration and Rehabilitation	Precinct 7 – V-Wall	Install rock filleting just north of V Wall	Council;	Mar-12	$25,000	N/A	Environmental Levy; Various Natural Resource Management Grants	Not Complete	Council has an annual budget towards bank stabilisation works in the Environmental Levy, however other priority locations have been addressed to date.		
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 7 – V-Wall	Upgrade existing toilet facilities	Council	Mar-12	$20,000	??	Council; S94 Funds; Other applicable grants	Ongoing	The amenities in this area was recently renovated, to bring to a satisfactory standard. However, given the significance of this location for tourism and recreation it may require renewal in the future.		
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 7 – V-Wall	Earthworks, turfing and replanting to existing eroded drain	Council	Mar-12	$10,000	??	Council	Ongoing	This area requires careful consideration, previous works completed in this area are impact by tidal inundation and overtopping of the breakwall. Solutions need to consider both these processes and the increasingly high public use of the area for recreation. Grant application submitted for V-wall precinct.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan	Safety	Precinct 7 – V-Wall	Install warning signage to V Wall swimming location	Council	Mar-12	$1,000	??	Council	Complete	Signs installed at all foreshore locations.		
Nambucca River Masterplan	Restoration and Rehabilitation	Precinct 7 – V-Wall	Mounding, re-vegetation planting, temporary fencing & signage to existing Casuarinas on V Wall	Council	Mar-12	$8,000		Environmental Levy; Various Natural Resource Management Grants	Ongoing	The V-wall path in this location is presently being re-surfaced and Council will examined the status of this vegetation at the completion of the work determine what if any restoration activities are required.		
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 7 – V-Wall	Upgrade existing path along southern edge of V Wall	Council	Mar-12	$14,000	??	General Budget; S94 contributions; Various infrastructure, accessibility and community grants	ongoing	The V-wall path in this location has recently been re-surfaced.	 V-wall path improvements (2018)	
Nambucca River Masterplan	Placemaking; Infrastructure and accessibility	Precinct 7 – V-Wall	Realign roadway and install new carparking with 65 car parking spaces & 5 coach spaces	Council	Mar-12	$90,000		General Budget;; S94 contributions; Various infrastructure, accessibility and community grants	Ongoing	Council has refined the plans for this area and costed various components for a grant application valued at $500,000. Concepts are being refined at present this project is underway.		
Nambucca River Masterplan	Placemaking; Climate Change Adaptation	Precinct 7 – V-Wall	New street & carparking tree planting (25 litre stock); New shade trees (100 litre stock); Create 'green park' along foreshore including balustrade, turf, shade trees, seating & picnic furniture	Council	Mar-12	$510,000		Environmental Levy; Various community grants	Ongoing	Council has refined the plans for this area and costed various components for a grant application valued at $500,000. This application included provision for Street Trees and other landscaping. Council is presently awaiting the results of this application. The creation of a green park has been considered. Overtopping in this location requires an alternative approach. A more urban styled coastal location will address the foreshore which will be embellished with shade trees and green space features appropriate for the harsh environment.	 V-wall Design Concept used to support grant application (2018)	
Nambucca River Masterplan	Safety	Precinct 7 – V-Wall	Install helipad for emergency evacuation	Council or SES	Mar-12	$65,000	N/A	Council; Various community safety grants	Not Complete	To be considered in future designs		
Nambucca River Masterplan	Restoration and Rehabilitation	Precinct 7 – V-Wall	Re-vegetation planting to existing Casuarinas (south of lagoon); Re-vegetate Banksia and Casuarina forest (southeast of caravan park) ; Re-vegetation to dune	Council	Mar-12	$56,000	N/A	Environmental Levy and Various Natural Resource Grants	Ongoing	Various Dune and Vegetation Management Activities have been undertaken in the area surrounding the v-wall and Headland Precinct. These activities will continue as required.	 Dune Management activities consolidation of trail and revegetation (2012)	

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 7 – V-Wall	Elevated steps to Shelly Beach; Install elevated steps to dune access at the V-wall; Create dune access including board & tie, constructed steps, fencing, re-vegetation	Council	Mar-12	$327,500	$125,000 (approx.)	Council; Various Natural Resource Grants	Ongoing	These steps and access points were installed as part of the Our Living Coast Program (2012). The area is now recognised as the 'Nyambaga Walking Trail'. Council is extending the recycled plastic boardwalk through the dune system each year. For the 2018/19 year Council has requested funding through OEH to complete the dune walk. Council presently awaiting the results of this application.	 Official Opening of the 'Nyambaga Walking Trail (2012)'.	
Nambucca River Masterplan	Infrastructure and accessibility; Placemaking	Precinct 7 – V-Wall	Upgrade existing Shelly Beach toilets	Council	Mar-12	$250,000	$200,000	S94 Contributions and the Boating Now Program	Complete	The amenities at Shelly Beach was replaced with a new facility as Regional Priority Boating Project in association with other works in the area including the Boat Ramp re-surfacing	 New amenities complete in (2017)	
Nambucca River Masterplan	Infrastructure and accessibility	Precinct 6 – Sand Island	Install mooring poles to Sand Island	Council	May-12	$18,000	Nil	Nil		For future consideration. Boats presently shore themselves on the bank of the island. Further expense on mooring poles is not necessary.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan	Tourism;	Precinct 6 – Sand Island	Install day use area/eco camping location to eastern end of Sand Island	Council	May-12	$200,000	Nil	Nil	Not Complete	For future consideration. This is a significant undertaking and not considered a priority. It may also have native title implications as a future act. The Area is also known habitat for the Beach-stone Curlew and unnecessary disturbance may impact on habitat for this and other threatened species. Various weed management restoration activities have been undertaken on the island. Council has received additional funding from Local Land Service to undertake weed management on the island during the 19/20 period.	  Documentation prepared on the Biodiversity Values of Sand Island. (2015)	
Nambucca River Masterplan	Tourism	Precinct 6 – Sand Island	Install low impact nature trail to Sand Island (combination of at ground walking track & low boardwalk) 1.2m wide	Council	May-12	$120,000			Not complete.	For future consideration. Given that that the area can only be used by persons that can access the island it has a lower priority than other similar projects in the estuary. It may also negatively contribute to anthropogenic impacts on habitat and species. The area may be best managed as an natural area.		
Nambucca River Masterplan	Placemaking; Wayfinding	Precinct 1 – Teagues Creek to Tourist Information Centre	New "welcome to Nambucca" sign	Council	Medium ((year 5 to 7)	$3000			Ongoing	Additional signage could be included as part of cultural way. To be considered in the near future.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	New street trees (25 litre plant stock, based on 1 every 15m); Planting to western side of highway	Council	Medium ((year 5 to 7)	$9,000			Ongoing	Some street tree planting and landscaping has been undertaken on the western side of the highway and within Brotherhood Park and the tourist information centre area.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	New pathway 2.2m wide	Council	Medium ((year 5 to 7)	$185,000			Ongoing	Cycleway constructed from Bellwood to Kingsworth Estate (Watt Creek). A Cycleway would be considered on the eastern side of the old Highway when works are proposed on the foreshore of the River in this area.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Re-vegetation (from Teagues Creek to Bellwood Creek); Weed control	Council	Medium ((year 5 to 7)	$25,000	n/a		Not complete.	This is presently managed by the RMS and private landholders.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Clean up rubbish removal	Council	Medium ((year 5 to 7)		Council contributed for the cost of waste disposal each year		no	Council contributed to annual clean up day of the Nambucca River Lower Estuary for a number of years. This has not occurred in the last few years.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Road re-alignment; New carparking areas; New pedestrian crossings	Council	Medium ((year 5 to 7)	$61,000	N/A		Not complete	For future consideration. The Pacific Highway has only recently been bypassed. The existing road is presently still owned by the RMS.		

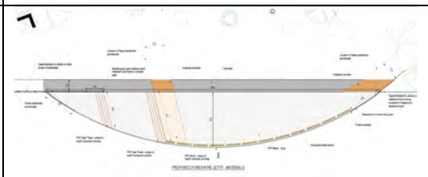
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Stepped access from shelter to pontoon; Ramped pathway to pontoon; Floating pontoon, gangway, 2 posts/pylons	Council	Medium ((year 5 to 7)	$50,000	N/A	Council; Boating Now.	Not complete	For future consideration; Pontoon does not exist. Existing bank condition does not support pontoon placement. Bank Stabilisation would need to occur prior to placing any new infrastructure in the area.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Shelter with concrete slab & seating**;** Other park furniture e.g. seats, bollards and upgrade to existing facilities. Whole of precinct from Teagues Creek to Tourist information Centre.	Council	Medium ((year 5 to 7)	$39,000	N/A	Council and various community grant program	Ongoing	A number of activities have been undertaken within Brotherhood Park;		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Pontoon at Tourist information finger wharf.	Council	Medium ((year 5 to 7)	$80,000	$80,000	Council and the Better Boating Program	Complete	Pontoon installed through Better Boating Funding and Effluent pump installed.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Bank Stabilisation; Earthworks on bank; Planted edge to river ; Ex ground tree (for feature shade tree) 100 litre stock	Council	Medium ((year 5 to 7)	$1,500	N/A however this will cost significantly more than $1,500	RMS	Ongoing	For future consideration. This issue has been raised as a concern in regards to the asset handover of the Pacific Highway. The RMS are presently investigating the issue as it relates stabilisation issues from Macksville to Nambucca Heads.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	"Cultural Way" signage; Sculptural element (on northeastern corner)	Council	Medium ((year 5 to 7)	$2,000	N/A	Council/ OEH	Ongoing	Council has applied for grant funding through OEH to plan the Foreshore Cultural Way. The cultural way will commence in this area and traverse the entire length to the V-wall. It will us art and signage n to provide a place of interest and information related to the Nambucca River.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Themed street pole treatment	Council	Medium ((year 5 to 7)	$15,000	N/A	Council or various community of placemaking funding sources	Not Complete	For future consideration. The Nambucca Chamber of Commerce engaged artist to paint poles in Bowra St Nambucca Heads.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	New carpark (21 spaces, 2 coaches, 2 caravans) 6000m2	Council	Medium ((year 5 to 7)	$500,000	N/A	Council/ Tourism funging	Not complete	For future consideration; It is noted that the land designated for carpark in the Masterplan is privately owned. There is some road reserve in this area which has potential for carparking.		
Nambucca River Masterplan		Precinct 1 – Teagues Creek to Tourist Information Centre	Screen planting to carpark; Tree planting to carpark (25 litre plant stock)	Council	Medium ((year 5 to 7)	$20,000	$5,000	Council;	Ongoing	Some roadside land scaping has occurred in this locality. Other landscaping works has been undertaken such as uplifting the large Fig trees facing the pacific Highway at Bellwood.		
Nambucca River Masterplan		Precinct 4 – RSL	Installation of rock filleting along Riverside Drive	Council	Long (year 7 -10)	$30,000	N/A	Council; DPI (Fisheries)	Not complete	For future consideration; As required, no urgent action required at this time. Some areas may require standard revetment options.		

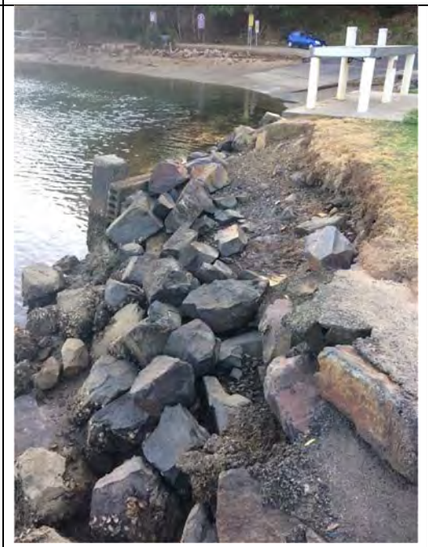
Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan		Precinct 4 – RSL	Upgrade to pathway, installation of shade trees to memorial park	Council	Long (year 7 -10)	$20,000	N/A	Council	ongoing	New bridge and other landscaping has occurred in Anzac Park. Bridge constructed with recycled bridge timbers.	 New Recycled Timber Bridge at Anzac Park (2018)	
Nambucca River Masterplan		Precinct 4 – RSL	Install new coach parking on Riverside Drive outside memorial park	Council	Long (year 7 -10)	$8,000	N/A	Council	Not complete	For future consideration. This would require removal of existing angle parking which is well used.		
Nambucca River Masterplan		Precinct 4 – RSL	Weed removal & revegetation works to Beer Creek	Council	Long (year 7 -10)	$4,500	N/A	Council; Various Natural Resource funding sources	ongoing	Beer Creek stabilised and planted with native species to suit riparian area and stabilisation.	 Beer Creek stabilisation and revegetation (2018)	
Nambucca River Masterplan		Precinct 4 – RSL	Planted buffer to Anzac memorial (low planting)		Long (year 7 -10)	$3000			Not complete	For future consideration		
Nambucca River Masterplan		Precinct 4 – RSL	New seating to Anzac memorial		Long (year 7 -10)		$20,000	Nambucca Heads Lions Club and Recreational Fishing Trust.	ongoing	Seating and new fishing platform constructed at Anzac Park. This was a successful project developed and implemented by Nambucca Heads Lions Club with funding provided by the Recreational Fishing Trust (2017)	 New fishing platform Anzac Park (2018)	
Nambucca River Masterplan		Precinct 4 – RSL	Pipe section of Beer Creek & install carparking		Long (year 7 -10)	$60,000		Council	Not complete	For future consideration.		
Nambucca River Masterplan		Precinct 4 – RSL	Install gross pollutant traps to stormwater system at Beer Creek		Long (year 7 -10)	$15,000		Council	Not complete	For future consideration.		
Nambucca River Masterplan		Precinct 4 – RSL	New 2 storey carpark to RSL carpark		Long (year 7 -10)	$2,800,000		RSL	Not complete	For future consideration. Land ownership and other aspects require consideration including 'feasibility'.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Nambucca River Masterplan		Precinct 4 – RSL	New road pavement to RSL carpark & new carparking		Long (year 7 -10)	$130,000		RSL	Not Complete	For future consideration. Nambucca RSL to consider requirements of asset.		
Nambucca River Masterplan		Precinct 4 – RSL	Urban infrastructure, lighting, furniture, signage, pavement		Long (year 7 -10)	$400,000		RSL, Council	Ongoing	Boating Now funds received for the RSL Boatramp. These funds will provide some additional lighting. Boating Now program also contributed to improving the boat ramp for passive craft launching (kayaks , canoes and the like). Works now complete New paths have been provided connecting ANZAC Park and the RSL precinct.		
Nambucca River Masterplan		Precinct 4 – RSL	Tree planting and gardens, turfing to new carparking & road circulation at RSL carpark		Long (year 7 -10)	$200,000		RSL, Council	Not complete	Planting and re-vegetation to occur as necessary to support other activities in the precinct. Re-arranging of the car parking would be subject to future consideration.		
Nambucca River Masterplan		Precinct 4 – RSL	Mixed used development (within carpark)		Long (year 7 -10)	$1,500,000		RSL, Council	Not complete	Masterplan shows some carpark re-claimed for commercial/ retail space. This will be subject to future consideration.		
Nambucca River Masterplan		Precinct 4 – RSL	Mixed used development (on water)		Long (year 7 -10)	$2,000,000			Not complete	This type of development is not considered feasible on the water due to flooding and sea level rise.		
Nambucca River Masterplan		Precinct 4 – RSL	River edge upgrade, including outside cafe		Long (year 7 -10)	$5,000		Council, Private investment	Not complete	For future consideration.		
Nambucca River Masterplan	Infrastructure and accessibility; Tourism	Precinct 4 – RSL	Upgrade boardwalk from RSL to Gordon Park 2.2 m wide		Long (year 7 -10)	$400,000		Infrastructure and accessibility; as well as tourism and recreational Fishing Trust grants	Not complete	For future consideration. An application has been made with DPI (Crown Lands) and Fisheries in respect to the renewal of the boardwalk. Council is presently awaiting approval.		
Nambucca River Masterplan		Precinct 4 – RSL	New street trees along Riverside Drive (25 litre stock)		Long (year 7 -10)	$2000		Council	Not complete	For future consideration		
Nambucca River Masterplan		Precinct 4 – RSL	New widened path from RSL precinct to southern end of Fraser Street (2.2m wide)		Long (year 7 -10)	$23,100		RSL, Council	Not complete	For future consideration		
Nambucca River Masterplan		Precinct 4 – RSL	Create shared pedestrian/local traffic zone western end of Riverside Drive (above Gordon Park) incl. Pavement, bollards, signage, kerbing, crossing		Long (year 7 -10)	$120,000			Not complete	For future consideration. Providing and extended link to Gordon Park at this location is questionable. Emphasis should be placed on the maintaining and improving boardwalk between the RSL and Gordon Park and the pedestrian link to Gordon Park from the Wellington Drive intersection (Rats of Tobruk Walk). Nevertheless improving this area and providing access at this point is not out of the question.		
Nambucca River Masterplan		Precinct 4 – RSL	Install new pavement along Fraser Street 2.2m wide		Long (year 7 -10)	$41,000			Not complete	For future consideration.		
Nambucca River Masterplan		Precinct 4 – RSL	New street trees to Fraser Street in pavement (tree surrounds plus grates)		Long (year 7 -10)	$4000			Not complete	For future consideration		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Gordon Park		Precinct 5 – Gordon Park (revised plan)	Masteplan implementation. A revised plan has been prepared.		Long (year 7 -10)			Council; Boating Now	Ongoing	The Nambucca River Masterplan as it relates to the Gordon Park was revised in 2016. The revised masterplan maintained many of the elements from the original plan whilst not committing to major infrastructure renewal such as removing and replacing carparks and parking areas. This revised plan has been prepared with funding received under the Boating Now Program and is presently being implemented in Part. Council has committed to the implementation of the Masterplan for Gordon Park which has been leveraged through significant commitment from the State Government under the Boating Now Program. To date the following has been completed: - Electricity supply relocated underground and bundled; - Existing amenities and club house demolished; - New amenities constructed; It is anticipated that in the 2018/19 period the following will be completed: - New foreshore Jetty and promenade constructed - New lighting; - New boat trailer parking - New pathways constructed - New landscaping; Council is presently awaiting Crown land approval for the foreshore jetty.	 Revised Masterplan (2016)  New Amenities Gordon Park (2016)	
Nambucca River Masterplan		Precinct 5 – Gordon Park	Remove existing cadaghi tree & lop some trees at northwest corner of park		Long (year 7 -10)	$4000			Ongoing	For future consideration. Some tree pruning is to be undertaken by as part of the Gordon Park Flying Fox Camp Management Plan. This pruning will allow access, for vegetation management and improve the amenity of the Tennis courts. Other pruning and removal was undertaken as part of the electricity supply improvements.		
River Masterplan		Precinct 5 – Gordon Park	Install sculptural element & elevated platform at top of park		Long (year 7 -10)	$550,000			Not complete	For future consideration.		
River Masterplan		Precinct 5 – Gordon Park	Stepped pedestrian access from shared pedestrian/local traffic zone down to Gordon Park, incl lookout structure		Long (year 7 -10)	$800,000			Not complete	For future consideration		
River Masterplan		Precinct 5 – Gordon Park	Demolish amenities/ tennis club.		Long (year 7 -10)	$50,000			Complete	Old amenities demolished and new amenities constructed. New tennis club constructed.		
River Masterplan		Precinct 5 – Gordon Park	Earthworks to Gordon Park		Long (year 7 -10)	$40,000			ongoing	For future consideration. Some earth works have been undertaken as part of the removal of the old amenities and underground power re-configuration.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
River Masterplan		Precinct 5 – Gordon Park	Install new carparking area to Gordon Park		Long (year 7 -10)	$76,000			Ongoing	For future consideration. New Parking area to Gordon Park has been constructed adjoining the Tennis Courts. Additional boat trailer parking will be provided adjoining the boat ramp.	 New Parking near Tennis Courts (2015)  New Boat Trailer Parking under construction in Gordon Park (2019)	
River Masterplan		Precinct 5 – Gordon Park	Realign and install new pavement to boat ramp area at Gordon Park		Long (year 7 -10)	$20,000			Not complete	For future consideration		
River Masterplan		Precinct 5 – Gordon Park	Install themed park entry sign		Long (year 7 -10)	$4,000			Not complete	For future consideration		
River Masterplan		Precinct 5 – Gordon Park	Install bollards to park edge within Gordon Park		Long (year 7 -10)	$28,000			Not complete	For future consideration. As required during completion of improvements.		
River Masterplan		Precinct 5 – Gordon Park	Install new pathway to Gordon Park (2.2m wide). Feature pavement to Gordon Park		Long (year 7 -10)	$292,000			Not complete	For future consideration. New pathway design included in revised masterplan.	 Proposed new pathway network (2017)	
River Masterplan		Precinct 5 – Gordon Park	Install artwork at Gordon Park entry from carpark		Long (year 7 -10)	$10,000			Not complete	For future consideration.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
River Masterplan		Precinct 5 – Gordon Park	Install new picnic shelters to Gordon Park, bbqs, picnic facilities		Long (year 7 -10)	$80,000			Not complete	For future consideration. Existing Shelters are dated and improvements to other parts of the park would benefit with the inclusion of new coastal themed shelters as proposed in the Masterplan.	 Proposed style of new shelters.	
River Masterplan		Precinct 5 – Gordon Park	Install seats to Gordon Park		Long (year 7 -10)	$55,000		Council; S94 contributions; Public Reserves Management Fund.	Not complete	For future consideration. Some Seating will be provided as part of the improvements to the foreshore area. Other seating will incrementally be replaced and improved.		
River Masterplan		Precinct 5 – Gordon Park	Install play/sculptural element to Gordon Park		Long (year 7 -10)	$80,000		Council; S94 contributions; Public Reserves Management Fund.	ongoing	Council has allocated funding to progress with improvements to the childrens playground in Gordon Park. Draft plans are shown opposite.	 Existing Playground awaiting grant application (2017)  Proposed Future Playground (2019)	
River Masterplan		Precinct 5 – Gordon Park	Install shade tree planting to Gordon Park (100 litre stock). Install shade trees to Carpark areas; Feature planting to Gordon Park		Long (year 7 -10)	$32,000		S94 contributions; Environmental Levy; Council	ongoing	For future consideration. Some park planting has been undertaken however this will be re-examined with the revised masterplan.		
River Masterplan		Precinct 5 – Gordon Park	New timber deck at water in Gordon Park		Long (year 7 -10)	$180,000		Boating Now; Council	Ongoing	For future consideration. Foreshore Jetty Design is completed and funding has been received through the Boating Now Program. Council is awaiting further advice from DPI (Fisheries) prior to proceeding.	 Jetty Design (2017)	

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
River Masterplan		Precinct 5 – Gordon Park	Rock filleting along Wellington Drive		Long (year 7 -10)	$30,000		Fish Habitat Action grants and various natural resources grants; Environmental Levy.	Ongoing	For future consideration as required. Bank stabilisation methods in this area would need to be on case by case basis. Some bank stabilisation has been undertaken on the fringe of the boat ramp at Gordon Park in 2019.	 Gordon Park Bank Erosion (pre-work 2019)  Gordon Park Bank Erosion (during works 2019)  Gordon Park Bank stabilisation (post-work 2019)	
River Masterplan		Precinct 5 – Gordon Park	New angle carparking at location on Wellington Drive		Long (year 7 -10)	$10,000		Council; Boating Now	Not complete	For future consideration as required.		
River Masterplan		Precinct 5 – Gordon Park	Mooring poles on beach section on Wellington Drive		Long (year 7 -10)	$15,000		Boating Now	Not Complete	For future consideration.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
River Masterplan		Precinct 5 – Gordon Park	Upgrade existing pathway along Wellington Drive to 2.2m wide		Long (year 7 -10)	$120,000		RMS; Council	Not Complete	For future consideration and subject to PAMP review.		
River Masterplan		Precinct 5 – Gordon Park	New seating locations to Wellington Drive		Long (year 7 -10)	$18,000		Council	Not complete	For future consideration		
Deep Creek Entrance Management Policy	The Deep Creek Entrance Management Policy provides management recommendation for a sensitive ICOLL at Deep Creek	3.1 Take No Action	This Option for Management relies on the system to manage itself naturally. It is a strategy that suits an area generally surrounded by natural landscape. In area surrounded by infrastructure, recreational areas, private residences; agricultural and commercial activities it may not be ideal. The do Nothing option is ok for the majority of the time however, it is not suitable in all circumstances.	Council; OEH; DPI (Fisheries); DPI (Crown Land)	Nil	Nil	Nil		Ongoing	For the majority of the time the ICOLL manages itself it is only when the ICOLL closes that Council and other agencies receive community pressure to mechanically open the ICOLL.		
		3.2 Berm Management	This option requires mechanical intervention of the berm; allowing it to be overtopped. Management of the Berm is not the recommended management option and has not been implemented to date.	Council; OEH; DPI (Fisheries); DPI (Crown Land)	Nil	Nil	Nil			This option is unlikely to ever be used.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		3.3 Assisted or Mechanical Opening	This option provides mechanical opening of the entrance at a water level. The flood study (WMA Water, 2012) recommends the entrance be opened manually at a water level of 1.4m AHD. This recommendation is the result of modelling which takes into consideration the likely risk to low lying infrastructure and property. Property inundation of residential land commences when water levels reach approximately 1.1m.	Council; OEH; DPI (Fisheries); DPI (Crown Land)	*A set trigger level to open the berm is the recommended strategy in this policy*	NIL	N/A	Environmental Levy	Ongoing to be implemented as required	This option has been implemented on 2 occasions. The first instance was during the construction of the New Pacific Highway Deep Creek Bridge crossing. At this time the ICOLL closed and the increasing water levels were effecting the works associated with the bridge construction. The entrance was opened with NSW Fisheries endorsement below the trigger level of 1.4m AHD. The second occasion was during the summer period of 17/18. The entrance closed and opened naturally after peaking at about 1.4m AHD. The entrance opening occurred at the south Valla Carpark and closed again soon After. With DPI (fisheries) endorsement and some poor water quality results Council opened the entrance mechanically south of the Council Carpark.	 Deep Creek Closed Entrance DEC 2017.  Wetland inundation with Closed ICOLL DEC 2017  Natural Entrance Opening DEC 2017  Artificial Entrance Opening JAN 2018 	

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		3.4 Voluntary Yard Raising in Hyland Park	Council investigate an option to raise yards in Hyland Park that are inundated during periods when the Entrance to Deep Creek is closed.	Council	n/a	n/a	n/a	n/a	Not commenced	This action has not been investigated further. It is notable that this is also an action in Council's Flood Risk Management Plan.		
		3.5 Powered Craft Management During Closed Conditions	Council will investigate the potential close Deep Creek to powered craft during closed conditions.	Council	n/a	n/a	n/a	n/a	Not commenced	Letter written to NSW Maritme. No Response received. No further action taken to date. The concerns raised during community consultation related to the wash of powered craft excaberating foreshore erosion due to elevated water levels.		
		3.6 Plan for recession of Coastal Habitat	Climate change and coastal recession can increase pressure on coastal ecological communities when habitat is constrained on the landward side via hard physical constraints such as roads or use constraints such as agriculture or residential development. This process is referred to as „Coastal Squeeze.. Council is to investigate opportunities to reduce the impact of Coastal Squeeze on natural environments in the Deep Creek system.	Council	n/a	Nil	n/a	Nil	Ongoing	Council has commenced the seeking opportunities to address coastal recession. A riparian area at Deep Creek has been revegetated with suitable riparian species and eliminating adhoc access to the foreshore. Council has recently mapped the condition of riparian areas as part of the Nambucca Coastal Management Program (2019). This mapping will provide a greater understanding of priority areas for restoration to assist in addressing coastal squeeze.	 Deep Creek Riparian Area (2017)	
		General Review of the Policy	The Deep Creek Entrance Management policy requires review .							All Council's policies require review in accordance with the Local Government Act requirements. During the last closure of the entrance at Deep Creek in 2017/18 the representatives from the community requested the policy be reviewed.		
Coastal Zone Management Plan 2012	**Land use planning to reduce future risk**	**Action 1**:	Council will not approve applications for new development or redevelopment of existing allotments forward of the 2050 limit of the Zone of Slope Adjustment with possible exceptions for specific coastal protection works and/or maintenance or strengthening of surf clubs (in the short-term)	Council	Short Term	Nil	Prepared by Staff	Nil	Complete	Nambucca DCP 2010 was amended to incorporate a chapter of Coastal Hazards. Adoption of Nambucca DCP 2010		https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-OSF-44-28-00

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		Action 2:	Council will require that new development, located within the 2100 hazard zone (between the 2100 zone of reduced foundation capacity and the 2050 zone of wave impact and slope adjustment), be on pier foundations designed to transfer the building loads into the Stable Foundation Zone for the 2100 planning period, Council will develop an appropriate standard pier specification as a Consent Condition for new development. The CZMP provides references to relevant standards (AS2870-2011).	Council	Short Term	Nil	Prepared by Staff	Nil	Adoption of Nambucca DCP 2010. Complete	Nambucca DCP 2010 was amended to incorporate a chapter of Coastal Hazards. Adoption of Nambucca DCP 2010.		https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-OSF-44-28-00
		Action 3:	Council will include information about the 2050 and 2100 limits of the Stable Foundation Zone on the Section 149 Certificates of relevant properties, to inform residents of the potential coastal hazard risk at each site. This will apply only to a small number of properties at Scotts Head and Swimming Creek.	Council	Short Term	Nil	Prepared by Staff	Nil	Complete	10.7 certificates are presently prepared to requirements including any requirements and the Coastal Management legislation. Ongoing changes will be required as required by changes to legislation		https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-OSF-44-28-00
		Action 4	Council proposes to zone the entire dune system along the NSC coastline as open space or environmental protection area, to enhance ecological connectivity, maintain resilient coastal ecological communities and to avoid future development risks.	Council	Short Term	Nil	Prepared by Staff	Nil	Complete	Nambucca LEP 2010 incorporates open space zones as appropriate.		https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-OSF-44-28-00
		Action 5	Council will include provisions in its DCP in relation to modifications or maintenance of existing buildings in the 2050 coastal risk area. The intent is to avoid future coastal recession risks by requiring that modifications to existing buildings not move or substantially increase the footprint of the development seaward of the existing development.	Council	Short Term	Nil	Prepared by Staff	Nil	Complete	Nambucca DCP 2010 was amended to incorporate a chapter of Coastal Hazards.		https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-OSF-44-28-00

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
	Establish a monitoring strategy to track changes to coastal condition	**Action 6**	Council proposes to establish a monitoring strategy which includes collection of data by various stakeholders. The monitoring program underpins Council's adaptive management of coastal risks and will provide information about the effectiveness of risk management and protection of ecological values. Suggested locations are noted in **Section 6.0 (Table 6.1)**.	Council	Short Term	Nil	Prepared by Staff	Nil	Not complete	A monitoring program has not been formally established at this time. An audit of beach access paths was completed in 2014/15. Other Council assets located in the coastal are managed in accordance with Councils Asset Management Plan.		https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-OSF-44-28-00
	Investigate funding sources	**Action 7**	Council will investigate potential funding sources and prepare applications and business cases to gain grant funding for priority projects.	Council	Short Term	Nil	N/A	Various Natural Resource Agencies	Ongoing	Council has been successful at gaining grant funds, various projects identified in the Coastal Zone Management Plan 2012. These funds have supported activities such as seawall and beach access improvements.	 Beach Access path installed at Valla Footbridge using recycled plastic (2015)	
		Action 8	Council will consider a specific allocation of its environmental levy to coastal protection works and a long-term fund for relocation and retreat of assets.	Council	Short Term	NIL	NIL	N/A	Ongoing	The Environmental Levy has contributed to the coast and estuary program since its commencement. Funding from the Environmental Levy is typically used to match grant funding opportunities. Larger infrastructure projects are often funded through general funds.		
	Raise community awareness of coastal processes and coastal change	**Action 9**	Maintain a coastal management page on Council's website, with information about implementation of the CZMP, information about coastal processes; information about monitoring results and community involvement activities.	Council	Short Term	NIL	NIL	Environmental Levy	Ongoing	Council has a Coast and Estuary section to website. This section is required to be updated to reflect current plans, programs and projects.		https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-SYL-75-60-41
		Action 10	At main beaches and lookouts, provide clear and well designed signage in keeping with recommendations outlined within the Nambucca River Masterplan to inform residents and visitors about coastal process hazards.	Council	Short Term	NIL	NIL	Environmental Levy; OEH	Not Complete			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		Action 11	During implementation of the CZMP, continue to support a Coast and Estuary Management Committee at Council, with representatives of local coastal communities and other agency stakeholders.	Council	Short Term	NIL	NIL	NIL	ongoing	Council Nambucca Rivers Creeks Estuaries and Coastline Management Committee is still active. Meeting with members and agency representatives have been regularly undertaken however the committee has resolved to maintain more regular meeting approx. quarterly.		
	Maintain existing rock protection to maintain functionality. (Long term actions suggest full redesign to appropriate standards. Refer to Action 28)	**Action 12**	Monitor the condition of seawalls at Scotts Head, Nambucca Main Beach, Shelley Beach and Valla Beach	Council	Short Term	NIL	NIL	NIL	Ongoing	Council regularly inspects seawalls particularly after coastal events. Minor maintenance works are undertaken as necessary. Alternatively consideration is given to appropriate pathways for major maintenance or renewal.	 Seawall in front of Valla Beach Carpark exposed (2017).	
		Action 13	Maintain existing rock protection structures, increasing the size of materials undertake other maintenance works as necessary to protect infrastructure. Note: At Nambucca Heads, maintenance works must consider the social value of art works on the breakwall. Strengthening and extending the seawall at Main Beach Nambucca heads is urgent. Maintenance/reconstruction of the seawall at Bellwood Park should be considered during this time period. Over time, as sea level rises, seawalls will need redesign and reconstruction to meet proper design standards for future conditions. Monitoring will inform decisions about the timing of this at each location, but the aim is to maximise the life of existing infrastructure.	Council	Short Term	NIL	Ongoing	Council; OEH Coastal Program	Ongoing	Council is progressively addressing seawall maintenance grant funds are obtained to assist. Council completed replace of the seawall at the Nambucca Heads Surfclub with stepped concrete bleachers (2016). OEH provided $81,000 which was matched by Council. Council has received funding to replace/ maintain seawall at Scotts Head Surfclub and Carpark (2018). $60,000 has been made available from OEH which was match by Council and other agencies; This project is presently underway. Council has received funds to repair Seawall at Main Beach Nambucca Heads for the area presently protecting the Carpark. $200,000 has been made available from OEH which has been matched by Council. This project is presently in design phase. Initial designs estimates have indicated that additional funds may be required to support the project.	 Main Beach Surfclub (2012)  Main Beach (2016)  Works Commenced at Scotts Head Forster beach to improve the stormwater outlet, seawall and access (2019)	

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
	Trial use of beach scraping to stabilise steep eroded dune escarpments on sand depleted beaches	**Action 14**	At Main Beach Scotts Head, conduct a trial beach scraping program. The works would stabilise the toe of the dune escarpment in the southern corner of Main Beach Scotts Head and help raise the beach profile. Beach scraping involves moving sand along and across the beach from the swash zone (between mean high water and mean low water). A detailed review of application of beach scraping (Carley *et. al*., 2010) is in **Appendix 5**.	Council	Short Term	NIL	NIL	Council, OEH, North Coast Caravan Parks	Ongoing	Minor beach scrapping has been under taken at Scotts Head after major coastal events and prior to school holiday periods. Beach Scrapping will be undertaken post works at the inner revetment wall at scotts head.		
	Consolidate coastal crown land parcels into a single coastal reserve for improved and consistent management	**Action 15**	Consolidate coastal crown land parcels into a single coastal reserve, and prepare a Plan of Management for the reserve as a whole. At Nambucca heads, Crown Land is currently held in multiple discrete parcels which hinders effective management of ecological values and of recreational use. Similarly, crown land at South Valla/Deep Creek area should be consolidated into single reserve.	Council; Department of Industry (Lands)	Short Term	NIL	N/A	DPI (Lands)	Ongoing	Many of the Coastal Crown Reserves have been consolidated as appropriate by Crown Lands. Council management arrangement for Crown lands has changed with the introduction of the Crown Lands Management Act 2016.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
	Strengthen weed removal programs in coastal ecological communities and replant with locally indigenous or native species	**Action 16**	In consultation with Landcare groups continue invasive species programs to remove weeds of national significance and regionally important weed species from coastal ecological communities taking into consideration the strategic and integrated management of weeds for biodiversity outcomes. Headland communities and communities along coastal creeks (e.g. Swimming Creek) should be a priority, but consideration should also be given to: - control of widespread environmental weeds to protect biodiversity outcomes; - containment of isolated environmental weeds - eradication of new and emerging environmental weeds.	Council	Short Term	NIL	NIL	Environmental Levy; Environmental Trust; OEH; LLS; Natural Resource Agencies; DPI (lands)	Ongoing	Clean Energy Fund (Coastal Reserve Weed Management) $500,000 received over 5 years to control coastal weeds in Council Management Coastal Reserves. Environmental Trust Funds Received ($80,000) for Glycine clandestine endangered population management at Scotts Heads; Various Coastal Reserve Management funds received from LLS for coastal reserves ($30,000); Landcare Coastal Reserve EEC management Funds (Swimming Creek) Received Environmental Trust (Nambucca Valley Landcare) $75,000; Beach Access Way improvements stage 1 & 2 (OEH funded $120,000) include Dune re-vegetation and weed management adjoining beach access ways across the LGA. EEC Management Valla ($30,000). Valla Headland and also Deep Creek Riparian area re-vegetation. Other weed restoration and weed management programs as programed. Please note this list is not comprehensive.	 Glycine clandestine endangered population management (2016-18).	
	Ensure consistent application of permitting conditions for beach driving permits issued by Nambucca, Kempsey and Port Macquarie-Hastings Councils	**Action 17**	Develop a memorandum of understanding (MoU) between NSC and OEH (Parks Service) so that there are consistent requirements for compliance across various land tenures. The MoU should be modelled on the existing MoU between Port Macquarie-Hastings Council and OEH.	Council	Short Term				Ongoing	Beach Access Committee developed to manage issues with access to beaches. Council undertakes regular inspections of vehicle activities on beaches using various methods.		
	Maintain, improve and rationalise beach access ways to ensure safe access onto and between the main beaches in the Shire and to ensure appropriate management of the natural dune system.	**Action 18**	Remove rubble from Main Beach (southern corner of Forster beach) at Scotts Head. Reinstate a beach access ramp separate from the boat ramp, using a design that is flexible and robust in different beach conditions.	Council	Short Term				Ongoing	Works presently underway in this area.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		Action 19	Maintain the toe of stairways at Little Beach, so that safe access is maintained. This could be achieved by extending the stairs below the beach sand level or by reinforcing the toe.	Council	Short Term				ongoing	Beach access improvements have been undertaken at various locations. Most of these need to be revisited and subject to maintenance as necessary.		
		Action 20	Upgrade and formalise the walking track between Shelly Beach and the breakwall at Nambucca Heads.	Council	Short Term				Ongoing	This trail was installed as part of the Our Living Coast Program (2012). The area is now recognised as the 'Nyambaga Walking Trail'. Council is extending the recycled plastic boardwalk through the dune system each year. For the 2018/19 year Council has requested funding through OEH to complete the dune walk. This has now been completed and is functional.	 Nyambaga Walking Trail (2019)	
		Action 21	Reinstate a beach access ramps at Shelly Beach, using a design that is flexible and robust with different beach levels. Construct controlled stormwater discharge point(s) to mitigate erosion at the car park and accesses undermining due to stormwater runoff.	Council	Short Term		$37,000	OEH coastal Program; Council	Complete	Two (2) beach access consolidated into 1 new concrete stairs installed with shower and adjoining revetment works. Stormwater Dish Drain installed along with new bollards.	 Shelly Beach Stairs (2016)	
		Action 22	Rebuild the footbridge over Deep Creek and Valla Beach, using a design suitable for an intermittently open creek entrance with occasional high flow velocities and scour potential.	Council	Short Term				Not complete		 Valla Footbridge (2018)	

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		Action 23	Maintain the headland viewing platform at Scotts Head and consider the formalisation of the walking tracks and access ways at Wakki Beach.	Council	Short Term				Not Complete	Council has applied for grant funding to improve walking trail at Wakki Beach (2019)		
		Action 24	Review beach 4WD accesses and take appropriate action to maintain, improve or otherwise ensure appropriate function and use. Dependant on consultation outcomes this may involve closure in some instances. Further details on specific 4WD Access actions are provided in Schedule Appendix 1.	Council	Short Term				Ongoing	General Maintenance to 4WD tracks has been undertaken as necessary.		
		Action 25	Monitor all beach access to ensure they function in a safe and sustainable manner. Maintain as a appropriate	Council	Short Term				Ongoing	Two (2) rounds of beach access improvements have been undertaken since the adoption of the Coastal Zone Management Plan. Some of these areas need to be revisited and monitoring after events should be standardised.		
	Maintain and improve beach amenity facilities	**Action 26**	Install shower facilities at strategic beach access locations. Designs should be robust and water efficient.	Council	Short Term				ongoing	A number of beach showers have been installed at various strategic locations.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		Action 27	Assess the condition of surf clubs and related beach amenity facilities at each of the main beaches prior to and at the end of the main summer beach/tourism season and take remedial action where necessary to ensure facilities are safe and attractive, providing amenity for beach users.	Council	Short Term				Ongoing	Improvements to the amenity of our Beach entrances and access is ongoing. Several projects have been undertaken to improvements to beach amenity and function and have been completed over the years. Including car park improvements at Thompson St; Gregory St, VallaBeach Road and the Footbridge at Valla. Swimming Creek, Shelly Beach and Mainbeach at Nambucca. Various beach accesses at Scotts Head. V-wall Improvements. New Amenities at Valla Beach Footbridge (2018) and the	 Lookout constructed at North Valla. (2016)  Revitalised Rotary Lookout (2018)  Valla Beach Amenities (footbridge 2018)	
	Improve stormwater management where stormwater outlets affect beach amenity, safety or the natural environment	**Action 28**	Conduct a Water Sensitive Urban Design Study for the catchment of the stormwater outlet onto Scotts Head Beach, with the intent of reducing peak velocities and scour and reducing water quality events (nutrients and pathogens).	Council	Short Term				Ongoing	Some minor Stormwater Management Activities have occurred however other opportunities may be available. Council supported in principle applications for stormwater management investigations in Scotts Head. Grant funding being sought with water quality as a focus.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
		Action 29	Investigate methods to manage stormwater flows across and from the car park a Beilbys Beach and Shelly Beach, which currently scour fill and erode the embankment. Investigate management of Stormwater at norther main beach access Nambucca Heads.	Council	Short Term				Not complete	Beilbys Beach impacted by Coastal Hazards. Given its isolated and open location 'planned retreated' is a viable option. Significant investment at this location is not recommended. Main Beach northern carpark access being considered for design improvements.		
	Upgrade Seawalls to meet proper Design Standards	**Action 30**	Prepare designs and costings for upgrades of all seawall assets, to remain functional with sea level and wave climate conditions beyond 2020. Reconstruction of the seawalls once more thorough investigation is done into the viability of these structures, they should be constructed to a design more appropriate to future conditions once the condition deteriorates and they are no longer 'fit for purpose', with the potential for further adaptation in future (e.g. increasing crest levels and relaying slope armouring where necessary).	Council	Medium Term				Ongoing	Re-construction of Seawall at main beach Nambucca has been undertaken in front of the Surf Club. Designs for stage 2 in front of the open space and carpark are presently underway. Seawalls at the following locations have been subject to maintenance. - South Valle Deep Creek - Scotts Head Forster Beach - Shelly Beach	 Valla Beach Seawall (2017)	
		Action 31	Reconstruct Wall infront of Valla Beach carpark and amenities. Council should plan for the future reconstruction of the South Valla seawall defence in front of the car park and amenities area. At present the beach is accreting and the current defence is buried. However, this is primarily due to the position of the Deep Creek entrance. Planning should consider the migration of the creek entrance and the potential for this area to be eroded in future. No works are likely to be required in the immediate time frame however	Council	Medium Term				Not complete	Coastal Engineering advice is recommended prior to proceeding down the Reconstruction path.	 Failing seawall Valla Beach (2018)	

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
	Review Traffic Management at Beaches	**Action 32**	Conduct a traffic study of the beach parking areas and vehicle circulation at Scotts Head to identify opportunities for improved layout. Options to be considered include changed turn around areas for the boat ramp; limiting parking beyond the surf club. Any potential changes should be discussed with the local community and would be included in reviews of the Master Plan for the Crown Reserve.	Council with Department of Primary Industries (Crown Land)	Medium Term				Not complete			
		Action 33	Prepare a traffic study on vehicle access to Main Beach Nambucca Heads, to consider alternative access arrangements beyond 2020, as coastal recession takes effect.	Council	Medium Term				Not complete	Council has improved the access to main beach at the surfclub and improved parking at Swimming Creek. Council is presently preparing designs for improvements to the main beach seawall, carpark and pedestrian Accesses.	 Main Beach bleachers and vehicle access (2016)	
	Mitigate effects of stormwater discharges on Beaches	**Action 34**	At Scotts Head Main Beach, modify the stormwater drainage system in accordance with the results of the WSUD study, to reduce scour in the southern corner of the beach, protect beach access and address stormwater quality issues.	Council	Medium Term				Not Complete	Stormwater issues in this small catchment include water quality (potential for elevated nutrient and bacterial levels), and excessive discharge velocities which are exacerbating scour of the beach. In addition, there may be opportunities to enhance water reuse in the catchment. Catchment study is required to be undertaken prior to implementation of improvements.		
		Action 35	The seaward margin of the car park at Beilbys Beach is being eroded by stormwater scour and wave impact. Consider a stormwater outlet at the Beilbys Beach car park to minimise erosion and maintain the viability of the access.	Council						Council is to investigate improvements to the access in 2019.		
	Review Viability of Surfclub infrastructure	**Action 36**	Review functionality, safety and amenity of the two main surf club buildings (Nambucca Main Beach and Scotts Head Main Beach). Examine options for long-term protection at the existing sites, or for retreat to lower risk locations. Consider the feasibility of new surf club construction.	Council	Medium Term				Not complete	At this stage Council considers the community asset is significant and protection is warranted. Seawalls in both locations are proposed to be re-newed.		

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
	Review effectiveness of Beach Scrapping	**Action 37**	Review beach profile records, beach and dune condition at Scotts Head Main Beach, together with storm records and volumes and costs of sand positioned by beach scraping program. Define achievements/ outcomes and revise the program as necessary.	Council	Medium Term				Not Complete	A formal monitoring program has not been implemented at this point in time. Largely due to available resources.		
	Review Monitoring program	**Action 38**	Review the data collection processes and information collected by the monitoring program after five years, in consultation with OEH, Northern Rivers CMA and local communities. Modify as necessary to provide relevant and cost effective information.	Council	Medium Term				Not Complete	A formal monitoring has not been designed.		
	Review the CZMP	**Action 39**	Review the implementation of the CZMP and consider new knowledge about coastal processes, climate change, sea level rise, community aspirations and coastal ecosytems. Determine whether trigger points for changing coastal risk management approaches have been reached. Review overall cost effectiveness of coastal zone management.	Council	Medium Term				Not Complete	The State Government has modified the legislation in respect to Coastal Management and Council is preparing its Coastal Management Program which is intended to review existing plans and strategies such as the CZMP, Estuary Management Plan, Nambucca River Masterplan.		Follow this link to information relating to the preparation of the Coastal Management Program. https://www.hydrosphere.com.au/nambuccacmp
Swimming Creek Catchment Management Plan (1995)			Implement a monitoring program designed to identify major sources of pollutants during run-off.	NSC	Short term	$1,000 (1995)		Incomplete	No monitoring has been undertaken.			
			Identify and implement the most effective methods and sites for the possible placement of mechanical structures for pollution reduction.	NSC	Medium term	$500 (1995)		Incomplete.	Unknown.			
			Provide publicity to encourage use of low phosphorus detergents.	NSC	Short term	$200 (1995)		Unknown	Time lapsed since plan = time for re-education.			
			Provide publicity on Dog Act requirements to encourage owners to clean up dog droppings.	NSC	Short term	$200 (1995)		Ongoing	Existing signage needs renewing. Dog control off-leash/ on-leash signage is present. Dog bags provided at appropriate locations			
			Regular maintenance of sewer pipes to reduce leakages.	NSC	Short term	$0 (1995)	Staff time – existing operation budget.	Ongoing	Regular monitoring and control of pipes is undertaken as necessary. Pipes addressed in 2018/19.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
			Provide publicity to discourage overuse of chemical and organic fertilisers.	NSC	Short term	$200 (1995)		Unknown	Time lapsed since plan = time for re-education.			
			Install litter traps in the stormwater system. Install two dams as trash traps to reduce litter and GPM reaching the estuary.	NSC	Short term	$10,000 (1995)		Incomplete	No pollutants controls have been installed.			
			Review and upgrade the alarm procedures at Sewerage Pump Station 8 to minimise the risk of sewage overflows.	NSC	On-going	$2,000 (1995)		Unknown	New smart technology/ telemetry for reticulation networks).			
	Creek Rehabilitation		Encourage and assist volunteer organisations to participate in remediation works for the removal of debris from the Creek (e.g. concrete, bricks, tyres, timber).	NSC	Short term	$700 (1995)		Incomplete	Debris is still evident.			
			Engage contractors where necessary to remove naturally occurring debris such as fallen trees and branches.	NSC	Short term	$250 (1995)		Unknown.	Since preparation of the PoM, removal of natural debris (fish habitat) is now listed as a key threatening process and is this action is unlikely to be supported by DPI Fisheries. No further action to be undertaken.			
			Advise nearby residents of effect of garden refuse placed on Creek bank on nutrients levels and sediment loads.	NSC	Short term	$250 (1995)		Unknown.	Time lapsed since plan = time for re-education.			
			Engage qualitied contractors to selectively lop the tree canopy to allow sunlight onto the water surface to improve natural processes.	NSC	Medium term	$1,000 (1995)		Unknown.	Needs further consideration. Additional sunlight may increase water temperature during closed conditions and affect stratification and other detrimental processes.			
			Engage contractors where necessary to remove silt and sludge from the Creek bed that has accumulated from siltation and sewerage spill.	NSC	Short term	$10,000 (1995)		Unknown.	Some natural flushing of the system is likely during major rainfall events and natural openings.			
			Cover disturbed bed areas with 100 mm of clean sand. Obtain consents to clear exotic trees. Progressively plant with indigenous trees, reeds and rushes. Removal of exotics as new plants mature.	NSC	Short term	$4,000 (1995)	OEH Coastal Program 2015; Clean Energy Futures Fund	Ongoing	Revegetation and weed management undertaken in 2015. Clean energy futures Fund address weeds in all councils coastal reserves 2015-17.			
			Establish an understanding of the typical water chemistry (primarily salinity) of the Creek by water sampling.	NSC	Short term	$500 (1995)		Incomplete	No monitoring has been undertaken.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
	Caravan Park Run-off – water quality		Communicate problems, both real and perceived, to the owner of the Caravan Park.	NSC	Short term	Staff time.		Ongoing	Communications with residents and caravan park occur from time to time, typically in response to complaints regarding odour or poor appearance of the creek. This process has in the past led to system checks (reticulation) and correspondence with the EPA.			
			Monitor type and quality of discharge from the stormwater pipe discharging from the Caravan Park to the Creek.	NSC	Short term	Not costed.		Incomplete	No monitoring has been undertaken.			
			Install additional sullage points to control sewerage disposal.	Caravan Park Owner	Short term	Private cost.		Unknown	Council and Big4 are unaware of any additional sullage points having been installed.			
			Control car washing to reduce nutrient loads on the Creek.	Caravan Park Owner	Short term	Private cost.		Ongoing	Many agencies have produced non-location specific education material improving Re water quality.			
			Install silt and trash controls for drainage of roads and overland flow.	Caravan Park Owner	Short term	Private cost.		Incomplete	No pollutants controls have been installed.			
	Education		Inform residents in Swimming Creek Rd and the immediate surrounds of appropriate house-keeping techniques to raise awareness of catchment management and its implications for a healthy Creek.	NSC	Short term	$100 (1995)		Unknown	Time lapsed since plan = time for re-education.			
			Inform the wider community of the actions and activities that pollute the Creek system.	NSC	On-going	$200 (1995)		Unknown	Time lapsed since plan = time for re-education.			
			Prepare and distribute a leaflet detailing what should and should not be done.	NSC	Short term	$500 (1995)		Unknown	Time lapsed since plan = time for re-education.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
			Attempt to maintain a constant level of awareness in the community regarding the state of our environment and the actions we are currently undertaking to conserve or improve it.	NSC	On-going	$500 (1995)		Ongoing	Council implemented the stormwater turtle program in 2014 which was part of the Our Living Coast initiative. NSC is required to prepare a State of the Environment Report in accordance with *Local Government Act 1993*. NSC's Annual Report also address the implementation of the Community Strategic Plan which included environmental goals.			
			Signposting to identify and explain areas that have cultural significance, both European and Aboriginal.	NSC	Short term	$1,500 (1995)		Ongoing – need renewing	Existing coastal foreshore signage was put in place some time ago and needs renewing. Dog control off-leash/ on-leash signage is present.		 Existing Signage.	
			Signposting to explain the natural processes as well as human impacts involved in shaping coastal systems.	NSC	Short term	$1,500 (1995)		Ongoing – need renewing				
	Recreation		Construct a carpark at the southern end of Swimming Creek to control vehicle use.	NSC	Short term	$25,000 (1995)		Complete	Car park sealed in 2017.			
			Formalise the walking track over the headland to improve pedestrian access	NSC	Medium term	$6,000 (1995)		Ongoing	A trail network exists through the coastal reserves. Condition unknown.			
			Construct tables, seats and fencing at the base of the headland to formalise the picnic area.	NSC	Short term	$3,000 (1995)		Ongoing	Some minor improvements to the picnic area have been undertaken. Council is consistently upgrading older park furniture with recycled bridge timber furniture or furniture from other suitable materials across NSC's reserve system.			
			Construct amenities.	NSC	Long term	$30,000 (1995)	OEH Coastal Program 2015	Complete. No further action likely.	New beach shower installed in 2015.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
Gumma Swamp Restoration Management Plan (NSC 2015)	Containment strategy to achieve raising of pH and reduced impact of ASS in two areas of Gumma Swamp (Lot 7 DP248676 250) and Lot 3 DP817508 412 Gumma Road Gumma).		Install hinge gate weirs and vehicle crossings; Raise levee; Retrofit existing weir.	NSC with OEH.	N/A	N/A	OEH Estuary Management Program (GranT # 2012-13-EM-0034)	Complete	Project implemented 2016. Monitoring program is presently underway.			
			Implement strategies to encourage dense re-establishment of wetland and groundcover species in and around Circular Swamp (stock fencing)					Incomplete	Opportunities to acquire a significant portion of Gumma swamp was reported to Council. However, Council resolved not to receive the land dedication, largely due to the potential resources required to program. Engagement with landholders required and resources to support initiatives			
NAMBUCCA ECOHEALTH PROJECT 2016/17 (UNE, 2018)	Weed Monitoring and Control		Active weed monitoring and repeated surveying by skilled personnel. Weed species control/ removal though chemical, mechanical or physical means by skilled and trained staff. Weed species strategic phase-out to allow for growth of native plantings, bank stability and maintenance of wildlife habitat.		High	Not costed		Ongoing	This report is only recently complete and reflects actions in the EMP (BMT WBM, 2008) and the CZMP (Umwelt, 2012). Several projects have received funding in different localities and under different programs currently in design approval phases (REF/ Crown/ Fisheries). Projects being considered for 2018/19s listed under status for EMP Management Strategy 1.			
	Riparian fencing and livestock		Removal of livestock and riparian fencing instalment/ improvement to allow for protection of estuarine macrophytes, recovery of native riparian vegetation, and reduced faecal matter in waterways.		High	Not costed		Ongoing	A number of sites addressed for bank stabilisation and other riparian improvements have been fenced to remove stock from the watercourse.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
	Native Plantings		Native plantings to increase vegetation continuity/ width, and to increase habitat connectivity between terrestrial and aquatic ecosystems. Actions require land holder and community engagement.		High	Not costed		Ongoing	Council is continually actioning projects of this type throughout the LGA. Often with the assistance of other agencies such as landcare, OEH, NSW DPI (Fisheries). Council actively seeks funding to support these initiatives with the support of the Environmental Levy.		 Riparian Plantings at South Creek Bowraville (2019)	
	Bank erosion		Bank erosion prevention techniques such as rock revetment or timber fillets to reduce active erosion rates and assist in riparian vegetation establishment.		High	Not costed		Ongoing	Council is continually actioning projects of this type throughout the LGA. Often with the assistance of other agencies such as landcare, OEH, NSW DPI (Fisheries). Council actively seeks funding to support these initiatives with the support of the Environmental Levy		 Bank Erosion Protection Gordon Park (2019)	
	Specific projects		- Investigation/ research into large scale canopy dieback (e.g. NAMB2); - signage for, and monitoring of 4WD activities to encouraging responsible use, curb illegal dumping of rubbish and thereby reduce the risk of wildfire and weed invasion. - controlling vehicle access and/or identifying vehicle boundaries and sensitive ecological areas through the use of wooden bollards. - reconsideration of projects that have previously been promoted (e.g. NAMB1 and TAYL1); - installation of signage at key public river access points throughout the Nambucca Catchment to highlight local biodiversity values, restoration efforts undertaken by council and river health issues, which can promote interest in riparian management, restoration projects and the responsible use of these areas.		High	Not costed		Ongoing				

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
	Current management practices		Maintain current management practices at DEEP1; NEWC1; and WARR1.		High	Not costed		Ongoing				
LOWER NAMBUCCA ESTUARY WATER QUALITY STUDY: MANAGEMENT STRATEGY (GECO ENVIRONMENTAL, 2009)	Gumma Gumma Creek subcatchment		Further monitoring (first flush after extended dry periods) to quantify the extent of issues related to surface water acid export.		High	Not costed		Complete	Additional monitoring undertaken by WRL (2013) and GECO Environmental (2014) resulting in additional management implications. See Gumma Swamp Restoration Plan (2015).			
			Remedial works to reduce surface acid export including removal of stock, plugging of lateral drains, prevention of future salt scalding from saline intrusion, control of sheoak and paperbark encroachment, and the slow raising of water levels to drown out surface ASS.		High	Not costed		Complete	See Gumma Gumma Wetland Restoration Project completed in 2015. Ongoing monitoring required.			
	Watt Creek subcatchment		Investigate whether failing OSMS are the source of very high bacterial contamination in Lumsdens Lane drain by checking OSSMs within the drain catchment.		High	Not costed		Not complete				
			Undertake sterol testing to determine the probable source of the faecal material.		High	Not costed			Water quality and other testing was undertaken on suspect system as part of regulatory action.			
			Accurately mapping the drainage system on the floodplain. This action may be assisted once airbourne LiDAR survey data can be acquired over the catchment area. Accurately determining the drain catchment area may assist in locating potential sources of contamination or pollutant generation in both the Lumsden Lane and Wrights Corner drain systems.		High	Not costed		Not complete.	Council has acquired LIDAR for the shire but a detailed analysis of this catchment has not been undertaken, other than for flooding behaviour.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
			Slowing down the transport of pollutants to allow some processing of nutrients before they enter the estuary by reinstating wetland areas on the floodplain.	NCLLS , DPI Fisheries, landholders	High	Not costed	Fish habitat grant	Complete	A major wetland restoration project was completed in the Watt Creek catchment in 2016 by LLS and NSW recreational fishers with the assistance of the landholders. This included 4.4km of stock exclusion fencing of a major wetland and re-instatement of full tidal flows by removal of failing floodgate system. The area is expected to self-rehabilitate.		https://northcoast.lls.nsw.gov.au/resource-hub/media-releases/2016/restoring-habitat-to-watt-creeks-fish	
			Improving agricultural practices by managing paddocks to reduce the potential for export of nutrient and bacterial contamination.		High	Not costed		Ongoing	As above, stock fencing of riparian and wetland areas.			
	Beer Creek subcatchment (Nambucca Heads)		Source control measures such as education campaigns, encouraging the installation of water tanks and the ongoing careful maintenance of sewerage infrastructure.		High	Not costed	Stormwater Turtle Our Living Coast rehabilitation initiative 2013/14.	Ongoing	Council implemented a water tank rebate scheme in 2013/14 originally funded through the environmental levy now the water fund. Stormwater Turtle Our Living Coast rehabilitation initiative 2013/14.		https://www.nambucca.nsw.gov.au/cp_themes/default/page.asp?p=DOC-IIF-72-65-47	
			The installation of a series of detention basins may help to attenuate flows somewhat and reduce the transport of sediments. This type of action requires careful investigations as such systems have in some locations been associated with nutrient saturation and associated algal growth.		High	Not costed		Not complete				
			Where feasible given current flood planning considerations, replace paved sections of creek bed and banks with grassed swales to promote infiltration of stormwater resulting in decreased velocities, increased sediment trapping efficiency and decreased stormwater volumes. They are particularly effective for the moderation of negative stormwater impacts arising from average rainfall events.		High	Not costed		ongoing	Some improvements have been made to eroding banks in this urban catchment.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
			More effective sediment controls where soil disturbance occurs, for example, during early phases of land development or construction.		High	Not costed		Complete	Erosion and sediment control component added to Councils DCP in 2012/13.			
	Bellwood Creek subcatchment		Employ appropriate WSUD principles to ensure future development within the catchment does not impact on the quality of runoff.		Medium	Not costed	Stormwater Turtle Our Living Coast rehabilitation initiative 2013/14.	Ongoing	DCP has controls for new development in respect to water quality treatment and outputs. Council also has a rebate incentive scheme for installation of water saving devices in existing developments. GPT installed at Bellwood park as part of Stormwater Turtle Our Living Coast rehabilitation initiative 2013/14. No WSUD treatments installed in Bellwood Creek subcatchment.			
			Testing urban residential areas within the catchment to identify properties with illegal stormwater to sewer connections. This may assist in reducing the potential for overflows from sewer infrastructure to heavy rainfall events.		Medium	Not costed		Not complete				
	Tilly Willy Creek subcatchment		Fencing the creek and associated wetlands to exclude stock.		Medium	Not costed		Not complete				
			Reinstating wetland functions through modifications to the artificial drainage system.		Medium	Not costed		Not Complete				
			Careful and regular monitoring and maintenance of on-site sewage management systems OSMSs located within the catchment.		Medium	Not costed		ongoing	All OSMS's are subject to permitting processes.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
			Employ appropriate WSUD principles to ensure future development within the catchment does not impact on the quality of runoff.		Medium	Not costed		Ongoing	DCP has controls for new development in respect to water quality treatment and outputs. Council also has a rebate incentive scheme for installation of water saving devices in existing developments. Scope for catchment solutions to be investigate to manage water quality outputs from industrial areas.			
			More effective sediment controls where soil disturbance occurs, for example, during early phases of land development or construction.		Medium	Not costed		Complete	Erosion and sediment control component added to Councils DCP in 2012/13.			
	East Drain subcatchment		Source control measures such as education campaigns, encouraging the installation of water tanks and the ongoing careful maintenance of sewerage infrastructure.		Medium	Not costed	Stormwater Turtle Our Living Coast rehabilitation initiative 2013/14.	Ongoing	GPT installed at Bellwood park as part of Stormwater Turtle Our Living Coast rehabilitation initiative 2013/14.			
			Employ appropriate WSUD principles to ensure future development within the catchment does not impact on the quality of runoff.		Medium	Not costed		Ongoing	DCP has controls for new development in respect to water quality treatment and outputs. Council also has a rebate incentive scheme for installation of water saving devices in existing developments.			
	Teagues Creek		Ensuring that appropriate runoff controls are applied to the quarry located immediately upstream of the confluence of Teagues Creek and the Nambucca River. Runoff from the quarry should be subject to sediment control in the form of sediment traps and fences on site.		Low	Not costed		Not complete. Further action unlikely whilst quarry inactive.	Quarry is not presently active. Natural regeneration on fringes of work area would provide some buffering to creek.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
			Employ appropriate WSUD principles to ensure future development within the catchment does not impact on the quality of runoff.			Not costed		Ongoing	DCP has controls for new development in respect to water quality treatment and outputs. Council also has a rebate incentive scheme for installation of water saving devices in existing developments.			
	All subcatchments		Implement a monitoring framework as per the Lower Nambucca WQ Management Strategy including: - collection of additional data to allow quantification of contaminate loads to facilitate subcatchment comparisons; - Additional sampling programs in Low and Medium Priority subcatchments to understand tends in WQ (i.e. long-term monthly, low-tide sampling, as well as event-based sampling) ; and - Further sampling/ modelling programs in High Priority subcatchments, i.e. to determine acid export mechanisms and quantities of acid and metals from gumma wetlands; MUSIC modelling in Beer Creek; and sampling of additional parameters and additional storm events in Watt Creek .		High	Not costed		Ongoing	Further sampling in Watt Creek and Gumma Gumma Creek subcatchments complete.			

Plan/ Strategy	Issue(s) addressed	Management action(s)		Responsible agency(s)	Priority/Ranking in original plan	Original estimated costs (or grant amount)	Actual cost if complete	Source of funding available or acquired	Status	Comments	Photo #s if relevant/available	Mapped location. Report Reference (GIS file name and ID)
		ID/ Ref #	Description									
			Develop a communication strategy to raise awareness of WQ issues in the lower estuary and management actions being undertaken to address those issues including: - Who is responsible for managing the estuary; - current estuary management activites and programs; - specific issues affecting the estuary and immediate threats to the estuary; - actions that impact on the estuary's many values that would help motivate residents to become more involved; and - advertisements in either the Hibbisucs Happynings, Mid-coast Observer or through letter-box drop.		High	Not costed		Not complete.				

Climate Change Adaptation Strategy Implementation Status (June 2019)

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
HHER-1	Limit Development and Access in areas at high risk of flooding	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies; In some instances individual studies which address hazards may be provided by developers.	Department of Lands are acquiring LIDAR which will be available to Council; Stage 1 Flood Study at Lower Nambucca in Draft Form. Deep Ck Flood Study ONGOING. Stage 1 of a 3 Stage Coastal Hazard Assessment has been completed.	LIDAR Obtained from Department of Lands; Flood Risk Modelling at Deep Ck and Nambucca River is complete. Coastal Zone Management Plans; Climate change policy endorsed for exhibition Sept 2018. Flood Studies Complete; Flood Risk Management Study and Plan Complete.	Oct-18	ONGOING	90%
HHVR-2 & BERM-1	Ensure Development Controls adequately protect development from Climatic Change Risk							
BEER-1	Investigate opportunities, or scenarios to reduce the number of existing properties and developments in at-risk locations through buy back or relocation							
BEER-1	Avoid new development in high-risk locations							
BEER-3	Ensure development in green field locations adequately considers sea level rise expectations over the life of the development.							
BEVR-2	Investigate opportunities to apply development controls which address location specific climate change hazards							
BERT-3	To maintain indemnity under section 733 of the Local Government Act 1993, ensure Development complies with state government policies on sea level rise.							
ERER-2	Identify suitable locations for the relocation or development of tourist assets (Caravan Parks) away from highly exposed locations.							
ERVR-3	Implement planning controls that provide protection of key economic assets including agriculture and natural environment which attracts tourism.							
GRER-1	Develop controls to minimise Councils exposure to future legal challenges							
FSER-1	Ensure Regionally Significant Farmland is retained for for Agriculture	Department of Environment and Planning/ State Government	The Regionally Significant Farmland Mapping Project (2009) has been prepared by the NSW Department of Planning. NSW government is proposing a review as part of North Coast Plan.	Nambucca LEP 2010 has incorporated Regionally Significant Farmland Mapping into the RU1 Primary Production Zone.		Oct-18	COMPLETE	100%
FSVR-1	Ensure Development Controls enhance the potential for local food production on rural land	Department of Environment and Planning	Local Growth Management Strategy - Rural Lands Component	Nambucca DCP 2010 has been prepared this would be subject to review upon completion of the Rural Lands Strategy		Oct-18		0%
HHER-1	Limit Development and access in areas at high risk of bushfire	Department of Environment and Planning	New Bushfire Prone Lands Map	The Rural Fires Act require each local government area to have a Bushfire Prone Lands Map, which is expected to be reviewed every 5 years. Council's updated Bushfire Prone Lands Map is awaiting the NSW RFS Commissioners approval. Planning for Bushfire Protection (NSW RFS, 2007) provides Guidelines for Bushfire Hazard Assessment.	Copmlete - Commissioner endorsed plan on 21 September 2011.	Oct-18	COMPLETE	100%
WSER-1	Provide Development Controls incentives which encourage/ maximise on-site water harvesting in all new development. Consider using development incentives.	Department of Environment and Planning		Nambucca DCP 2010 has been prepared this would be subject to investigation at the next review	A stormwater turtle project was aimed at creating awareness of stormwater issues. Council's DCP incorporates current WSUD principles. The DCP supports individual property renewable energy use.	Oct-18	ONGOING	80%
WSVR-1	Provide Development Controls and/or incentives which decrease water use in all development.							
SRER-2	Should development occur in locations where viable infrastructure cannot be assured, require that developers make stand alone arrangements for wastewater treatment.							
SRER-5	Develop thresholds for development requiring Council infrastructure to be constructed an maintained. An example would be to only allow development requiring a pump station where a predetermined number of lots are involved.							
ESER-1	Develop planning controls that will facilitate reduction of climate-enhanced hazards to power distribution system (eg toward undergrounding of cables, removal of hazards close to power lines).							
ESER-2	Develop controls that allow for increases to embedded (local) generation of electricity, through gas turbines and renewable energy (eg, solar, wind, run-of-river hydroelectricity, biomass from agricultural waste).							
ESVR-2	Ensure back-up systems exist for important private sector services including commercial-scale food refrigeration, telecommunications facilities, aged care facilities.							

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
GRVR-1 & GRRT-1	Introduce controls that transfer the requirement for climate change risk management (and therefore legal risks stemming from future loss) to the developer. This can be done by requiring buildings and other activities that need Council consent to show that climate change hazards have been adequately managed.							
TSER-3	Ensure planning controls increase densities in and around urban centres to increase alternative forms of transport such as walking, cycling and public transport.	Department of Environment and Planning		Nambucca LEP 2010 has incorporated height and density increases in Macksville and Nambucca CBD to try and encourage urban consolidation.	Council is progressively improving connectivity and accessibility within urban centres. Councils Pamp and Cycleway Plan propose actions to improve connectivity	Oct-18	ONGOING	100%
BEVR-3	For exposed buildings, ensure that property management plans address the location specific climate change risk and require each property to maintain a current emergency risk management plan, to manage the impacts on people and property from climate change related events.	Department of Environment and Planning	Funding; Resources	New buildings can be requested to provide management plans through consent conditions. Property owners of existing buildings could be encouraged to prepare plans through education programs. The SES is responsible for education regarding flooding and storm emergencies; the NSW RFS is responsible for education relating to Bushfire Emergencies.		Dec-11	AS REQUIRED	50%
CSER-1	Develop controls to ensure communication systems are located in low risk environments.	Department of Environment and Planning	Telecommunications Act and SEPP Infrastructure provide exemptions	Typically not subject to Council approval. Communication service providers can be advised of climate risks as Council is made aware of them.	Not Council responsibility		No Action to be taken	0%
CSVR-1	Investigate options to ensure developments in high risk locations install suitable telecommunication equipment.	Department of Environment and Planning	Telecommunications Act and SEPP Infrastructure provide exemptions	Typically not subject to Council approval. Communication service providers can be advised of climate risks as Council is made aware of them.	Not Council responsibility		No Action to be taken	0%
NSER-1	Minimise the exposure of conservation areas and agriculture by using the LEP to limit development in and access to areas at high risk from climate change hazards, including accelerated transfer of climate migrating weeds and pests.	Department of Environment and Planning	Biodiversity Management Plan; Funding; Resources	Council does not have a Biodiversity Management Plan or similar conservation policy. Should Council resolve to prepare such a strategy a key component would be the consideration of Climate Change Risks.		Dec-11	ONGOING	50%
NSER-2	Develop controls to protect natural environments, including buffers and corridors.	Department of Environment and Planning	Biodiversity Management Plan; Funding; Resources	Council does not have a Biodiversity Management Plan or similar conservation policy. Should Council resolve to prepare such a strategy a key component would be the consideration of Climate Change Risks.	Council's DCP contains buffer controls. LEP amendments including the Valla Growth Area incorporate appropriate buffers for future development.	Dec-11	COMPLETE	100%
NSER-2	Revise conservation values to incorporate climate change driven constraints and identify options to re-optimise zoning for new climate regimes. Consider loss of habitat and coastal squeeze due to sea level rise, heat and drought stress and relocate farming out of coastal flood plains to allow natural coastal systems to realign.	Department of Environment and Planning	Biodiversity Management Plan; Funding; Resources	Council does not have a Biodiversity Management Plan or similar conservation policy. Should Council resolve to prepare such a strategy a key component would be the consideration of Climate Change Risks.	Deep Creek Entrance Management Policy adopted by Council with inclusion ofactions recommending extension to riparian/ wetaland buffers to allow for landward migration of waterways and other matters	Aug-14	ONGOING	80%
NSVR-1	Maximise the health and resilience of natural environment through: (a) best-practice conservation, (b) limiting pressure from development/urban encroachment into high value areas, especially by noting that in the community there may be auto-adaptation pressures which may necessitate a development cap, and (c) incentives or regulations to develop and maintain biodiversity corridors on private land.	Department of Environment and Planning	Funding; Resources	Best practice conservation principles and protection measure can be developed through LEP and DCP controls should Council choose to pursue them. The State Government provides incentives to conserve biodiversity on private land through Biobanking Schemes and other similar arrangements such as conservation agreements.	Various conservation initiatives and programs have been undertaken throughout the shire; For example Banks stabilisation projects have addressed areas of high riverine erosion which are imapcted by more frequent extreme weather such as drought and flooding.	Oct-18	ONGOING	50%
Local Growth Management Strategy - Rural Lands Component								
FSRT-2	Investigate expansion of Regionally Significant Farmland into lands not effected climate risks	Department of Environment and Planning	Rural Lands Component of Local Growth Management Strategy; LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Funding/Resources	The Local Growth Management Strategy - Rural Lands Component will require State Government Approval. Before Council examines this Rural Component it is expected that the Residential Component will need to be completed.	LiiDAR is now available; however need other resources to determine climate proof rural land. NSW Planning legilsation has changed Council will be required to prepare Local Planning Statement which will address strategic direction	1/10/2018		0%
FSAO-1	Identify climate proof agricultural land							
ERER-1	Identify opportunities to relocate high-risk agricultural activities to low risk locations							
ERVR-1	Investigate agricultural activities that would be suitable to the projected climate regime							
ERRM-3	Identify options for stock management before during and after major flooding events. For example identify land unlikely to be impacted by flooding.							
ERAO-2	Identify agriculture and forest options for increased income under a low-carbon economy from bio-sequestration and renewable Energy Production.							
ERVR-1	Investigate oppertunties for niche agricultural activities on large lot residential land							
Local Growth Management Strategy - Tourism Component								

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
ERER-2	Identify suitable locations for the relocation or development of tourist assets (Caravan Parks) away from highly exposed locations.	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;	Council has not scheduled the preparation of the local growth management strategy - tourism component. Such a strategy could identify alternative lands for tourism activities which could be implemented through zoning changes in the LEP.	LiDAR available - flood and Coastal Management Studies have been completed. Resources required to identify flood proof agricultural land. Council has completed a Tourism Strategy which refers to this document.	24.05.2019	ONGOING	50%
ERRM-1	Educate the local tourism industry on the projected risks associated with Climate Change. Encourage the development of industry partnerships to assist the area in maintaining it self as a desirable tourism destination.			Council has not scheduled the preparation of the local growth management strategy - tourism component. Such a strategy could identify alternative lands for tourism activities which could be implemented through zoning changes in the LEP. Although a Council prepared tourism strategy may examine these actions, their implementation is largely dependent on the on tourism industry embracing and implementing them.				
ERER-3	Identify options for re-timing tourist events in months with lower risk of flooding, heat stress and tropical disease vectors.	Department of Environment and Planning						
ERVR-1	Investigate Tourism activities that would be suitable in the projected climate regime	Department of Environment and Planning						
ERAO-1	Indentify tourism opportunities related to a low carbon tourism paradigm	Corporate Services/ Department of Environment and Planning						
On-site Sewerage Management Plan								
SRA0-1	Review of On-site Sewerage Management Plan should consider use and management of systems under the projected climate regime	Department of Environment and Planning	Council on-site Sewerage Management Plan was adopted in 2009, changes may not be made until next review.		Council on site Sewerage Management Plan was reviewed in 2017 and systems have been categorised into three categories based on various constraints and risks inlcuding flooding.	16/10/2018	COMPLETE	100%
Flood Risk and Estuary Management Planning								
GRRM-1	Improve the ability of Council to understand the implications of climate change hazards by commissioning research to quantify the impacts. This would include modelling of the effects of sea level rise and storm surge on the local coast, revised flood modelling in light of increased precipitation (3 day extreme precipitation currently predicted to increase by 10%. The risk report accompanying this document predicts an increase by 13% to 2030), and the confluence of sea level rise and precipitation increases.	Department of Environment and Planning; State Government	LIDAR; Funding; Resources	Council has ONGOING a review of its flood mapping taking into consideration State Policies on Sea Level Rise. Stage 1 Flood Mapping for Lower Nambucca has been drafted . Stage 2 will address the Macksville Floodplain and Stage 3 upper catchment areas including Bowraville. A flood study has also ONGOING in the Deep Ck Catchment. Council has recieved State Goverment Funding to pursue these actions.	LiDAR Available; Stage Lower Nambucca Flood Study Drafted; Deep Creek Flood Study Modelling complete; Deep Creek and Nambucca River Flood Risk Management study and Plan complete in 2017	Oct-18	COMPLETE	100%
SRER-2	Reviewing flooding and sea level rise to 2300.	Department of Environment and Planning						
SRER-2	Adopt planning controls that ensure developments are limited to locations where infrastructure is viable for the long term							
BERT-3 & BEER-2	To maintain indemnity under section 733 of the Local Government Act 1993, ensure Development complies with state government policies on sea level rise.							
ERVR-4	Identify measures which may reduce flooding and velocity of flows in commercial and industrial areas							
Integrated Water Cycle Management Strategy								
FSRT-1	Seek a revision of water license conditions to allow a higher level of extraction during periods of increased rainfall.	Department of Engineering Services	Water extraction license requirements will be dependant on Council's Water Supply System and whether or not Council proceeds with the off River Storage Facility or an alternative option to secure Council's Water Supply.	Water extraction licenses are issued by the State Government under the Water Management Act 2000	Discuss with MWS	Oct-18		0
WSER-2	Investigate and implement measures to mitigate the impacts that increased temperatures may have on water quality.	Department of Engineering Services	Funding	It is standard practice for the design of Water supply systems to esnure water quality is maintained. The studies completed to support development of an off river storage facility have considered various treatment options such as aerators.	Discuss with MWS	Oct-18		0
WSER-3	Investigate options to extend the Integrated Water Cycle Management System to provide additional sources from harvesting, recycling and grey water use.	Department of Engineering Services	Funding	The Integrated Water Cycle Management Plan developed 3 options to for consideration through a triple bottom line assessment process. The recommended option allows for the greatest level of system integration as the integration becomes feasible.	Discuss with MWS	Oct-18		0
WSVR-2	Ensure Council's Water Supply System is prepared for seasonal changes in water availability, more specifically a reduced mean monthly winter rainfall.	Department of Engineering Services	Funding	Investigations have ONGOING into a proposed off River Storage Facility and expansion of the borefields (watersource) at Bowraville.	Discuss with MWS	Oct-18		0

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
WSRM-1	Ensure inappropriate water extraction practices are not undertaken during periods of low flow. Extraction regimes should consider the projected reduction in mean monthly rainfall.	Department of Engineering Services		Water extraction licenses are issued by the State Government under the Water Management Act 2000	Not council Responsibility	Oct-18		0
WSRM-2	Consider seasonal water pricing and regulation to accommodate the projected reduction in winter rainfall and demand increases during the predicted hotter summer months.	Department of Engineering Services			Discuss with MWS	Oct-18		0
WSRT-1	Seek cost sharing with State and Federal Governments for measures which do not provide short term cost-benefit but would increase water security.	Department of Engineering Services			Discuss with MWS	Oct-18		0
Asset Management Plan								
BERM-2	Develop spatial information sets (Asset Risk Maps) to identify assets that will be at-risk with climate change, and identify alternative, low risk locations. Require that this information be considered in asset management planning.	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies		LIDAR AVAILABLE ASSET RISK PLAN Complete FOR INFRASTRUCTURE IN THE COASTAL ZONE THROUGH THE CZMP; Flood Risk Management Study and Plan mapping could be used to identify infrastructure at Risk from Flooding hazards in different sized events. This requires resources to progress.	Oct-18	ONGOING	50%
HHER-2	Maintain Functionality of Open Space Areas	Department of Engineering Services	Asset Risk Maps; Funding; Resources		RISK MAPS AVAILABLE FOR COASTAL AREAS; FLOOD MAPPING COMPLETED ACROSS THE SHIRE. MAPPING USED TO GUIDE INSTALLATION OF NEW INFRASTRUCTURE AND ASSETS IN OPENS SPACE AREAS	Oct-18	ONGOING	50%
HHER-2	Ensure Adequate shading is provided in open space areas	Department of Engineering Services; SES	Funding; Resources		VARIOUS GRANTS HAVE BEEN APPLIED TO INCLUDED SHADING IN OPEN SPACE AREAS. BELLWOOD PLAYGROUND AND ANDERSON PARK RECEIVED FUNDING FOR SHAD SAILS; NEW PARK SHELTERS INSTALLED AT STUART ISLAND, MACKSVILLE FORESHORE. STREET TREES INSTALLED IN NAMBUCCA TOWN CENTRE; TENDER CURRENTLY UNDERWAY FOR MACKSVILLE STREET TREES	Oct-18	ONGOING	80%
HHER-2	Ensure Stormwater in open space areas does not effect functionality	Department of Engineering Services	Asset Risk Maps; Funding; Resources		Dawkins Park Stormwater Management project presently being considered	Oct-18	ONGOING	20%
HHER-3	Increase availability and access to Council facilities/ services	All of Council	Resources		Library Strategies prepared and includes various actions dirve accessibility	Oct-18	ONGOING	20%
WSVR-3; BEVR-4 & GRVR-5	Ensure Risk guidelines and specifications for Council infrastructure give consideration to projected climate change risks such as flooding that considers sea level rise and predicted rainfall patterns.	Department of Engineering Services	Asset Risk Maps; Funding; Resources		draft climate adaptation policy prepared and to be exhibited in 2018	Oct-18	ONGOING	20%
SRER-1 & SRVR-2	Review water reticulation, waste water and storm water systems and associated infrastructure in respect to identified climate hazards (including physical hazards and possible effects of carbon price on costs of operation). Use the results of this review as the basis for developing a management plan for climate-proof systems with minimised exposure to climate change hazards.	Department of Engineering Services	Asset Risk Maps; Funding; Resources	This action may need to be undertaken in a staged process, commencing in areas identified as high risk areas through the Asset Risk Maps.	RISK MAPS FOR INFRASTRUCTURE IN THE COASTAL ZONE WAS BEEN PREPARED. FLOOD MAPPING AVAILABLE HOWEVER INFRASTRUCTURE RISK MAPS HAVE NOT BEEN PREPARED.	Oct-18	ONGOING	50%
SRVR-2	Actions which may assist in creating a climate-proof system include: the use of one way valves and modification of release points to accommodate floods; connect septic systems in high risk locations to mains sewerage; ensure backup power systems to pumping stations (due to anticipated increases in power outages).	Department of Engineering Services	Asset Risk Maps; Funding; Resources	Retrofitting one way valves would be of benefit in existing low lying areas subject to surface water ingress. However only likely to occur if Council subsidised work or issued notices on properties.	Discuss with MWS			
SRRM-1	Identify components of water, waste water and storm water systems that cannot be climate-proofed, and which will require intervention if they are to remain functional. Develop strategies to address these components which should consider the expected frequency and duration of disruptive events such as flooding and power outages.	Department of Engineering Services	Asset Risk Maps; Funding; Resources		RISK MAPS FOR INFRASTRUCTURE IN THE COASTAL ZONE HAS BEEN PREPARED, czmp ADOPTED BY COUNCIL AND BEING IMPLEMENT.	Oct-18	ONGOING	50%
SRRM-2	Develop actions/strategies to manage loss of infrastructure during climatic events	Department of Engineering Services	Asset Risk Maps; Funding; Resources		SEE ABOVE ACTION	Aug-14	ONGOING	
SRER-2	Should development occur in locations where viable infrastructure cannot be assured, require that developers make stand alone arrangements for wastewater treatment.	Department of Environment and Planning	Asset Risk Maps;	Nambucca DCP 2010 has been prepared this would be subject to investigation at the next review		Dec-11	ONGOING	

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
SRER-3 & SRRT-2	Investigate options privatise to infrastructure that is not cost effective to maintain, or make arrangements with affected community to charge for additional costs.	Department of Engineering Services	Asset Risk Maps;	This action would be location specific as issues with specific infrastructure are raised.		Dec-11	ONGOING	
SRER-4 & SSRT-1	Investigate options to transfer at-risk assets to other utilities or a new utility.	Department of Engineering Services	Asset Risk Maps;	This action would be location specific as issues with specific infrastructure are raised.		Dec-11	ONGOING	
Asset Management Plan								
SRVR-1	identify stormwater connections into the waste water system.	Department of Engineering Services	Resources					
SRVR-1	Investigate options to remove stormwater connections into the waste water system.	Department of Engineering Services	Funding; Resources					
BEVR-1	Subject to cost benefit analysis consider community scale risk reduction works to reduce vulnerability to an identified hazard. For example stormwater upgrades, construction of sea walls or levies.	Department of Engineering Services	Asset Risk Maps; Funding; Resources	This action would be location specific as risks specific to certain locations are identified.	COASTAL ZONE MANAGEMENT PLAN LOOKS AT THESE TYPES OF ACTIONS IN THE COASTAL ZONE. IT IS COMPLETE AND IS BEING IMPLEMENTED.	Oct-18	ONGOING	
ESVR-1	Install uninterruptible power supplies (UPS), back-up power storage, and back-up generation in Council facilities that provide critical systems for Council operations, and for essential services of water supply and waste water systems.	Department of Engineering Services	Funding		UNSURE	Oct-18		
TSER-1	Identify roads and bridges that are likely to be unviable to maintain in the long term due to repeated riverine and sea level rise flooding. It will also be important to identify low-risk alternative routes (eg, along ridge lines).	Department of Engineering Services	Asset Risk Maps;		CONSIDERATION TO FLOOD LEVELS AND ACCESSIBILITY WITH NEW BRIDGE/ ROAD CONSTRUCTION. Eg LANES BRIDGE	Oct-18	ONGOING	
TSER-2	Investigate options to close roads and buy back properties on roads which have a high remediation or operation cost, if this is cheaper than maintaining current services.	Department of Engineering Services		This action would be location specific as issues with specific infrastructure are raised.	AS NEEDS; For example Beilbies Beach Road carpark is being lost to immediate beach erosion. However planned retreate is the preferred option	Oct-18	ONGOING	
TSRT-3	Investigate options to transfer ownership of high risk roads to the community serviced by the road.	Department of Engineering Services	Asset Risk Maps;	This action would be location specific as issues with specific infrastructure are raised.				
TSVR-1	Investigate options to increase the resilience of road and bridge materials, construction and management.	Department of Engineering Services			MATERIAL USE AND RESILENCE IS AN IMPORTANT CONSIDERATION IN COUNCILS PROCUREMENT AND CONSTRUCTION OF NEW INFRASTRUCTURE. COMPOSITE MATERIALS, RECYCLED PLASTICS, AND OTHER LONG LIFE AND DURABLE MATERIALS ARE BEING USED WHERE APPROPRIATE.	Oct-18	ONGOING	
TSRT-2	Seek State or Federal Government funding to cover costs of increased maintenance of the transport systems due to climate change, or seek rate increases to cover these costs.	Department of Engineering Services/ Corporate Services	Asset Risk Maps;		UNSURE/ Highway handover considerationS???	Oct-18		
TSVR-2	Investigate options to minimise overtopping of roads during flooding events	Department of Engineering Services	Asset Risk Maps;	This action will require the Asset Risk Maps to identify existing overtopping problems areas or areas likely to be inundated at a later date;	CONSIDERATION TO FLOOD LEVELS AND ACCESSIBILITY WITH NEW BRIDGE/ ROAD CONSTRUCTION. Eg LANES BRIDGE	Oct-18	ONGOING	
TSVR-3	Ensure that boat ramps, wharfs and pontoons can accommodate sea level rise, increased storm surge and overland flooding.	Department of Engineering Services	Asset Risk Maps;		CONSIDERATION TO FLOOD LEVELS AND ACCESSIBILITY WITH NEW INFRASTRUCTURE IS A CONSIDERATION	Oct-18	ONGOING	
TSRM-2	Develop strategies to divert heavy traffic off council roads during very hot days, when roads are vulnerable to damage.	Department of Engineering Services	Resources					
TSRT-1	Seek to transfer high-risk roads to the RTA if maintenance costs exceed Council's resources.	Department of Engineering Services	Asset Risk Maps;		UNSURE/ Highway handover considerationS???	Oct-18		
TSRT-1	Ensure that Council is aware if high-risk roads are being transferred to Council from the RTA and If so, ensure that appropriate funding is available to support operation of the roads under increased climate change hazards.	Department of Environment and Planning	Asset Risk Maps	The Asset Risk Maps should specifically target section of the existing Pacific Highway likely to be transferred to Council when the Highway Upgrade is completed.	UNSURE/ Highway handover considerationS???	Oct-18		
TSAO-1	Implement programs to enhance walkable communities	Department of Engineering Services	Funding;	Council has prepared a Cycleway Plan, the focus of the plan is to provide a cycleway link between Nambucca and Macksville. Funding has been made available through the federal Government, Council and various State Government authorities to construct the cycleway. Additional funding is required to complete stage 2.	IMPLEMENTATION OF CYCLEWAY PLAN and PAMP IS ONGOING.	Oct-18	ONGOING	

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
GRVR-2	Develop and implement an ongoing process to reduce Council's economic exposure to measures which regulate carbon (ie, measures which reduce greenhouse gas emissions). This could be accomplished by minimising energy use, fuel use and high carbon materials (eg, in road construction) across Council operations.	Department of Engineering Services		Continue to review Councils Sustainable Fleet and Plant Policy	Clean energy committee established; various investigations underway to determine best use of allocated budgets, Renewable Energy Action Plan being developed which will contact emissions and renewable energy targets	Oct-18	ONGOING	
ESER-3	Facilitate the uptake of electric vehicles (which reduce the vulnerability to disruptions in the supply of fuels) through provision of charging stations and other incentives.	Department of Engineering Services	Funding; Demand Analysis	Subject to funding opportunities and a demand analysis this may be something that Council could consider for public parking areas.	Budget Allocation for Electric Vehicle Charging Station in 2018/19 Environmental Levy Budget	Oct-18	ONGOING	
Nambucca Disaster Management Plan (2007) (DISPLAN)								
HHVR-1	Use existing emergency management plans and relationships with emergency service providers to ensure that an adequate level of functionality can be developed for basic needs (food, water, sanitation and human health) and essential services (energy, transport and communications) during and post major extreme weather events which are expected to increase in frequency, severity and coincidence	Department of Engineering Services/ Department of Engineering Services/ SES	Nambucca DISPLAN was adopted in 2009. Consideration of these matters should be included in the next review. At which time more accurate flood mapping and coastal hazard mapping will be available.	The Nambucca DISPLAN is reviewed every five (5) years or after an Emergency Event. The Nambucca DISPLAN is not due for review until 2014. Should the revised Flood Risk Mapping become available prior to the scheduled review period, it is recommended the DISPLAN review be moved forward.	FLOOD STUDY DATA AND MAPPING HAS BEEN PROVIDED TO THE SES.	Oct-18	ONGOING	100%
FSRM-1	Incorporate food security considerations for isolating climate incidents. Eg shared refrigeration in pre-agreed location (eg a single supermarket in each location likely to be isolated).				COUNCIL & OEH FUNDING IMPROVEMENTS TO THE FLOOD WARNING SYSTEM WITH UPGRADE TO THE GUAGE SYSTEM	Oct-18	ONGOING	50%
ESRM-2	Develop actions to cope with more frequent and severe power outages that do not require repeated use of, or excessive dependence on, emergency services.							
ESRM-3	Develop actions to cover the high likelihood that there could be a confluence of extreme weather events and power outage.							
TSRM-1	Identify and develop actions for people and businesses affected by more frequent and lengthy road flooding and isolation.							
CSVR-2	Educate the community to minimise the pressures on mobile communications systems during extreme events.							
CSRM-1	Ensure alternative communication avenues are available to provide redundancy in the event of telecommunications failure during extreme events.							
CSRM-2 & ERRM-2	Develop actions to ensure clear, reliable and consistent communications to tourists, travellers and residents in region during extreme events. Ensure the community is made aware of current threats and risks as well as when the risk/threats are withdrawn							
ERRT-1	Develop 'state of emergency triggers' to avoid communication via media that can also have the effect of dissuading tourists from the visiting the area.							
Council Property Plans of Management								
BEVR-3	For exposed buildings, ensure that property management plans address the location specific climate change risk and require each property to maintain a current emergency risk management plan, to manage the impacts on people and property from climate change related events.	Corporate Services/ Department of Engineering Services	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;	All property management plans should address climate change risk in their preparation. It is noted that this can only be considered as the information becomes available.	WITH THE AVAILABILITY OF LIDAR, THE DEEP CREEK AND NAMBUCCA FLOOD STUDY AND THE COASTAL ZONE MANAGEMENT PLAN. DATA IS AVAILABLE TO DES FOR REFERENCE WHEN PREPARING PLANS OF MANAGEMENT FOR PUBLIC RESERVES AND INFRASTRUCTURE.	Oct-18	ONGOING	
Human Resources Strategic Plan								
CSAO-1	Investigate options to increase telecommuting for Council Employees	Corporate Services		The human resources strategic plan currently in draft form identifies options to investigate work from home and E-recruitment. These are scheduled for investigation by 2012.	INFORMATION WILL BE FORWARDED TO THE HUMAN RESOURCES MANAGER FOR CONSIDERATION	Dec-11	ONGOING	
Economic Development Plan								
WSAO-1 & ERVR-2	Investigate options to capture economic and livability advantages for this region, which has comparatively high water security compared to other parts of the eastern seaboard.	Corporate Services		Council's Economic Development Plan 2006, identifies opportunities to maintain, expand and diversify economic growth in the Shire. When the Economic Development Plan 2006 is reviewed it should examine the opportunities Climate Change may present for the shire.				
State of the Environment Report								

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
NSRM-1	Monitor the migration of new species of flora and fauna entering the district and new or enhanced threats posed by new invaders and exacerbated pest outbreaks. Communicate these results to the agricultural sector to allow them to change pest control systems.	Department of Environment and Planning /State Government		The State of the Environment Report can continue to monitor and communicate species presence in the shire. The state government monitors, regulates and educates on threatened species, and communities, threatening processes and other immediate threats	STATE OF THE ENVIRONMENT REPORTING WILL EXAMINE THIS MATTER. VARIOUS THREATS TO BIODIVERSITY ARE IDENTIFIED BY STATE GOVERNMENT AGENCIES, WHICH IS FOLLOWED WITH RESOURCES SUCH GRANT FUNDING FOR PRIORITY ACTIONS	Oct-18	ONGOING	
Environmental Education								
HHRM-1	Educate Residents and Businesses to lower expectation of service levels in light of climate hazards. Encourage the community to develop individual resilience to cope with changes and disruptions affecting health, access to basic needs and services.	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;	Seek Funding Opportunities for a climate Change Education Program	SES AND COUNCIL HAVE PROVIDE WORKSHOPS TO HIGH RISK RESIDENTIS	Oct-18	ONGOING	
SRRM-2	Educate communities which are located in areas at risk from infrastructure failure during climatic events.				NONE AVAILABLE TO DATE		ONGOING	
BERM-1	Educate local business and industrial sectors of projected climate risks and options to improve their resilience to these risks.							
ERRM-1	Educate the local tourism industry on the projected risks associated with Climate Change. Encourage the development of industry partnerships to assist the area in maintaining it self as a desirable tourism destination.							
ESRM-1	Educate the community to manage increased disruptions to their power supply. Identify high-risk people, groups and facilities to ensure they have continuity management plans that will allow them to cope with loss of power over extended periods.	Department of Environment and Planning	Funding; Resources	Seek Funding Opportunities for a climate Change Education Program	SES AND COUNCIL HAVE PROVIDE WORKSHOPS TO HIGH RISK RESIDENTIS	Oct-18	ONGOING	
FSVR-2	Educate the regions agriculture sector on the regions potential climate risk so it can assist them in transitioning crops and stock better suited to the changing climate.	Department of Environment and Planning	Funding; Resources	Seek Funding Opportunities for a climate Change Education Program				
	Encourage the private sector to make arrangements with essential service providers, to ensure security of service provision where possible.	Department of Environment and Planning	Funding; Resources	Seek Funding Opportunities for a climate Change Education Program				
HHRT-1	Ensure that Community Health Plans and Strategies address climate change risks in relation to basic needs and essential services.	Department of Environment and Planning/ NSW Department of Health	Funding; Resources	Seek Funding Opportunities for a climate Change Education Program				
HHRT-2	Ensure utility services outside of Council are aware of climate change risks in the region so they can incorporate into plans and services. As an example forward flood mapping, seal level rise maps, Coastal Hazard Maps to Country Energy.	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;	Seek Funding Opportunities for a climate Change Education Program				
BEER-4, BERT-2 & GRER-2	Section 149 Certificate should identify an known climate change risks and state government policies or requirements and also disclose the predictions of current science	Department of Environment and Planning	Legal Advice	Council presently identifies the State Governments sea level rise predictions on all S149 Certificates. We need to consider disclosing the predictions of current science. This may be subject to legal advice.	THIS IS A LEGAL REQUIREMENT	Oct-18	ONGOING	
ESRM-2	Develop non-emergency management plans to cope with more frequent and severe power outages that do not require repeated use of, or excessive dependence on, emergency services.	Department of Environment and Planning	Funding; Resources	Seek Funding Opportunities for a climate Change Education Program				
Natural Resource Management								
NSRM-1	Integrate new practices to manage the protection of native species which are in process of dispersing to track climate change	State Government		The state government monitors, regulates and educates on threatened species, and communities, threatening processes and other immediate threats				
NSRM-2	Revise environmental conservation and biodiversity management plans in light of climate change. Ensure they are realistic in the light of climate change, and do not escalate demands on resources to maintain systems which will be unavailable in the new climate change regime.	Department of Environment and Planning	Funding; Resources	Council does not have a Biodiversity Management Plan or similar conservation policy. Should Council resolve to prepare such a strategy a key component would be the consideration of Climate Change Risks.				
NSRM-3	Develop management plans for increased risks from weed breakouts following more flooding, bushfires and higher temperatures.	Department of Engineering Services	Funding; Resources	The NSW North Coast Weeds Advisory Committee documents management plans and other policies which assist local governments and other authorities to implement weed management. Representatives of this committee should ensure climate change is appropriately considered during the preparation of plans and policies.			ONGOING	

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
NSRM-4	Ensure Climate Change is comprehensively dealt with in any Estuary Management Plan	Department of Environment and Planning	Funding; Resources	Council has recently completed an estuary management plan for the Nambucca River. This plan gave some consideration to Climate Change	All current plans and strategies being prepared including Council Coastal Management Program will give consideration to climate change.	Oct-18	ONGOING	
NSRT-1	Transfer costs to the State or Federal Governments, or consider raising land rates to cover costs of land-buy backs which will allow for re-zoning to promote more resilient conservation zones.	Department of Environment and Planning	Funding; Resources; Biodiversity Management Plan	Council does not have a Biodiversity Management Plan or similar conservation policy. Should Council resolve to prepare such a strategy a key component would be the consideration of Climate Change Risks.				
NSRT-2	Develop a combined regional-scale strategy for cross cutting biodiversity and bio-security risks, to ensure that risks are managed overall.	State Government		The State Government has prepared a Draft Northern Rivers Biodiversity Management Plan. This plan identify a range of actions help maintain and conserve biodiversity.				
NSRT-3	Request State or Federal Government funding for adaptation measures for natural environments which may be of State or Federal significance.	Department of Environment and Planning		Should Council resolve to prepare a biodiversity management plan it should seek funding assistance from the State Government to prepare it.				
General Governance								
BERT-4	Negotiate for State and Federal funding for measures to reduce exposure and increase the resilience of building stock. Alternatively, seek a mandate to increase the rates, to cover the additional capital and operational costs that may be associated with this exposure.	Corporate Services	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;					
ESRT-1	Consult with energy utilities, regarding options for load shedding, priority supply locations, embedded generation, and undergrounding of cables, to reduce exposure to physical hazards.	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;	As Climate Change Hazards become known to Council the information should be forwarded to service providers, neighbouring Councils and other relevant authorities				
ESRT-2	Consult with utilities to introduce secondary power lines around high risk links, to introduce redundancy into the power supply chain.	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;	As Climate Change Hazards become known to Council the information should be forwarded to service providers, neighbouring Councils and other relevant authorities				
ESRT-3	Consult with utilities and neighbouring Councils to address neighbouring high-risk locations through which the power system passes and where it is prone to outage.	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies; Risk identification in neighbouring Councils	As Climate Change Hazards become known to Council the information should be forwarded to service providers, neighbouring Councils and other relevant authorities				
CSRM-2 & ERRM-2	Develop actions to ensure clear, reliable and consistent communications to tourists, travelers and residents in region during extreme events. Ensure the community is made aware of current threats and risks as well as when the risk/threats are withdrawn	Department of Engineering Services/ Department of Engineering Services/ SES		Subject to the DISPLAN review				
CSRT-1	Consult with communication suppliers and neighbouring Councils to develop climate-proof communications systems for the area, including relocation of high-risk assets, and fit-for-purpose specification of equipment.	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;	As Climate Change Hazards become known to Council the information should be forwarded to service providers, neighbouring Councils and other relevant authorities	Flood Risk Mapping has been provided to relevant bodies including SES and the Insurance Council of Australia.	Oct-18	ONGOING	
GRER-2, GRER-4 & BEER-2	Reduce the exposure of council to legal and financial risks through a strategy of disclosure and awareness by: (a) ensuring that all known climate change hazards are published in the public domain, (via maps and other tools) (b) where possible, at minimum, adhering to State or Federal Government benchmarks, whilst also disclosing that risks may exceed these levels due to science known to Council; (c) ensuring that parties that could suffer loss are made aware of possible risks at the earliest possible time (eg, through the 149 certificate), allowing them to make their own decisions on risk management; and (d) requiring that the known climate change hazards are adequately managed by those seeking to build or redevelop in high-risk locations	Department of Environment and Planning	LIDAR; Flood Risk Mapping which considers the implications of Climate Change; Coastal Hazard Mapping; Funding required to complete studies;	Will require amendments to Nambucca LEP 2010 and DCP 2010 when climate change risks are appropriately identified	Flood Mapping and Coastal Hazard Mapping is not available to the public except via request. It could be made available on Councils Website. Bushfire Mapping is available on the NSW State Governments Planning Portal	Oct-18		
GRER-3, BERT-3 & BEER-2	Ensure that Council complies with State benchmarks for indemnification under the Local Government Act (section 733) by implementing required benchmarks across all Council approvals, whilst also disclosing that actual risk may by higher.	Department of Environment and Planning	Legal Advice					

Local Environmental Plan (LEP) and Development Control Plan (DCP)								
Action Code	**Action Summary**	**Responsibility**	**GAPs**	**Original Notes and Status**	Actual Progress	**Last Updated**	**STATUS**	**Percentage complete**
GRER-5	Develop a legal transition strategy based upon legal opinion to minimise short-term litigation (eg, for cost increases in developments). This can be folded into the process of introducing measures that would address climate-related legal risks for Council in the long term.	Corporate Services		May be required when new development standards are implemented. If standards are based on professional investigations, legal opinions may only be necessary when proponents challenge those standards.				
GRVR-4	Reduce vulnerability of Council to community dissatisfaction, loss of goodwill and political instability by implementing consultative processes around climate change management strategies, changes in resource allocation, and possible increases in rates to maintain services and changes in service levels.	Department of Environment and Planning	Funding; Resources	Seek Funding Opportunities for a climate Change Education Program				
GRVR-5	Update risk guidelines/specifications for Council infrastructure to cope with weather-related events that may be affected by climate change (eg, flood risk), to reflect projected rather than historical risk levels. For example, a storm water drain might be designed to last 100 years and cope with a 1 in 100 year event; with climate change, the suitable flood level should consider that an event with a return frequency of 1 in 100 years today may look more like the current 1 in 200 year event by 2100 (ie, much more severe).	Department of Engineering Services	Asset Risk Maps; Funding; Resources					
GRVR-6	Implement a policy of 'shadow pricing' across decision-making to include Federal Treasury estimates for forward carbon prices under a two degree Celsius / sub-450 parts per million scenario.	All of Council	Will require a standard methodology to be provided to staff so estimates of the carbon price can be simply calculated.	Implement into Council Reporting process for projects likely to be actioned in the next 5 years.				
GRRM-2	Review the ability of Council to provide core services and maintain assets under climate change. If this is not possible, develop plans to consolidate asset bases and service provisions. Also, review the ability of Council to respond to major events including the workforce required for timely recovery post-event. Overall, create a revised financial, asset and human resource strategy.	All of Council	Funding; Resources	This action would require a supporting study prepared by a specialist in economic and planning.				
BERT-1	Work with insurance providers to ensure that all properties in the area are affordably insurable and where insurers have specific concerns about risks such as flooding and bushfire, review options within Council's control that can reduce these risks to levels acceptable to insurers Promote full insurance cover within the community.	Corporate Services	Funding; Resources	Council can continue to communicate with insurance companies and develop and implement actions within this strategy to promote more insurable communities, however it is idealistic to achieve full insurance cover within the community.				
GRRM-4	Integrate climate change management strategies into all Council planning documents, policies and guidelines.	Department of Environment and Planning/ Corporate Services		This action is best placed in Council 20 year Community Strategic Plan as an overriding objective.	Council's guiding plans and policies give consideration to climate change. For example: THe Nambucca Flood Risk Management Study and Plan; THe Estuary Management Plan; The Coastal Zone Management Plan; The Nambucca LEP and the Community Strategic Plan.	Oct-18	ONGOING	
GRRM-5	Implement monitoring and measurement processes for key climate change indicators and metrics for exposed and vulnerable people, property and infrastructure.	Department of Environment and Planning		May be incorporated in existing monitoring activities such as the State of the Environment Report; Land and Housing monitors; development statistics etc			ONGOING	
GRAO-1	Collaborate with all neighbouring Councils and State Government to 'climate-proof' the region which would increase relative value and also harness potential advantages: water and food security for agriculture and low-carbon tourism making the region attractive to inward investment and young families.	Department of Environment and Planning		As Climate Change Hazards become known to Council the information should be forwarded to service providers, neighbouring Councils and other relevant authorities. Initiatives for joint actions or programs should be identified and joint funding opportunities investigated.				
GRVR-3	Reduce Council's financial exposure to increased extreme events which cause disruption to services and damage to assets. Act on a range of strategies to ensure resilience of Council's services - eg implement this adaptation plan	All of Council						

Extract table 11.1 from the Estuary Management Plan

Actions	Responsibility	Specific Tasks and Resources	Timeframe	Cost	Potential Fund Source
11.1 Repair or improve existing public boat ramps, as detailed below. The priority for implementation of works is provided in Table 12-1:	As detailed below.	As detailed below.	As detailed below.	As detailed below.	NSW Maritime DECC Estuary Program Dept Lands
Shelley Beach, Nambucca Heads • Improve signage highlighting the specific usage for boat trailer parking to prevent usage conflict.	Council in consultation with the Offshore Fishing Group	Council should have all the required tools to implement these actions.	Improvement of car park signage should be initiated in the short term (1 to 2 yrs)	Improvements to signage may cost between $2 and $5K.	-
Wellington Drive, Nambucca Heads • Review feasibility of this ramp. If the ramp is to be retained: ❑ Improve foreshore amenity near this ramp; ❑ Remove ballast rock to provide additional sandy beach; and ❑ Clearly identify appropriate boat ramp usage, i.e. solely for launching/retrieval of small craft, i.e. 3 to 4m.	Council in consultation with River Users Group and NSW Maritime	Council should have all the required tools to implement these actions.	A determination on the ramp should be made in conjunction with **Strategy 16.3.**	Improvements may cost $2 to $5K.	NSW Maritime Infrastructure Program if ramp is to be improved
Gordon Park, Nambucca Heads • Gordon Park ramp may be benefited by a public wharf (see RSL). There remains an issue with shoaling immediately adjacent to Gordon Park, which may limit the ability of boats to tie up to the structure unless dredging is performed.	Council in conjunction with NSW Maritime, DECC, Dept Lands and DPI Fisheries	Consider Council's Structure Plan.	A determination on the wharf should be made in conjunction with **Strategy 16.3.**	-	NSW Maritime Infrastructure Program
RSL, Nambucca Heads • Investigate feasibility of wharf structure (and holding pontoon at ramp) to replace existing aged and potentially undersized infrastructure. Consideration should be given to extending the public wharf along the entire foreshore of the Inner Harbour. Consideration of Council's Structure Plan for Nambucca to be the Tourist Centre of the Shire should be made.	Council in conjunction with NSW Maritime, DECC, Dept Lands and DPI Fisheries	For design guidance: http://www.waterways.nsw.gov.au/docs/engineering-guidelines.pdf	A determination on the wharf should be made in conjunction with **Strategy 16.3.**	Wharf structure (and holding pontoon) would cost $1M+ but may generate significant income through enhanced tourism over a number of years.	NSW Maritime Dept Lands (Waterways Program)

Actions	Responsibility	Specific Tasks and Resources	Timeframe	Cost	Potential Fund Source
Stuarts Island, Nambucca Heads • Need for localised sand removal (see also **Strategy 14.1**). • Improve night-time lighting. Lighting provided at this location is unlikely to be a disturbance to local residents. • Assess feasibility of additional toilet block	Council in conjunction with NSW Maritime, DECC, Dept Lands and DPI Fisheries.	Maintenance Dredging of Tidal Waterways, SEPP 35 would be the appropriate planning instrument by which to conduct dredging	Dredging should be carried out immediately. Lighting should be improved in the mid term (3 to 5 yrs)	Dredging costs around $10/m^3. Lighting improvements may cost between $2K and $5K.	Council to consult with Department of Lands
Apex Park, Bowraville (Wilson Road) • Consider closure of ramp and conversion of land to Public Park. There currently exists a very dangerous vehicle access to park, particularly for those towing boats. • If the ramp is to be retained: ❑ Significantly improve or alter access/exit arrangements. ❑ Provide signage indicating that the river is highly shoaled in this location. ❑ Provide some basic visitor facilities.	Council in consultation with River Users Group	Council should have all the required tools to implement these actions.	A determination on the ramp should be made immediately. Access to the park should be improved immediately Other improvements should be made in the mid term (3 to 5 yrs).	Altered entrance arrangements may cost $20K+ depending on design Other improvements may cost ~$5K	-
Weir Reserve, Scotts Head • Improve water access facilities for a range of users and uses. • Improve visitor facilities e.g. construction of playground equipment, gas BBQs and covered seats for visitors to improve amenity.	Council in consultation with River Users Group	For design guidance: http://www.waterways.nsw.gov.au/docs/engineering-guidelines.pdf	Improvements should be made in the mid term (3 to 5 yrs).	Water access improvements around $10K, other facilities around $10K	NSW Maritime Infrastructure Program
Lions Park, Macksville • Provide boat tie up facilities for launching/retrieving craft. • Investigate feasibility of a jetty/wharf area for fishing, swimming and boat access. • Investigate need for additional parking for boats trailers. • Assess feasibility of construction of a ski beach near the existing ramp.	Council in consultation with River Users Group	Council should have all the required tools to implement these actions.	Improvements should be made in the short to medium 2 to 3 yrs). Investigations of jetty wharf should be completed in the mid term	Boat tie up facilities ~$10K Feasibility study for wharf may cost ~$10K. Cost of parking study internal to Council	NSW Maritime Infrastructure Program Grants for boat tie up facilities, jetty or wharf
Boultons Crossing/Gumma Reserve, Warrell Creek • Construct an access ramp for canoeists/kayakers near the campground.	Council in conjunction with Committee	For design guidance: http://www.waterways.nsw.gov.au/docs/engineering-guidelines.pdf	Improvements should be made in the mid term (3 to 5 yrs).	Cost for access ramp may be $10K+	NSW Maritime Infrastructure Program Grants

Refer to item 11.3 of the Estuary Management Plan - Suggested priorities for upgrading existing public ramp/ wharf facilities

Table 12-1 Suggested priorities for upgrading existing public ramp/wharf facilities

Boat Ramp	Requirement	Timing (yrs)
Nambucca Heads		
Shelley Beach	Improve signage in dedicated trailers park to reduce inappropriate parking by non-trailered vehicles	1 to 2
Wellington Drive	Review feasibility of ramp (and continuation of its use)	1 to 2
	(*if ramp to be continued*) Improve foreshore amenity near ramp, remove ballast rock to provide sandy beach	3 to 5
	(*if ramp to be continued*) Provide signage identifying that ramp is suitable for launching of small craft only (i.e. less than 4m).	3 to 5
Gordon Park	Investigate feasibility of a public wharf at this location (and along Inner Harbour)	1 to 2
RSL	Investigate feasibility of a public wharf at this location (and along Inner Harbour) and holding pontoon at ramp	1 to 2
	Commence construction of public wharf facilities (*if to be proceeded with*)	3 to 5
Stuarts Island	Erect nighttime lighting	3 to 5
	Minor dredging required near jetty	Immediate
Macksville/Bowraville		
Apex Park	Review feasibility of ramp (and its continued use) due to traffic issues	Immediate
	(*if ramp to be continued*) Improve safety of road access and exit to Wilson Road	Immediate
	(*if ramp to be continued*) Improve signage relating to high degree of shoaling in the river at this location	3 to 5
	(*if ramp to be continued*) Improve visitor facilities e.g. covered seats, toilets, BBQs, etc. to promote park use.	3 to 5
Lions Park	Provision of bollards for boat tie up facilities	2 to 3
	Investigate feasibility of a beach area for boat parking and ski starts	2 to 3
	Investigate need for additional parking facilities	2 to 3
Scotts Head (Warrell Creek)		
Scotts Head Weir Reserve	Upgrade existing facilities by provision of defined boat trailer parking, redesigned ramp and boat access area (for boaters, fisherman, swimmers and picnickers), playground equipment, gas BBQs and picnic tables for visitors	3 to 5
Boultons Crossing	Construct an access ramp for canoeists/kayakers near the campground	3 to 5
Public Reserves (Boultons Crossing and Shelley Beach)		
Public Reserves	Complete Review of Plans of Management and integrate recommendations where appropriate into the Plans of Management	3 to 5

Appendix E. RISK ASSESSMENT AND GAP ANALYSIS

E1. METHODOLOGY

The following methodology was applied to complete Risk Assessment and Information Gaps Analysis:

Risk Assessment

- Review of current knowledge and information available on the study area to highlight key issues, values and assets within the coastal zone and estuaries.
- Assess the risk of each issue to values and assets. This involved considering the priority risks identified in the Threat and Risk Assessment (TARA) for the Marine Estate Report (BMT WBM, 2017). The risk assessment process identifies credible risks; the likelihood of the risk event occurring given existing controls; the consequences to environment, social and economic values, public safety and benefits should the event occur; and applies a risk rating. The risk assessment takes into account the AS/NZS ISO 31000: Risk Management – Principles and Guidelines. The methodology herein uses the following risk assessment process outlined in Table 16 and Table 17, which uses qualitative scales to assess the risk of identified issues impacting the values and assets of the study area under current management practices.
- In accordance with the Coastal Management Manual (OEH, 2018 c) the risk assessment evaluates the current day risk and also considers how the risk level likely to change in the future (i.e., over 20, 50 and 100 years). This includes assessment of it how factors such as climate change, increasing development pressures, and population increase will impact these risks. Where available, future risk levels have been assigned based on the projected hazard mapping and data for these risks. In other cases a qualitative assessment has been undertaken considering the expected future changes.
- For the coastal hazards erosion, recession, landslip and coastal inundation, consideration was given to the certified CZMP (Umwelt, 2012) and any management actions implemented since. The highest risk for each threat (erosion, recession, instability) for any specific area in the coastal zone (taking subsequent treatments into account) was used to provide an overall risk is this first-pass risk assessment.
- The first-pass risk assessment applies a conservative approach by considering the risk to values from categories of issues and key threats across the whole study area, rather than a location, or specific infrastructure-based approach.
- The assessment typically focusses on the detrimental, rather than the beneficial impacts of the threat, unless otherwise indicated. Should later stages of the CMP focus further on particular threats, the beneficial aspects, or opportunities associated with those threats will be further assessed.
- In all circumstances, the potential highest consequence level to any asset or value was used for the assessment. Potential impacts to part of an Aboriginal site/ object or practice of cultural heritage significance were considered to be impacting the whole value or asset.

Gap Analysis

- Identification of knowledge gaps related to each issue.
- The assessment of the importance of resolving each knowledge gap to allow for effective future management of issue, using the scale outlined in Table 19.
- The allocation of a timeframe for resolution of knowledge gaps, i.e. immediate, short term (1-2 years), medium term (3-5 years) and long term (5-10 years and beyond).
- Recommendations for Stage 2 in regards to further in-depth assessments or management requirements for the CMP for knowledge gaps with an immediate priority for resolution. Knowledge

gaps with a longer-term priority for resolution will be addressed through Stage 5 (CMP implementation).

The results of this process are provided in Table 20.

Table 16: Qualitative Measures of Likelihood under Current Management Practices

Likelihood	Description
Almost certain	Expected to occur several times per year or impact the value frequently or continuously.
Likely	May occur every year but not expected to impact the value frequently or continuously. Alternatively, management actions to be implemented within this timeframe (1st year) if impacts are expected to worsen (e.g. as a result of climate change and sea level rise).
Possible	May occur at some point in the next 10 years but not expected to impact the value every year. Alternatively, management actions to be implemented within this timeframe (10 years) if impacts are expected to worsen (e.g. as a result of climate change and sea level rise).
Unlikely	Not expected to occur of impact on the value within the next 10 years but expected within 20 years. Alternatively, management actions to be implemented within this timeframe (20 years) if impacts are expected to worsen (e.g. as a result of climate change and sea level rise).
Rare	Very unlikely to occur or impact on the value within the next 20 years. Management actions for any possible future threats not likely to require implementation within a 20-year timeframe.

Table 17: Qualitative Measures of Consequence or Impact

Values and Assets		Consequence Level				
		Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Environmental	Ecosystem Functions	Negligible impact on ecosystem functions within the study area – within natural variation.	Short term impact on ecosystem functions within the study area – strong recovery.	Medium term impact on ecosystem functions within the study area – recovery likely.	Long term impact on ecosystem functions within the study area – limited chance of recovery.	Permanent and catastrophic impact on ecosystem functions within the study area – irreversible.
	Species, Communities and Habitats	Negligible changes detected, with changes likely due to natural variation.	Isolated but detectable changes to population, biodiversity, or distribution of species, communities or habitats within study area - strong recovery.	Detectable changes to population, biodiversity, or distribution of species, communities or habitats within study area – recovery likely.	Serious, ongoing detectable changes to population, biodiversity, or distribution of species, communities or habitats within study area – limited chance of recovery.	Catastrophic and irreversible impacts to population, biodiversity or distribution of species, communities or habitats within study area.
Social	Amenity - Recreational Use	Zero impact on the ability of the community to pursue recreational activities in the area.	Short term (Days) or restricted (certain sections closed) inability of the community to pursue recreational activities in the area.	Medium term (weeks) or restricted (certain sections closed) inability of the community to pursue recreational activities in the area.	Long term (Years/ Months) inability of the community to pursue recreational activities in the area.	Long term to permanent inability of the community to pursue recreational activities in the area.
	Amenity – perception	No impact on community perception of the study area.	Community perception that the study area has experienced minor damage.	Community perception that the study area has been damaged. Slight reduction in the number of users.	Community perception that the study area has been significantly damaged. Significantly reduced number of people utilising the study area.	Community perception that the study area has been permanently damaged and is avoided by all users.

Values and Assets		Consequence Level				
		Insignificant	**Minor**	**Moderate**	**Major**	**Catastrophic**
Social (cont.)	Cultural/ Heritage (Aboriginal and European)	No impact to objects/ sites or practices of cultural/ heritage significance.	Minor alteration of objects/ sites or practices of cultural and heritage significance. Impacts can be reversed.	Alteration/ modification of objects/ sites or practices of cultural and heritage significance. Impacts likely reversible.	Serious impacts or alterations/ modifications of objects/ sites or practices of cultural and heritage significance. Difficult to reverse impacts.	Permanent and irreversible impact to objects/ sites or practices of cultural and heritage significance.
Economic	Tourism	Minimal to zero reduction in the number of tourists visiting the study area.	Short term reduction in the number of tourists visiting the study area.	Substantial reduction in the number of tourists visiting the study area.	Permanent reduction in the number of tourists visiting the study area.	Permanent loss of tourism asset and drawcard for the region.
	Business/ industry influenced/ reliant on access to and health of estuaries and beaches	Minimal to zero impact on income or the ability to provide services.	Minor short-term loss of income or the ability to provide services due to short-term closure of waterways/ beaches or to (perceived or actual) health or safety risks.	Reduced income or the ability to provide services due to medium-term closure of waterways/ beaches or to (perceived or actual) health or safety risks.	Significant long-term loss of income or the ability to provide services due to long-term closure of waterways/ beaches or to (perceived or actual) health or safety risks.	Permanent loss of income or the ability to provide services due to closure of waterways/ beaches.
Public Safety	Minor injury/ illness	No minor injury/ illness.	Minor medical treatment required.	Injury requiring medical treatment.		
	Major injury/ illness	No major injury/ illness.	Medical treatment required.	Hospitalisation required	Long-term hospitalisation required.	
	Serious injury/ fatality	No serious injury/ fatality.			Loss of life or widespread long-term hospitalisation required.	Multiple loss of life.

Table 18: Qualitative Risk Estimation

Likelihood	Consequence				
	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Minimal	Low	Moderate	High	High
Likely	Minimal	Low	Moderate	High	High
Possible	Minimal	Minimal	Low	Moderate	High
Unlikely	Minimal	Minimal	Minimal	Low	Moderate
Rare	Minimal	Minimal	Minimal	Minimal	Low

Table 19: Importance of knowledge to management of the coastal zone and estuaries

Importance	Description
Low	This knowledge is not required for management decisions/ actions/ planning – academic interest only.
Moderate	The knowledge would improve the effectiveness of management.
High	Management action required within the timeframe of this CMP cannot proceed effectively without this knowledge.
Unknown	Unknown importance of knowledge for management decisions/ actions/ planning.

E2. ASSESSMENT AND ANALYSIS

Table 20: Risk assessment and information gaps analysis

Issue	ID	Threats (use, activity or stressor)	Key locations	Key impacts	Preliminary Risk Assessment (present day risk)			Future Risk			Assessment of Knowledge Gaps			Recommendation for additional studies
					Consequence	Likelihood	Current Risk	20 yr Risk	50yr Risk	100 yr Risk	Knowledge Gap	Importance for Resolution	Priority for Resolution	
Coastal hazards	T1	Storm surge and storm bite coastal erosion	Shelly Beach, Beilbys Beach, Nambucca Main Beach, Scotts Head Main Beach, South Valla Beach, North Valla Beach, Swimming Beach Potentially other locations.	Degradation to or of loss of assets and infrastructure including increased frequency of flooding and inundation; loss of dune vegetation; extent of, and migration of estuarine and riparian vegetation communities; loss of amenity; public safety risks; tourism impacts; Council liability and legality issues; other social, cultural and economic factors	C-Moderate	1-Almost Certain	Moderate	Moderate	High	High	Coastal hazards within NVC's area of responsibility have been sufficiently mapped. Unmapped areas include Oyster Creek/ North Valla Beach, South Valla Beach, Forster/ South Beach, Little Beach and Wakki Beach. These areas are the responsibility of other agencies/authorities (e.g. DPIE - Crown Lands, DPIE - NPWS, and State Rail in Oyster Creek etc.). Understanding of potential for breakthrough of frontal dunes (e.g. at Deep Creek and Warrell Creek).	Low	Short term	**Stage 5** (CMP Action) - - Mapping of storm surge and storm bite erosion hazards. - Recommendation to other agencies/authorities to consider coastal hazard mapping (present day, and relevant long term planning scenarios) to fill in the gaps where these agencies are land managers of the coastal zone (DPIE - Crown Lands, DPIE - NPWS, State Rail in Oyster Creek etc.).
	T2	Coastal long-term shoreline recession	Main beach, Shelly Beach, Swimming Creek, Beilby's Beach, Scotts Head.		D-Major	1-Almost Certain	High	High	High	High		Moderate	Short term	
	T3	Increased risk of slope instability/ landslip	10 sites at North Valla, Main Beach, Scotts Head and the lower Nambucca River estuary as per SMEC (2009).		D-Major	1-Almost Certain	High	High	High	High	Lack of GIS information on coastal cliff instability. Hard copy data available only.	Moderate	Medium term	**Stage 5** (CMP Action) - Digitise information from SMEC (2011) Coastal Slope Instability Hazard Study and any amendments made through reassessment of priority sites.
	T4	Coastal inundation including wave propagation into estuaries	Estuarine waterways and waterbodies		C-Moderate	1-Almost Certain	Moderate	Moderate	High	High	None - sufficient high level information provided in SMEC (2009 & 2010) and WMAwater (2017a).	N/A	N/A	N/A
	T5	Tidal inundation	Wellington Drive; Bellwood Park; Rural Lands		D-Major	1-Almost Certain	High	High	High	High	Inadequate understanding of tidal inundation extent and frequency (separate to catchment flooding) with climate change, and the associated impacts (e.g. to assets & infrastructure, ecological habitats, access to built areas, and to recreational opportunities and infrastructure).	Moderate	Medium term	**Stage 5** (CMP Action) - Detailed local tidal inundation assessment of the estuaries for a variety of future sea level rise scenarios, with a risk assessment to estuary assets and infrastructure.
	T6	Disrepair of, or inadequate design of coastal protection structures and infrastructure	Shelly Beach, South Valla Beach, Swimming Beach		D-Major	1-Almost Certain	High	High	High	High	On-going monitoring of infrastructure condition and performance especially. after coastal hazard events. Lack of detailed design of coastal infrastructure and approval for maintenance and improvement.	Moderate	Short term	**Stage 5** (CMP Action) – -Monitor performance of existing coastal protection infrastructure. - Detailed design of coastal infrastructure and approval for maintenance and improvement (e.g. South Valla Beach carpark) - Ensure coastal infrastructure is adequately addressed in Council's Asset Management Plan and where necessary investigations are undertaken to support contemporary inventory of coastal assets
	T7	Stormwater erosion in the coastal zone	Scotts Head (Forster Beach), Main Beach, Beilbys Beach		C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	High	None - sufficient high level information provided in Umwelt (2012).	N/A	N/A	N/A

Issue	ID	Threats (use, activity or stressor)	Key locations	Key impacts	Preliminary Risk Assessment (present day risk)			Future Risk			Assessment of Knowledge Gaps			Recommendation for additional studies
					Consequence	Likelihood	Current Risk	20 yr Risk	50yr Risk	100 yr Risk	Knowledge Gap	Importance for Resolution	Priority for Resolution	
Climate change impacts	T8	Increased storminess	Catchment and estuarine waterways/water bodies.	Water quality impacts associated with increased runoff events (e.g. high turbidity levels/ suspended solid concentrations; increased erosion and sedimentation; low DO; high nutrient concentrations elevated acidity and heavy metal loadings etc.) Impacts to seagrass health and distribution; risk from elevated bacterial concentrations to oyster aquaculture and human health.	D-Major	3-Possible	Moderate	Moderate	High	High	None -	N/A	N/A	**Stage 5** (CMP Action) - Development of catchment plans for key urban areas with a focus on water quality improvements (e.g. East Street/Hughes Creek, Nambucca Heads, Bellwood, Scotts Head all urban areas and growth areas).
	T9	Increased salinity in the upper estuary	Upper estuary	Decline in potable/stock water quality	C-Moderate	3-Possible	Low	Moderate	High	High	None -	N/A	N/A	N/A
	T10	Average warming and extreme temperatures	Whole study area	Estuarine ecological impacts; increased bushfire risk; extended dry periods.	C-Moderate	3-Possible	Low	Moderate	High	High	None -	N/A	N/A	N/A
	T11	Anthropogenic barriers (i.e. physical barriers, land use and planning constraints) to migration of vegetation communities with sea level rise (e.g. saltmarsh)	Estuarine waterways/water bodies.	Coastal squeeze; loss of estuarine, dune and riparian vegetation.	C-Moderate	1-Almost Certain	Moderate	Moderate	High	High	Lack of mapping of barriers and land use constraints to estuarine vegetation migration with sea level rise	High	Medium term	**Stage 5** (CMP Action) - Assessment of potential for estuarine vegetation migration with sea level rise (2050 and 2100) based on vegetation types, topography, land use and possible future tidal range and including: - mapping of anthropogenic barriers and land use constraints to migration (e.g. training walls and rock revetments, footpaths, roads, land uses); - allocation of a management priority classification indicating the level of intervention required to minimise the potential impact of sea level rise on migration.
Estuarine bank erosion	T12	Flooding	Current areas of concern: Valla Beach carpark; Upper Warrell Creek; Lower Warrell Creek sand dunes, saltmarsh and mangroves; Gumma Rd at Wrights Corner; South Arm at Bowraville (flood debris). Other locations to be confirmed in Stage 2 via mapping of estuarine bank and riparian vegetation condition	Bank instability; loss of land; erosion to and loss of riparian and estuarine vegetation and habitat; siltation; water quality issues; navigational impacts; impacts to oyster growers; impacts to general amenity; tourism impacts; Council liability and legality issues	D-Major	2-Likely	High	High	High	High	Lack of comprehensive, up to date bank stability and riparian condition mapping including for previous unmapped areas of Oyster Creek, Deep Creek and Swimming Creek. Lack of robust, repeatable, evidence-based approach to selection of best practice management bank treatments (Priority = Medium term).	High	Immediate	**Stage 2** - Desktop assessment, field survey and mapping of bank condition (erosion and riparian vegetation) of navigable reaches of Nambucca River estuary (including Taylors Arm, Newee Creek and Warrell Creek), Swimming Creek and Deep Creek. **Complete**. **Stage 5 –** Develop an estuary-wide Bank Management Strategy (BMS) commensurate with Initiative 2 of the Marine Estate Management Strategy and any tool/ guidance provided.
	T13	Powered vessels and towing			D-Major	3-Possible	Moderate	Moderate	Moderate	High				
	T14	Wind waves			C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	High				
	T15	Historic clearing of riparian vegetation and adjacent habitat			D-Major	1-Almost Certain	High	High	High	High				
	T16	Uncontrolled stock access to and grazing within the riparian zone			D-Major	1-Almost Certain	High	High	High	High				
	T17	Past gravel extraction contributing to ongoing poor geomorphic condition			C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	Moderate				
	T18	Accumulation of flood debris (e.g. fallen trees resulting in scour eddies of adjacent banks)			D-Major	3-Possible	Moderate	Moderate	Moderate	High				
Riparian vegetation and weed management	T19	Dominance of invasive weeds (e.g. Camphor Laurel and Small-leaved Privet in the upper reaches and bitou bush in the lower reaches)	Buckra Bendinni Creek; South Creek; tributaries to Taylors Arm; upper catchment of Deep Creek; Nambucca River estuary entrance; North Arm (upstream of Macksville); Taylors Arm.	Bank instability; sedimentation; displacement of native species; alteration of fauna habitats; reduced recruitment of native riparian vegetation; poor water quality; other social and economic factors.	D-Major	1-Almost Certain	High	High	High	High	-	N/A	N/A	N/A
	T16	Uncontrolled stock access to and grazing within the riparian zone									-	N/A	N/A	N/A
	T15	Historic clearing of riparian vegetation and adjacent habitat									-	N/A	N/A	N/A

Issue	ID	Threats (use, activity or stressor)	Key locations	Key impacts	Preliminary Risk Assessment (present day risk)			Future Risk			Assessment of Knowledge Gaps			Recommendation for additional studies
					Consequence	Likelihood	Current Risk	20 yr Risk	50yr Risk	100 yr Risk	Knowledge Gap	Importance for Resolution	Priority for Resolution	
	T20	Community concern about pesticide and herbicide use in the catchments as well in Council roadside weed spraying.	Catchment wide but primarily for roadside weeds	Public perception	C-Moderate	3-Possible	Low	Low	Low	Low	N/A- Use of glyphosate as a weed management technique is supported by the Australian Government at present provided it is used as recommended including with appropriate PPE.	N/A	N/A	N/A
Public use and access	**Public access**													
	T21	Not enough public recreational access and facilities throughout the estuaries (e.g. bike storage; canoe trail facilities; fish cleaning facilities; boardwalks; parking; amenities; rubbish bins; waterway access for boating and non-motorised water sports)	Whole study area other than the lower Nambucca River estuary (covered by the Nambucca River Master Plan)	Public access, public safety, public amenity; tourism impacts	C-Moderate	2-Likely	Moderate	Moderate	Moderate	Moderate	Whilst the Nambucca Estuary Management Plan and the Nambucca River Master Plan (RDM *et al*., 2010) provides detailed strategy for the Nambucca River, there is a lack of understanding of recreational access and infrastructure needs in other parts of the study area (coastal beaches and Deep Creek).	Moderate	Medium term	**Stage 5** (CMP Action). -Prepare a strategy that builds on previously successful plans (e.g. Nambucca River Masterplan, Dawkins Park Plans, Nambucca Lookouts Plans) to drive future public recreational infrastructure needs for the study area. The strategy would include assessment of suitability of current infrastructure, consideration of growth potential, disability needs, identification of public land that could be used for public recreation, and a suggested allocation of funds for facility improvements, provision of coastal pathways etc. The aim will be to provide strategic master planning for additional areas that support placemaking, facility improvement and open space/ environmental management.
	T22	Poor condition and inadequate foreshore access and parking during summer peak use. Likely to increase with population growth.	e.g. Parking at Valla Beach Road	Public access, public safety, public amenity; tourism impacts	C-Moderate	3-Possible	Low	Moderate	Moderate	High				
	T23	No linkage of coastal pathways	e.g. narrow Inner Harbour Boardwalk	Level of tourism; economic activity; recreational enjoyment; commuting ability	C-Moderate	3-Possible	Low	Low	Low	Low				
	T24	Not enough mobility infrastructure (e.g. lookouts, easily traversable access ways, design of seats etc.)	Whole study area other than the lower Nambucca River estuary (covered by the Nambucca River Master Plan)	Public safety risk, lack of public access, social impacts	C-Moderate	3-Possible	Low	Moderate	Moderate	Moderate				
	T25	Insufficient maintenance of access infrastructure to minimise safety risks	e.g. bridge at North Valla Beach access track; Deep Creek footbridge	Public safety risk	C-Moderate	3-Possible	Low	Moderate	Moderate	Moderate	Lack of detailed design of coastal infrastructure and approval for maintenance and improvement.	N/A	N/A	**Stage 5** (CMP Action). Detailed design of coastal infrastructure and approval for maintenance and improvement.
	T26	Insufficient, or inappropriate public education and signage (e.g. outdated or too much information)		Un-informed community; confusion; information fatigue; tourism impacts	C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	Moderate	Current delivery methods, locations of and types of information being provided; and effectiveness of delivery/ engagement with the community.	Moderate	Medium term	**Stage 5** (CMP Action). Assessment of public education and signage including: consideration of key issues requiring education; review of previous/ current educational techniques being implemented (e.g. web-based, signage), their status and appropriateness; consideration of s successful education program(s) that has produced a favourable outcome and its applicability to the coastal zone.
	T27	Litter and marine debris	Nambucca Estuary esp. at Pacific Hwy service station, open coastline.	Reduced amenity; micro-plastics; ingestion, smothering and entanglement of seabirds and marine fauna	C-Moderate	2-Likely	Moderate	Moderate	Moderate	High	-	N/A	N/A	**Stage 5** (CMP Action) - Development of catchment plans for key urban areas incorporating management of litter (e.g. GPTs at key locations, education campaign etc.)

Issue	ID	Threats (use, activity or stressor)	Key locations	Key impacts	Preliminary Risk Assessment (present day risk)			Future Risk			Assessment of Knowledge Gaps			Recommendation for additional studies
					Consequence	Likelihood	Current Risk	20 yr Risk	50yr Risk	100 yr Risk	Knowledge Gap	Importance for Resolution	Priority for Resolution	
	Usage conflicts and public safety (other than boating - see below)													
	T28	Conflict of use between off-leash dogs (at both on-leash and off-leash areas)	Several locations within study area	Public health and safety; recreational enjoyment; amenity; habitat disturbance; reduction in abundance and health of fauna;	B-Minor	1-Almost Certain	Low	Low	Moderate	Moderate	N/A. Council has been through several iterations of management options and associated community consultations regarding companion animals. It is anticipated that this will be a continual and ongoing issue. Increased regulation of the existing policy is an option however this is subject to resource availability.	N/A	N/A	This is a continual and ongoing issue that is being addressed through existing Council programs outside of this CMP. **Stage 5** (CMP Action) to monitor the performance of existing actions and ensure effective management.
	T29	4WD/ motorbikes on beaches (ambiguity of permitted areas; lack of enforcement)	4WD areas at North Valla, Swimming Creek to Deep Creek, and Forster Beach and prohibited areas adjacent to these beaches (e.g. entrances to Deep Creek, Oyster Creek, Scotts Head beaches)	Public safety; public amenity; +ve and -ve tourism impacts; noise disturbance/ physical disturbance to nesting shorebirds; vegetation disturbance; erosion risk.	C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	High	N/A. Council has a beach access committee which manages policy decision in respect to 4WD on beaches. Council is presently trialling improved regulation of 4WD access to beaches.	N/A	N/A	This is a continual and ongoing issue that is being addressed through existing Council programs outside of this CMP. **Stage 5** (CMP Action) to monitor the performance of existing actions and ensure effective management.
	T30	Illegal camping in coastal and foreshore areas	South Valla	Fire risk; habitat disturbance; litter; public amenity; faecal contamination	C-Moderate	2-Likely	Moderate	Moderate	Moderate	High	-	N/A	N/A	N/A
	T31	Conflicts of use between cyclists and other users of footpaths and boardwalks	Lower Nambucca River estuary	Public safety; public amenity	B-Minor	1-Almost Certain	Low	Low	Moderate	Moderate	-	N/A	N/A	N/A
	T32	Use of recreational drones disturbing amenity and birdlife	Lower Nambucca River estuary and other coastal locations	Public amenity; habitat disturbance	B-Minor	3-Possible	Minimal	Minimal	Low	Moderate	-	N/A	N/A	N/A
	T33	Trampling and unfenced access to coastal vegetation	Coastal dunes	Damage to and loss of habitat; reduction in abundance and health of fauna and flora	B-Minor	1-Almost Certain	Low	Low	Moderate	Moderate	-	N/A	N/A	N/A
	T34	Public safety risks from faecal contamination of waterways	Estuary waterways	Public safety, public amenity; tourism impacts	C-Moderate	2-Likely	Moderate	Moderate	Moderate	High	-	N/A	N/A	N/A
	T35	Public safety risks from marine life (e.g. shark bite, stingers)	Marine and estuary waterways	Public safety, public amenity; tourism impacts	D-Major	3-Possible	Moderate	Moderate	Moderate	Moderate	-	N/A	N/A	N/A
	Boating and waterway usage (including fishing, leisure boating, commercial uses, and transportation); jet-skiing; motorised towing sports (e.g. water skiing, wakeboarding, wake surfing, wake foiling and tubing)													
	T36	Lack of exclusion areas and regulatory restrictions (speed and usage controls)	Estuary waterways	Wave impacts on unprotected banks, estuarine vegetation and oyster growers (particularly during high usage periods); trampling of estuarine vegetation and bed sediments; anchor dragging; conflict of use and safety risks to other waterway users; noise and amenity disturbances; vessel strike of marine mammals	C-Moderate	1-Almost Certain	Moderate	Moderate	High	High	-	N/A	N/A	N/A
	T37	Irresponsible usage (e.g. speeding) and lack of enforcement									-	N/A	N/A	N/A
	T38	Lack of understanding habitat sensitivities and locations; impacts to sensitive habitats (see "Public access - education and signage" above)									-	N/A	N/A	N/A
	T39	Marine noise pollution	Marine environments	Reduced habitat usage and health of marine mammals	B-Minor	1-Almost Certain	Low	Low	Low	Low	-	N/A	N/A	N/A
Entrance management, shoaling and estuary hydraulics	T40	Siltation affecting navigation, water quality (reduced flushing) and aesthetics	Upper reaches of the estuaries, e.g. Deep Creek tidal limit and East Bowraville; lower Deep Creek near Hyland Park	Navigational impacts, reduced flushing, aesthetics/ amenity; poor water quality, biodiversity impacts	D-Major	2-Likely	High	High	High	High	-	N/A	N/A	N/A

Issue	ID	Threats (use, activity or stressor)	Key locations	Key impacts	Preliminary Risk Assessment (present day risk)			Future Risk			Assessment of Knowledge Gaps			Recommendation for additional studies
					Consequence	Likelihood	Current Risk	20 yr Risk	50yr Risk	100 yr Risk	Knowledge Gap	Importance for Resolution	Priority for Resolution	
	T41	Shoaling of marine sands affecting navigation and marine safety	Lower reaches of Deep Creek and of the Nambucca River estuary (priority locations include Marine Rescue, Gordon Park and Golf Course Shoal)	Navigational impacts; marine safety; community perception/ satisfaction; tourism	D-Major	1-Almost Certain	High	High	High	High	Suitability of alternative marine rescue equipment, or alternatives for relocation of marine rescue assets and infrastructure (as recommended in GHD, 2016).	Moderate	Short term	**Stage 5** (CMP Action). In conjunction with Nambucca Marine Rescue, consider undertaking an assessment of the suitability of alternative marine rescue equipment and the possibility of relocation of marine rescue assets and infrastructure.
	T42	Artificial entrance management	Deep Creek, Swimming Creek	Potential for unintended impacts (e.g. changing salinity regimes and impact on marine vegetation (i.e. mangrove die-off), water quality issues, fish kills, ASS impacts etc.)	D-Major	3-Possible	Moderate	Moderate	Moderate	Moderate	Efficacy of the existing Deep Creek Entrance Management Strategy since its implementation in 2012 (e.g. effect on flooding, water quality, inundation of EECs such as Swamp Oak forest etc.).	High	Short term	**Stage 4**. Review of the Deep Creek Entrance Management Policy
	T43	Closure of ICOLLs (likely to decrease in frequency with SLR)	Deep Creek; Swimming Creek	Detrimental: Inundation of private property (Deep Creek); decreased recreational and environmental water quality (DO, nutrients, temperature, faecal coliforms etc.); inundation of estuarine wetland vegetation; reduced fish health and potential fish stress; aesthetics/ amenity; odour; community perception/ satisfaction; tourism; potential contribution to mangrove die-off Beneficial: Natural inundation and changed salinity regimes for fringing and swamp vegetation	C-Moderate	2-Likely	Moderate	Moderate	Low	Minimal				
	T44	Dangerous currents	V-wall opening and recreational back beach	Safety of passive waterway users (e.g. swimmers, snorkelers); navigational difficulties; tourism	D-Major	2-Likely	High	High	High	High	-	N/A	N/A	N/A
Threats to biodiversity	T45	Removal, fragmentation and degradation of riparian and adjacent habitat	Catchment and estuarine waterways	Reduced habitat availability; reduced abundance; loss of biodiversity; water quality impacts, reduced amenity.	D-Major	1-Almost Certain	High	High	High	High	An understanding of current riparian condition and connectivity.	Moderate	Immediate	Incorporated into the bank condition assessment study under "Estuarine Bank Condition" above
	T46	Removal of instream (e.g. dead wood) and reef habitat	Catchment and estuarine waterways		D-Major	1-Almost Certain	High	High	High	High	-	N/A	N/A	N/A
	T47	Predation and invasion by introduced animals and exotic plants	Whole study area		D-Major	1-Almost Certain	High	High	High	High	-	N/A	N/A	N/A
	T48	Soil disturbance through uncontrolled stock access/ erosion/ nutrient and pathogen introduction	Whole study area		D-Major	1-Almost Certain	High	High	High	High	-	N/A	N/A	N/A
	T49	Overgrazing by stock resulting in reduction in groundcover, enabling erosion and compaction of soil	Grazing areas		D-Major	1-Almost Certain	High	High	High	High	-	N/A	N/A	N/A
	T50	Development including catchment, foreshore, urban and industrial development reducing land for habitat	Urban development at Hyland Park, Macksville, Pearl at Valla, Scotts Head		D-Major	3-Possible	Moderate	High	High	High	-	N/A	N/A	N/A
	T51	Unrestricted pedestrian access in sensitive vegetation communities (e.g. dunes and riparian areas)	Deep Creek.		C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	Moderate	-	N/A	N/A	N/A
	T52	Pesticide spray drift	Deep Creek catchment in particular		C-Moderate	3-Possible	Low	Low	Low	Low	-	N/A	N/A	N/A
	T53	Dumping of rubbish and green waste	Hughes Creek/ Macksville drain and areas on the urban fringe		C-Moderate	2-Likely	Moderate	Moderate	Moderate	Moderate	-	N/A	N/A	N/A
	T54	Illegal plant collection			B-Minor	2-Likely	Low	Low	Low	Low	-	N/A	N/A	N/A

Issue	ID	Threats (use, activity or stressor)	Key locations	Key impacts	Preliminary Risk Assessment (present day risk)			Future Risk			Assessment of Knowledge Gaps			Recommendation for additional studies
					Consequence	Likelihood	Current Risk	20 yr Risk	50yr Risk	100 yr Risk	Knowledge Gap	Importance for Resolution	Priority for Resolution	
	T55	Fire/ altered and inappropriate fire regimes/ frequent burning			D-Major	2-Likely	High	High	High	High	-	N/A	N/A	N/A
	T56	Inconsistencies between Council's planning framework and mapping of protected habitats (e.g. SEPP Coastal Wetlands and EECs	Particularly: Saltmarsh on the west side of the Newee Creek complex, towards the outlet of Gumma Swamp, and upstream of Scotts Head on Warrell Creek. Swamp Oak Forest, Swamp Sclerophyll Forest and Freshwater Wetlands adjacent to Warrell Creek (upstream of Scotts Head) and on significant areas of the Nambucca River floodplain upstream of Watts Creek.	Whilst SEPP Coastal Wetlands and other EECs are protected under the overarching planning framework, it is desirable that the Nambucca LEP and DCP fully reflect the conservation status of these protected communities to aid community awareness and assist in ease of the development application process.	B-Minor	1-Almost Certain	Low	Low	Low	Low	Whilst the NLEP2010 was amended to zone estuarine macrophytes mapped by DPI Fisheries as either Waterway as (W1/ W2) or Environmental Conservation (E2) (where not already appropriately zoned as E1 National Parks/ Nature Reserves), it is not understood whether these zonings sufficiently protect other areas of significant habitat such as: - extent of SEPP CM mapped wetlands and littoral rainforests (and their proximity areas); - other EECs such as swamp oak forest, swamp sclerophyll and freshwater wetlands; and - future likely areas for migration of estuarine vegetation with sea level rise (refer "Climate change 2050 & 2100 - tidal inundation").	Moderate	Medium term	Stage 5 (CMP Action) - GIS desktop assessment involving: - mapping of NLEP environmental protection/ W1, W2 and E2 zones overlayed with vegetation mapping of other sensitive habitats in the study area. - assessment of suitability of existing zones to protect current significant habitat; - assessment of suitability of zones to protect and conserve areas, and to prevent land use constraints from impeding future migration of habitat with sea level rise (based on associated estuarine vegetation migration mapping); and - discussion of potential management actions (such as discussions with landholders RE placing protective covenants on the land under the Biodiversity Conservation Act 2016 etc.)
Recreational and commercial fishing and aquaculture	T57	Commercial ocean trawl and ocean haul	Nambucca River estuary and Warrell Creek	Reduced abundance of species and trophic levels; marine debris; bycatch, physical disturbances; wildlife disturbances; lack of community support for local fishing industry	D-Major	1-Possible	Moderate	Moderate	Moderate	Moderate	Commercial and recreational fishing are considered priority regional threats in the MEMA TARA (BMT WBM, 2017) contributing to reduced abundance of species and trophic levels, marine debris, bycatch, physical disturbance and wildlife disturbance. Data specific to the Nambucca study area is currently lacking.	Moderate	Medium term	N/A However, a Stage 5 action may be developed in conjunction with DPI Fisheries regarding a community educational program on current threats and impacts to fish/fish habitat and current fish management practices.
	T58	Commercial trap and line					Moderate	Moderate	Moderate	Moderate				
	T59	Estuary general fishing					Moderate	Moderate	Moderate	Moderate				
	T60	Estuary prawn trawl					Moderate	Moderate	Moderate	Moderate				
	T61	Recreational boat and shore-based line and trap fishing	All study area		D-Major	1-Possible	Moderate	Moderate	Moderate	Moderate				
	T62	Recreational hand gathering	All study area		B-Minor	1-Almost Certain	Low	Low	Low	Low				
	T63	Oyster aquaculture	Lower Nambucca River estuary	Physical disturbance; litter and marine debris; amenity	B-Minor	1-Almost Certain	Low	Low	Low	Low	-	N/A	N/A	N/A
	T64	Marine debris, including monofilament fishing line, bait bags and microplastics	All study area	Ingestion, smothering and entanglement of seabirds and marine fauna	C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	High	-	N/A	N/A	N/A
Water quality	T65	Agricultural diffuse source runoff (runoff from large areas of agricultural land with no specific point source)	Agricultural land use catchments	TSS and sedimentation; nutrient export	D-Major	1-Almost Certain	High	High	High	High	Comprehensive, catchment wide: - long-term monitoring programs and records of water quality monitoring results to assess trends and issues including data for Oyster Creek, Scotts Head and Swimming Creek. - catchment plans for stormwater management, focused on water quality improvements.	High	Medium term	**Stage 5** (CMP Action) - Development of a long-term and frequent monitoring program and record of water quality monitoring results as a component of a frequent Ecohealth reporting program. **Stage 5** (CMP Action) - Development of catchment plans for key urban areas with a focus on water quality improvements such as undertaken for Dawkins Park catchment. Seek opportunity for pollutant reduction such as GPTs.
	T66	Urban stormwater pollution and lack of management of existing GPTs; gutter and gully erosion	Discharge from urban areas, e.g. Bay St Nambucca Heads	TSS and sedimentation; nutrient export	D-Major	1-Almost Certain	High	High	High	High				
	T67	Sewer surcharge and STP overflows	Licensed discharges and overflows from the four STPs; sewer surcharges (e.g. Bellwood Creek, Swimming Creek)	Export of nutrients, high TSS, high BOD, and faecal contamination; oyster industry closures	D-Major	2-Likely	High	High	High	High				
	T68	On-site wastewater management (e.g. failing septic systems)	LGA wide - rural areas		C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	Moderate				
	T69	Pet and wild fauna faeces	e.g. Beer Creek/ Dawkins Park	Water quality impacts; public safety and public amenity	B-Minor	1-Almost Certain	Low	Low	Low	Low				
	T70	Logging on steep, highly erodible soils (i.e. of the Nambucca Beds)	Steep, upper catchment forestry areas	Mass movements; high TSS; sedimentation	D-Major	3-Possible	Moderate	Moderate	Moderate	Moderate				

Issue	ID	Threats (use, activity or stressor)	Key locations	Key impacts	Preliminary Risk Assessment (present day risk)			Future Risk			Assessment of Knowledge Gaps			Recommendation for additional studies
					Consequence	Likelihood	Current Risk	20 yr Risk	50yr Risk	100 yr Risk	Knowledge Gap	Importance for Resolution	Priority for Resolution	
	T71	Urban development	Hyland Park, Macksville, Pearl at Valla, Scotts Head	Urban stormwater impacts e.g. increased TSS and TN, potentially low pH	C-Moderate	2-Likely	Moderate	Moderate	High	High				
	T72	Construction industries	LGA wide		C-Moderate	2-Likely	Moderate	Moderate	High	High				
	T73	Other licensed industrial sources	e.g. extraction, processing associated with the construction of the Pacific Highway Upgrade and of Macksville Hospital; abattoir, Wirrimbi; resource extraction, Missabotti; waste management facility, Nambucca Heads; quarrying, Macksville and Valla	Export of various physical and chemical stressors	C-Moderate	1-Almost Certain	Moderate	Moderate	High	High				
	T74	Pesticide and fertilizer runoff	Roadside weed management (LGA wide); horticultural pesticide use (e.g. Deep Creek); pasture improvement (e.g. Watts Creek catchment)	Potential pesticide contamination of waterways and impacts on biodiversity; legality issue for Council; export of nutrients	C-Moderate	1-Almost Certain	Moderate	Moderate	High	High				
	T75	Poor geomorphic condition (i.e. bed instability)	Upper catchments	Mobilisation of sediment and organic matter; smothering of aquatic habitat; reduced channel capacity	C-Moderate	1-Almost Certain	Moderate	Moderate	Moderate	Moderate				
	T76	Poor flushing of ICOLLs	Deep Creek; Swimming Creek	Amplification of existing water quality impacts leading to eutrophication	C-Moderate	1-Almost Certain	Moderate	Moderate	Low	Minimal				
Hydrology, connectivity and water extraction	T77	Water extraction	Primarily Deep Creek (e.g. for horticulture farming) and Oyster Creek	Hydrological stress; reduced aquifer recharge; impacts to groundwater dependent ecosystems and threatened species (e.g. frogs, birds and floodplain and riparian vegetation such as Swamp oak forest), reduce flow, stagnation, stratification, increased temperatures and other water quality impacts. Likely to increase in future with expansion of the horticulture industry.	C-Moderate	1-Almost Certain	Moderate	High	High	High	Understanding of the hydrological regime and requirements of Deep Creek estuary, the volumes of water extraction in the catchment and the impacts on ecohealth.	Moderate	Medium term	Management of water extraction is addessed in the Water Sharing Plan administered by NRAR and DPIE-Water. CMP to document this threat and implications for estuary health and seek to coordinate and consult with agencies responsible for managing extraction. Also incorporated for consideration of the review of ICOLL entrance management strategy and hydrological review/ flushing regime under "Entrance Management" above.
	T78	Hydrological modifications of wetlands and floodplain drainage works	e.g. historical modifications to Gumma Swamp; rural drainage works	Reduced hydraulic connectivity and fish passage; soil acidity and salinity changes; native vegetation changes; agricultural viability and commerciality; export of acidity, metals (including iron and aluminium), nutrients and bacterial contamination either by groundwater flow or surface runoff; modified inundation regimes; habitat and biodiversity implications	D-Major	3-Possible	Moderate	Moderate	High	High	Understanding of any current impediments to connectivity (e.g. floodgates, weirs, roads, levees), floodgate design and operation (management plans, memorandums of understanding etc.) within the study area.	Moderate	Medium term	**Stage 5** (CMP Action) - Review current status of wetland connectivity and fish passage barriers including the discussions between DPI Fisheries, Council, landholders (and any drainage boards) RE location of structures and management practices; and mapping of impediments to connectivity; and prioritisation of barriers for removal/ modification (DPI Fisheries as responsible agency).
	T79	Floodgate design, operation and maintenance			D-Major	3-Possible	Moderate	Moderate	High	High				
Governance, education and compliance	T80	Insufficient governance	Whole study area	Complex mix of landowners/managers, lack of alignment of plans/policies, lack of collaboration, cooperation and resource support	C-Moderate	2-Likely	Moderate	Moderate	Moderate	Moderate	-	N/A	N/A – To be addressed through development and implementation of the CMP	N/A
	T81	Lack of awareness, education and engagement		Tourism, insufficient governance, limited availability of resources	B-Minor	1-Almost Certain	Low	Low	Low	Low	-	N/A		N/A
	T82	Compliance		Limited availability of resources, competing compliance issues within the study area	B-Minor	1-Almost Certain	Low	Low	Low	Low	-	N/A		N/A

Issue	ID	Threats (use, activity or stressor)	Key locations	Key impacts	Preliminary Risk Assessment (present day risk)			Future Risk			Assessment of Knowledge Gaps			Recommendation for additional studies
					Consequence	Likelihood	Current Risk	20 yr Risk	50yr Risk	100 yr Risk	Knowledge Gap	Importance for Resolution	Priority for Resolution	
Political risk	T83	Political risk	Whole study area	Election promises, media profiles, political support for climate change mitigation/adaptation, political support which limit actions involved with certain activities, ad hoc release of state and federal funding associated with political cycles, ideological beliefs, and community expectations	C-Moderate	2-Likely	Moderate	Moderate	Moderate	Moderate	-	N/A	N/A	N/A