

**GREATER TAREE CITY COUNCIL**



# **MANNING RIVER ESTUARY MANAGEMENT STUDY**



**Issue No. 3  
JULY 2009**



**WorleyParsons**  
resources & energy

**Patterson Britton  
& Partners Pty Ltd**  
consulting engineers

# GREATER TAREE CITY COUNCIL



## MANNING RIVER ESTUARY MANAGEMENT STUDY

### Issue No. 3 JULY 2009

#### Document Amendment and Approval Record

Issue	Description of Amendment	Prepared by [date]	Verified by [date]	Approved by [date]
1	Draft Report - Issue for Exhibition	WJH/CRT (10/3/08)		
2	Final Report – Incorp. Comments	WJH/CRT (25/6/09)	CRT (26/6/09)	
3	Final Report – Incorp. Final Review	WJH/CRT (20/7/09)	CRT (29/7/09)	Chris Thomas

Note: This document is preliminary unless it is approved by a principal of Patterson Britton & Partners.

Document Reference: rp5947wjh090601-Manning River EMS.doc  
Time and Date Printed: 4:00 pm 29<sup>th</sup> July 2009

© Copyright The concepts and information in this document are the property of Patterson Britton & Partners Pty Ltd. Use of this document or passing onto others or copying, in part or in full, without the written permission of Patterson Britton & Partners Pty Ltd is an infringement of copyright.



level 4  
104 Mount Street  
North Sydney 2060

PO Box 515  
North Sydney 2059  
Australia

telephone: (02) 9957 1619  
facsimile: (02) 9957 1291  
reception@patbrit.com.au  
ABN 89 003 220 228

Newcastle Office  
8 Telford Street  
Newcastle East 2300

PO Box 668  
Newcastle 2300  
Australia

telephone: (02) 4928 7777  
facsimile: (02) 4926 2111  
mail@newcastle.patbrit.com.au

**Patterson Britton  
& Partners Pty Ltd**  
consulting engineers

# FOREWORD

---

The Estuary Management Policy of the New South Wales Government has been developed in conjunction with other government policies that address resource planning and management on a catchment basis. The Estuary Management Policy focuses on tidal waterways and coastal lakes. These waterbodies are an essential component of coastal catchments and are characterised by the interplay of saline coastal waters and freshwater runoff from the land.

The Policy provides for the assessment of all estuarine uses, the resolution of conflicts and the production of a unified and sustainable management plan for each NSW estuary. The objectives of the Policy are:

- protection of estuarine habitats and ecosystems in the long term including maintenance in each estuary of the necessary hydraulic regime;
- preparation and implementation of a balanced long term management plan for the sustainable use of each estuary and its catchment, in which all values and uses are considered, and which defines management strategies for:
  - conservation of aquatic and other wildlife habitats;
  - conservation of the aesthetic values of estuaries and wetlands;
  - prevention of further estuary degradation;
  - repair of damage to the estuarine environment; and
  - sustainable use of estuarine resources, including commercial uses and recreational uses as appropriate.

The objectives of the Policy are to be implemented by the government's Estuary Management Program, which aims at the production and implementation of management plans. The Estuary Management Program is administered through the Department of Environment and Climate Change (*DECC*) and encourages the sustainable management of the State's estuaries in accordance with the government's draft Estuary Management Manual (1992).

The primary objective of this study has been to undertake appropriate consultation with the community and key stakeholders, and to combine the outcomes of this consultation with scientific data to develop this Management Study report for the Manning River Estuary.

The Study is based on the outcomes of the *Manning River Estuary Processes Study (Webb, McKeown and Associates 1997)*, the *Manning River Estuary Management Study – Numerical Modelling (WBM 2001)* and the consultation process. It identifies and prioritises strategies for the future management of the Manning River Estuary. The findings from this study will be used to formulate a management plan for the estuary.

# TABLE OF CONTENTS

Page No.

---

<b>1</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	THE SETTING	1
1.2	THE ESTUARY MANAGEMENT PROCESS	2
1.3	CONSISTENCY WITH THE ADAPTIVE MANAGEMENT FRAMEWORK	4
1.4	APPLICATION OF THE ESTUARY MANAGEMENT PROCESS	5
1.4.1	Completed Stages of the Estuary Management Process	5
1.4.2	Estuary Management Study and Plan	6
1.5	METHODOLOGY	6
<b>2</b>	<b>COMMUNITY CONSULTATION</b>	<b>8</b>
2.1	CONSULTATION PROGRAM	8
2.1.1	Committee Workshop #1	9
2.1.2	Committee Workshop #2	9
2.1.3	Committee Workshop #3	9
2.1.4	Committee Workshop #4	9
2.1.5	Consultation with Key Stakeholders	10
<b>3</b>	<b>SIGNIFICANCE OF THE ESTUARY</b>	<b>11</b>
3.1	ESTUARY SIGNIFICANCE	11
3.2	ESSENTIAL FEATURES OF THE ESTUARY	11
3.2.1	Assessment of Value of Estuary Attributes	12
3.2.2	Essential Features	14
<b>4</b>	<b>KEY ISSUES, CONFLICTS AND CONCERNS</b>	<b>15</b>
4.1	KEY ESTUARY MANAGEMENT ISSUES	15
4.1.1	Previous Assessment of Key Issues	15
4.1.2	Committee Response to Potential Key Issues	16
4.1.3	Entrance Condition Issues	19
4.1.4	Adopted Key Issues	23
4.2	CONFLICTS OF ESTUARY USE	25
4.2.1	Waterway Conflicts	25
4.2.2	Power Boating	25
4.2.3	Passive Recreation	26
4.2.4	Fish Stocks	26
4.3	IMPACTS OF HUMAN ACTIVITIES ON KEY ESTUARY PROCESSES	27



# TABLE OF CONTENTS

Page No.

---

4.3.1	Urban Stormwater Management	28
4.3.2	Wastewater Management	28
4.3.3	Agriculture and Forestry	29
4.3.4	Development Pressures	29
4.3.5	Commercial and Recreational Fishing	29
4.3.6	Acid Sulphate Soils	30
4.3.7	Waterway Structures	30
4.3.8	Climate Change	31
<b>5</b>	<b>LAND USE &amp; WATERWAY PLANNING</b>	<b>33</b>
5.1	HISTORICAL LAND USE DEVELOPMENT	33
5.2	CURRENT LAND USE	33
5.3	PROPOSED FUTURE LAND USE	34
5.3.1	Future Land Use in the Vicinity of Taree	35
5.3.2	Future Land Use at Wingham	36
5.3.3	Future Land Use at Harrington	36
5.3.4	Future Land Use at Old Bar / Wallabi Point	36
5.3.5	Future Land Use at Lansdowne	37
5.3.6	Future Land Use at Coopernook	37
5.3.7	Future Land Use at Cundletown	37
5.3.8	Future Land Use at Tinonee	38
5.4	PLANNING CONTROLS	38
5.5	RELEVANT LEGISLATION / PLANNING CONTROLS	39
5.5.1	Link between Estuary Management and Legislation	39
5.5.2	Statutory Powers	40
5.6	CONSOLIDATED ACTS AND NSW PLANNING CONTROLS	41
5.6.1	State Legislation	41
5.6.2	State Environment Planning Policies ( <i>SEPPs</i> )	41
5.6.3	NSW State Rivers and Estuaries Policy 1992	42
5.7	LOCAL PLANNING CONTROLS	44
5.7.1	Hunter Regional Environmental Plan 1989	44
5.7.2	Greater Taree Local Environmental Plan ( <i>1995</i> )	46
5.7.3	Development Control Plans and Policies	48
5.8	LOCAL STRATEGIES, PROGRAMS AND PLANS	52
5.8.1	Strategies and Plans	52

# TABLE OF CONTENTS

Page No.

---

5.8.2	Specific Management Plans	59
<b>6</b>	<b>ESTUARY MANAGEMENT STRATEGIES</b>	<b>60</b>
6.1	MANAGEMENT OBJECTIVES	60
6.1.1	Committee Response to Estuary Management Objectives	60
6.1.2	Adopted Estuary Management Objectives	60
6.2	POTENTIAL MANAGEMENT OPTIONS AND STRATEGIES	61
6.3	DESCRIPTION OF RECOMMENDED MANAGEMENT STRATEGIES	66
6.3.1	Planning Controls and Policies	66
6.3.2	On-Ground Works	72
6.3.3	Investigation and Research	75
6.3.4	Monitoring	81
6.3.5	Education and Community Involvement	83
<b>7</b>	<b>RECOMMENDATIONS</b>	<b>89</b>
7.1	PRIORITISED STRATEGIES	89
7.1.1	Planning Controls and Policies	90
7.1.2	On-Ground Works	91
7.1.3	Investigation and Research	91
7.1.4	Monitoring	92
7.1.5	Education and Community Involvement	92
<b>8</b>	<b>REFERENCES</b>	<b>94</b>
<b>APPENDIX A GLOSSARY</b>		
<b>APPENDIX B MEMBERS OF THE MANNING RIVER ESTUARY MANAGEMENT COMMITTEE</b>		
<b>APPENDIX C STATE LEGISLATION</b>		
<b>APPENDIX D MANNING RIVER WATER QUALITY AND RIVER FLOW OBJECTIVES</b>		
<b>APPENDIX E CROWN LANDS ASSESSMENT MAP</b>		
<b>APPENDIX F OYSTER INDUSTRY SUSTAINABLE AQUACULTURE STRATEGY (2006) MANNING RIVER OYSTER AQUACULTURE MAP</b>		

# LIST OF TABLES

Page No.

---

Table 1	PREVIOUSLY IDENTIFIED KEY ISSUES	15
Table 2	KEY ISSUE RANKINGS FROM DISCUSSIONS AT COMMITTEE WORKSHOP #1	17
Table 3	ADOPTED RANKING FOR KEY ISSUES	24
Table 4	ENVIRONMENTAL AND LAND USE LEGISLATION	38
Table 5	ORGANISATIONS RESPONSIBLE FOR PLANNING CONTROLS APPLICABLE TO THE MANNING RIVER ESTUARY	40
Table 6	MANAGEMENT OBJECTIVES FOR THE MANNING RIVER ESTUARY	61
Table 7	LINKAGES BETWEEN KEY ISSUES, ESSENTIAL FEATURES AND MANAGEMENT OBJECTIVES	63

# LIST OF FIGURES

---

FIGURE 1	MANNING RIVER CATCHMENT
FIGURE 2	EXTENT OF THE MANNING RIVER ESTUARY
FIGURE 3	SIGNIFICANT ESTUARY FEATURES – ZONE 1
FIGURE 4	SIGNIFICANT ESTUARY FEATURES – ZONE 2
FIGURE 5	SIGNIFICANT ESTUARY FEATURES – ZONE 3
FIGURE 6	SIGNIFICANT ESTUARY FEATURES – ZONE 4
FIGURE 7	KEY ISSUES FOR ESTUARY MANAGEMENT – ZONE 1
FIGURE 8	KEY ISSUES FOR ESTUARY MANAGEMENT – ZONE 2
FIGURE 9	KEY ISSUES FOR ESTUARY MANAGEMENT – ZONE 3
FIGURE 10	KEY ISSUES FOR ESTUARY MANAGEMENT – ZONE 4
FIGURE 11	LAND USE ACROSS THE MANNING RIVER ESTUARY
FIGURE 12	ESTUARY MANAGEMENT STRATEGIES – ZONE 1
FIGURE 13	ESTUARY MANAGEMENT STRATEGIES – ZONE 2
FIGURE 14	ESTUARY MANAGEMENT STRATEGIES – ZONE 3
FIGURE 15	ESTUARY MANAGEMENT STRATEGIES – ZONE 4

# ACKNOWLEDGEMENTS

---

The Manning River Estuary Management Study was prepared by Patterson Britton & Partners Pty Ltd (*now a part of WorleyParsons*) on behalf of the Estuary & Coastline Management Committee. The Committee reports directly to Greater Taree City Council.

The Study stems from Council's commitment to managing the estuarine reaches of the Manning River and its major tributaries including the Lansdowne River, the Dawson River, Ghinni Ghinni Creek, Cattai Creek, Dickensons Creek, Browns Creek and Cedar Party Creek. It has been funded jointly by Council and the Department of Environment and Climate Change on a 50:50 subsidy basis, under the New South Wales Government's *Estuary Management Program*.

The Study has been developed taking into account contributions from the broader community and key stakeholders. These key stakeholders include members of the Estuary & Coastline Management Committee (*past and present*), all of whom are listed in **Appendix B**. The contributions from Committee members and the key stakeholders have been essential to the preparation of the Study and are greatly appreciated.

# 1 INTRODUCTION

---

## 1.1 THE SETTING

The Manning River Estuary is situated on the Mid-north Coast of NSW approximately 300 kms north of Sydney within the Greater Taree City Council Local Government Area. The Estuary falls within the Hunter Central Rivers Catchment Management Authority. The Manning River Estuary drains a catchment area of approximately 8420 km<sup>2</sup> (refer **Figure 1**). The estuary, including both the Lansdowne River and Dawson River is a complex system of inter-connecting channels approximately 115km in total length. The estuary is unique as it has two natural ocean entrances, one at Harrington and the other 12km to the south, known as the Farquhar Inlet, at Old Bar.

The main entrance at Harrington is permanently “open” to the ocean and has an artificial breakwater on the northern bank and extensive rock training walls on both banks extending up the river. Farquhar Inlet is untrained and has a history of periodic closure.

Between the ocean and Taree, which is approximately 27km upstream of Harrington, there is a broad delta with numerous inter-connecting channels and large islands. The main channels are:

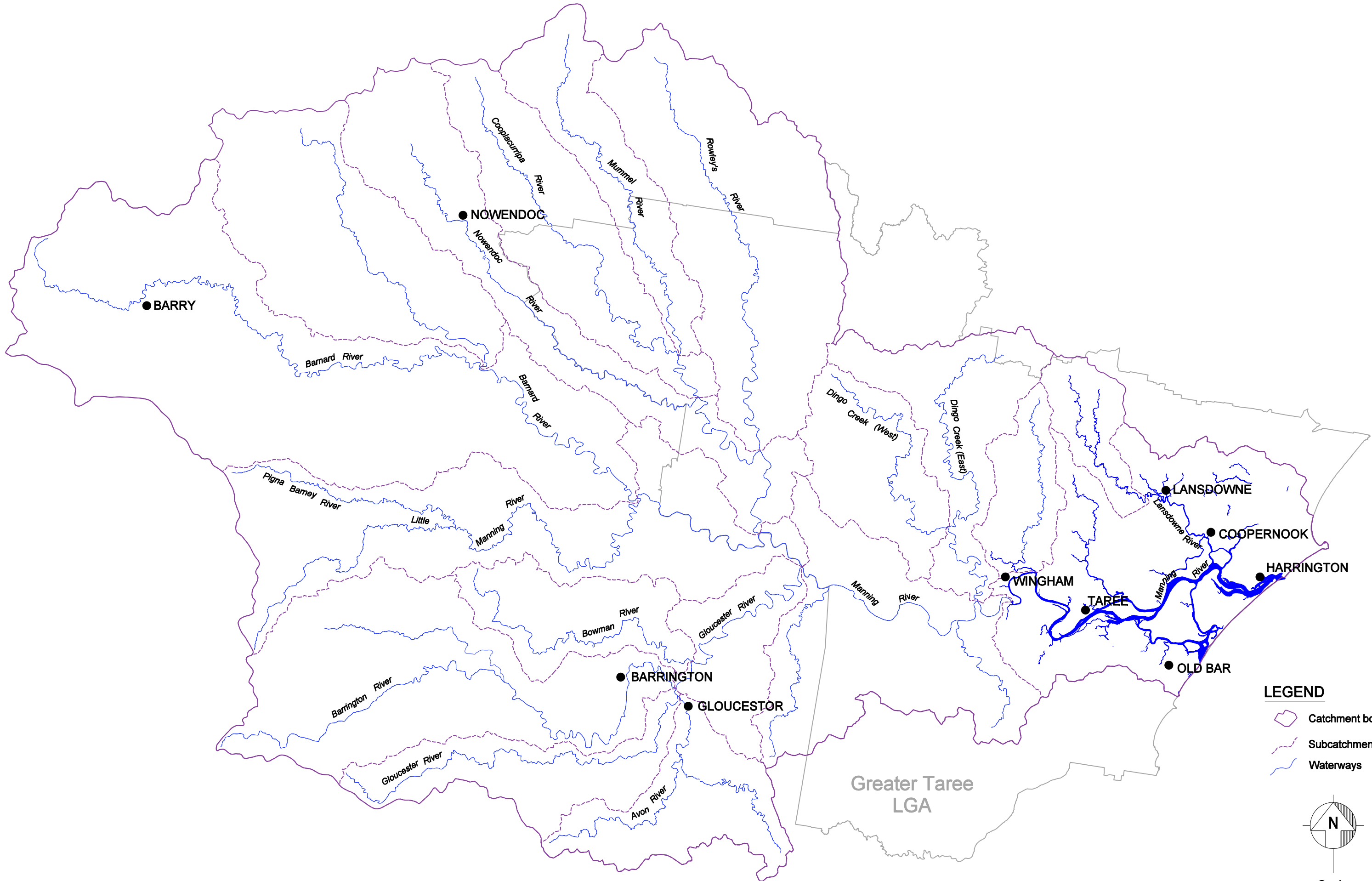
- The Manning River;
- The North Passage;
- The South Passage;
- The South Channel; and,
- Scotts Creek.

Beyond Taree the river is a single channel to the tidal limit. The approximate length of the main river is 150 km with the limit of tidal influence located in the vicinity of "Abbotts Falls", a gravel bar approximately 54 km from the entrance. The river is navigable up to Wingham, a major town located approximately 47 km from the entrance.

The lower reaches of the Lansdowne and Dawson Rivers are also part of the estuary. The tidal limit of the Lansdowne River is at the Lansdowne Weir, approximately 18km upstream of the confluence with the Manning River. The Dawson River has a tidal length of approximately 11km. The Manning provides a wide variety of estuarine conditions which then produce a range of habitat types which in turn result in a range of biota, including micro plankton and algae through to mangrove forests and aquatic species.

The study area focuses on the tidal waters, foreshores and adjacent lands of the Manning River estuary from its ocean entrance at Harrington and Old Bar upstream to the tidal limits of the Manning, Lansdowne and Dawson Rivers and associated tidal creeks.

A plan of the study area is shown in **Figure 2**.



**LEGEND**

- Catchment boundary
- Subcatchment boundary
- Waterways

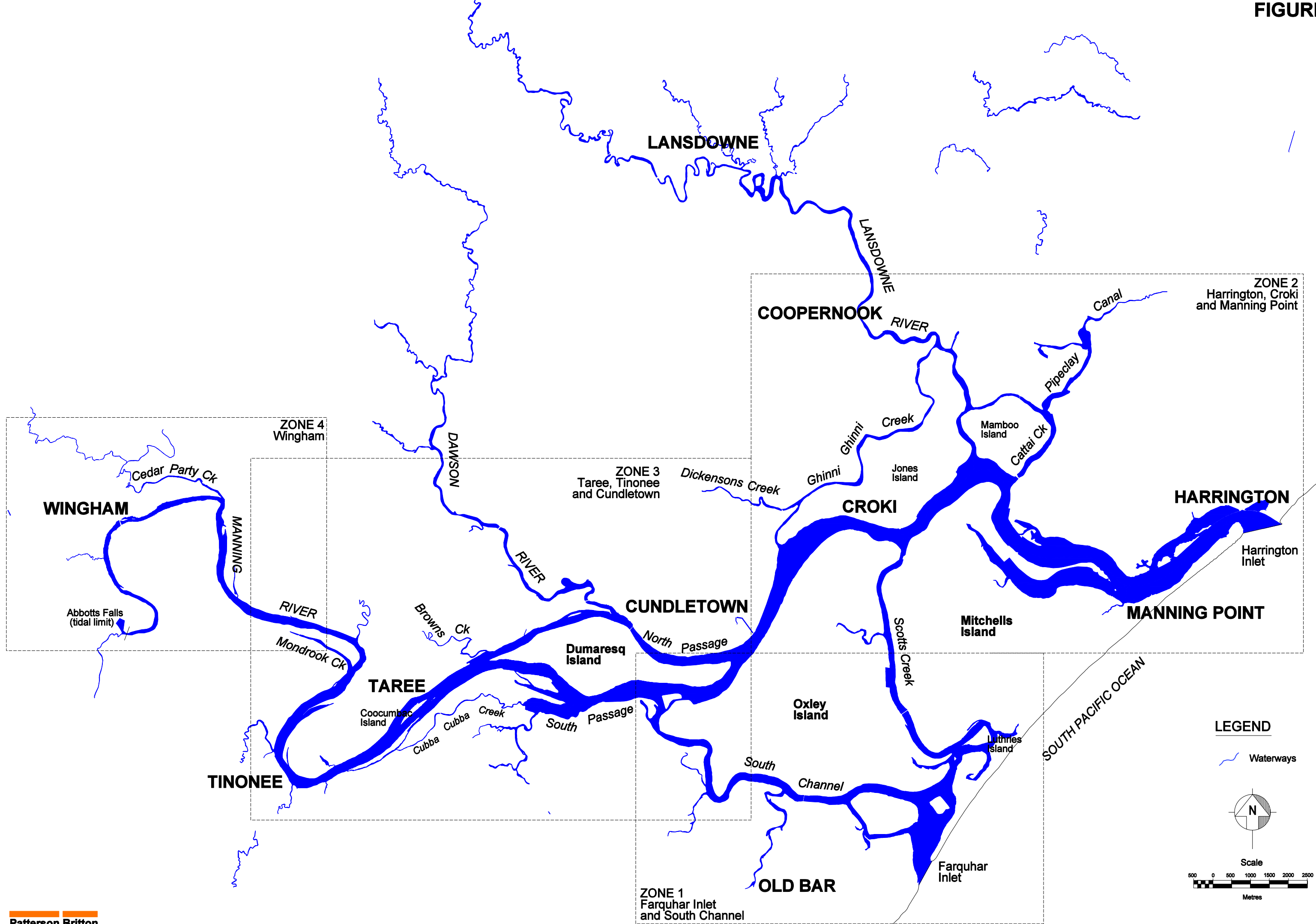
N

Scale

0 2 4 6 8 10

Kilometres





**LEGEND**

Waterways

N

Scale

0 500 1000 1500 2000 2500

Metres

Over the last 150 years, much of the catchment has been extensively cleared for grazing, particularly in the lower estuary area. Around 50% of the catchment remains in its natural timbered condition (*Webb McKeown & Associates 1997*). The main urban centres are Taree, Manning Point, Cundletown, Coopernook, Lansdowne, Old Bar, Harrington, Wingham and Tinonee. Most development is concentrated around the upper estuary (*Taree – Wingham*) area as a result of historical development patterns associated originally with shipping access and then with rail and road access. Catchment land usage is broken up into:

- urban areas which cover less than 1% of the catchment;
- small farms that occupy around 5% of the catchment;
- farms greater than 150 ha that occupy around 55% of the catchment; and,
- state forests and national parks.

The *City of Greater Taree Local Environmental Plan 1995* shows most of the estuary has been zoned for Rural General (*Zone 1(a)*) and Rural Valley Agriculture (*Zone 1(b1)*), although significant areas around the entrances have been zoned for Environmental Protection Habitat (*Zone 7(a)*) and Environmental Protection Coastal Lands (*Zone 7(f1)*). The Cundletown, Taree and Wingham foreshore areas are zoned for a mixture of urban uses including industrial, residential and open space. There are four (4) sewage treatment plants (*STPs*) in the lower valley / estuary area – the Taree, Wingham, Dawson and Harrington *STPs*.

The bed and banks of the Manning River Estuary, islands and much of its public foreshore land, to the mean high water mark (*MHWM*) is Crown Land. These lands therefore come under the control of the *Crown Lands Act 1989* and are administered by either the Department of Lands or appointed reserve trust managers.

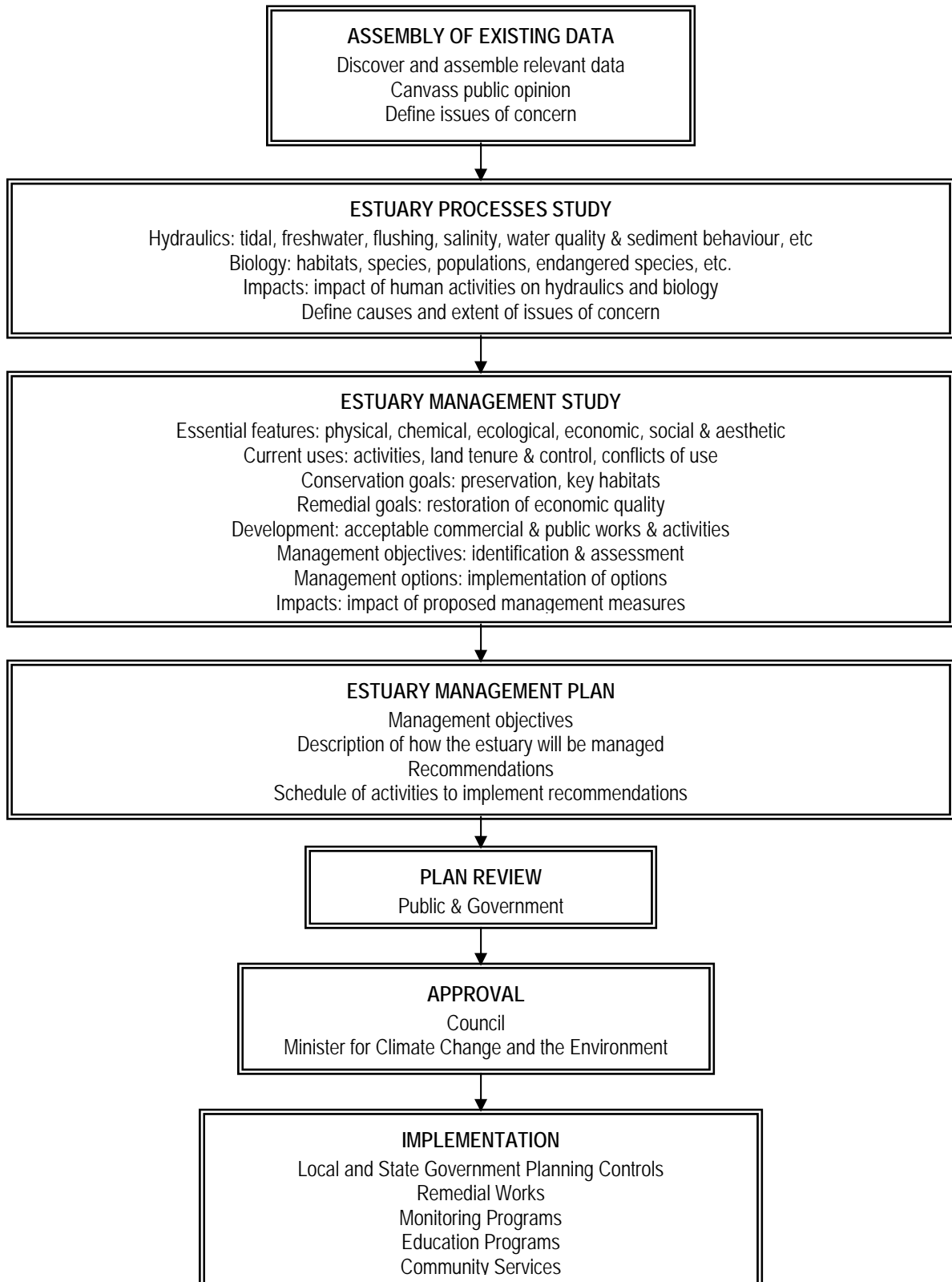
## 1.2 THE ESTUARY MANAGEMENT PROCESS

In 1992, the NSW State Government introduced an *Estuary Management Policy* which was aimed at managing the growing pressures on estuarine ecosystems. The policy forms part of a suite of catchment management policies, which have been combined under the *Catchment Management Act, 1989*.

The Estuary Management Policy is a component of the NSW Rivers and Estuaries Policy, which in turn comes under the umbrella of Total Catchment Management. The general goal of the Estuary Management Policy is to achieve an integrated, balanced, responsible and ecologically sustainable use of the State's estuaries, which form a key component of coastal catchments.

The *Estuary Management Policy* provides for the assessment of all estuarine uses, the resolution of conflicts, and the production of a unified and sustainable management plan for each estuary (*NSW Government, 1992*). It is implemented on individual estuaries through a process which involves the establishment of an Estuary Management Committee. This Committee is responsible for carrying out the steps in this process. The estuary management process, as specified by the NSW Government's Estuary Management Manual, is shown on **page 3** of this report.

## ESTUARY MANAGEMENT COMMITTEE



(Source: 'Estuary Management Manual', NSW Government (1992))

In February 2003, amendments to the *Coastal Protection Act 1979* came into affect. One of the significant amendments related to the preparation of Coastal Zone Management Plans, which include Estuary Management Plans. A new requirement is that plans now need to be referred to the Minister for Climate Change and the Environment for approval and once approved these plans must also be gazetted.

The Committee is responsible for the development of an Estuary Processes Study, which outlines all the hydraulic, sedimentation, water quality and ecological processes within the estuary, and the impacts of human activities on these processes. The Estuary Processes Study provides the necessary understanding of the physical and biological processes within an estuary, to enable informed decision-making in the resolution of conflicts and planning for the future development. These issues are usually addressed in detail in the next step in the process, which comprises the preparation of an Estuary Management Study.

The Estuary Management Study identifies the essential features and the current uses of the estuary, and determines the overall objectives required for management of the estuary. The Management Study also identifies options for meeting these objectives, and determines potential impacts of the proposed options.

From the findings of the Management Study, an Estuary Management Plan is prepared. The Plan describes how the estuary will be managed, gives recommended solutions to management problems, and details a schedule of activities for the implementation of the recommendations. Once the Plan has been accepted by both the community and the relevant Government Departments, the Plan can be implemented through planning controls, works programs, monitoring programs, and education services.

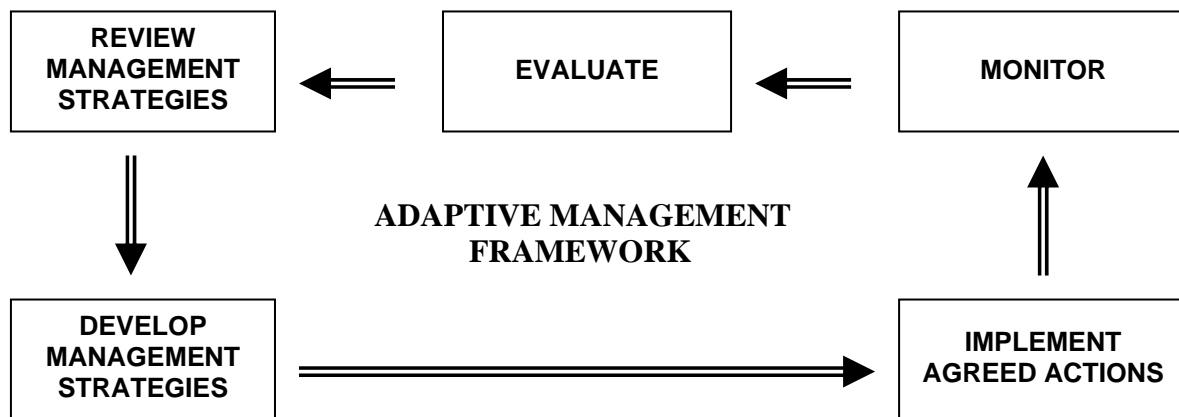
This report documents the findings of an Estuary Management Study of the Manning River estuary system. Through assessment of the current uses and features of the estuary, objectives for management of the estuary have been determined. From these findings, management options have been identified and then assessed in terms of meeting the objectives and their potential impact on natural processes within the estuary.

### **1.3 CONSISTENCY WITH THE ADAPTIVE MANAGEMENT FRAMEWORK**

In broad terms, adaptive management can be defined as ‘*a systematic process for continually improving management policies and practices by learning from the outcomes of operational programs*’ (Bennett and Lawrence, 2002). The estuary management planning process is consistent with an adaptive management framework. The benefits of such an approach include:

- the assessment of ecosystem health;
- evaluation of the success of management programs and adoption of appropriate management responses;
- increased scientific understanding of the estuarine ecosystem; and,
- education of the community.

Monitoring and evaluation of Plan implementation is critical to the overall success in the estuary management planning process. The main components of the adaptive management framework are represented conceptually in the following diagram.



## 1.4 APPLICATION OF THE ESTUARY MANAGEMENT PROCESS

The *Estuary Management Policy* is implemented on individual estuaries through a process which involves the establishment of an Estuary Management Committee. The Manning River Estuary Management Committee was formed on 29 September 1999 under stewardship of Greater Taree City Council and with assistance from the State Government's Estuary Management Program. The Committee aims to assist Greater Taree City Council in achieving integrated, balanced, responsible and ecologically sustainable use of the Manning River Estuary.

The Committee consists of representatives from Greater Taree City Council, state government authorities, local organisations and the local community. The charter of the Committee is to identify the main issues affecting the river and its tributaries and then to proceed with preparation of an Estuary Management Plan to address identified problems or issues.

### 1.4.1 Completed Stages of the Estuary Management Process

As the first step in the estuary management process, the Committee commissioned a Data Compilation Study for the estuary. A report titled, '*Manning River Estuary Data Compilation Study*', was completed by the Department of Public Works – Coast and Rivers Branch, in March 1990. The primary aim of producing this document was to discover and appraise literature, data and anecdotal information related to the Manning River estuary. Information was obtained from libraries, written communications to particular organisations and interest groups, and through site inspections.

Following completion of the *Data Compilation Study*, the Committee commissioned an Estuary Processes Study for the estuary. The report titled '*Manning River Estuary Processes Study*' was completed in September 1997 (*Webb McKeown & Associates, 1997*). The report describes the hydrodynamic, sedimentary, water quality and ecological processes within the estuary, as well as waterway usage, including facilities, human impacts and conflicting uses.

The estuary processes study provides essential information on the physical processes of importance to the estuary. It provides the Manning River Estuary Management Committee with technical information on which informed decision making can be based. These decisions include how to manage the estuary and how to respond to issues that may confront the future sustainability of the estuary as a conservation area, fish nursery and place for recreation, agriculture and urban living.

One recommendation from the *Estuary Processes Study* was for a numerical modelling investigation of the entrances to be undertaken to provide a better understanding of the entrances, the impacts of entrance training works, artificial entrance opening and channel dredging on both estuarine and coastal processes.

To address this, the Manning River Estuary Management Committee commissioned a numerical modelling investigation for the entrances. A report titled '*Manning River Estuary Management Study – Numerical Modelling*' was completed in March 2001 (*WBM Oceanics 2001*). This study formed Stage 1 of the Estuary Management Study and deals specifically with numerical modelling of natural processes and management options. It provides essential background information on the natural processes and the physical impacts of management options for consideration in formulating the Management Plan.

#### **1.4.2 Estuary Management Study and Plan**

In 2005, Patterson Britton & Partners was engaged by Greater Taree City Council to prepare an Estuary Management Study and Estuary Management Plan in accordance with the estuary management process. The aim of this phase of the estuary management process is to undertake appropriate consultation with the community and key stakeholders and to carry out investigations that will enable Council to adopt a Management Plan for the estuary.

The Plan is to be based on the outcomes of the Estuary Management Study, which identifies and prioritises objectives and options for the future management of the estuary. The Plan is to provide a scheduled sequence of recommended activities that can be implemented over three, five and ten year timeframes.

This report documents the findings of investigations and consultation undertaken for the Estuary Management Study.

### **1.5 METHODOLOGY**

The objective of the Management Study is to determine specific management measures that could be implemented as part of the Management Plan to address the range of human impacts that have been identified in the '*Manning River Data Compilation Study*' and the '*Manning River Estuary Processes Study*'.

In addition, the Management Study identifies measures to maintain or improve the value of the estuary where estuary conditions are considered to be good. The potential benefits of suggested management measures have been determined to assist in prioritisation during development of the Management Plan.

The general methodology adopted to complete the study involved the following tasks:

- identification of essential features of the estuary;
- identification of the significance of the estuary in terms of the broader urban planning issues;
- identification of issues or conflicts within the estuary;
- assessment of the potential impacts of these issues on estuary condition;
- the documenting of current uses and conflicts within the estuary;
- identification of possible future land-uses in the estuary and assessment of these in the context of their potential future impact on estuarine processes and general estuary condition;
- an assessment of the need for nature conservation and remedial measures;
- identification and assessment of management objectives;
- identification of planning controls, works and other strategies to achieve these objectives;
- identification and justification of additional investigations or works that would need to be undertaken to resolve outstanding issues;
- identification of measures and strategies that could be implemented to resolve conflicts and reduce the impact of human activities;
- development of a set of actions required to undertake each of the recommended strategies; and,
- assessment of the effectiveness of management strategies.



## 2 COMMUNITY CONSULTATION

---

### 2.1 CONSULTATION PROGRAM

In order to develop a successful Management Plan for the estuary, it is essential that key stakeholders and the broader community have an opportunity to participate in the process leading to development of the Plan. Successful community consultation ensures that all management issues are identified and assessed, and that the full range of potential management options is considered.

In recognition of the importance of engaging the community, an extensive consultation program was developed. The primary aim of the consultation program was to ensure that all issues that could confront the future management of the estuary were identified.

The consultation process was extended to extract views and ideas on appropriate measures for estuary management. It also involved the identification of the major attributes of the estuary and an assessment of these to determine which attributes are essential to maintaining or improving estuary processes. The program of consultation involved the following:

- Consultation with key stakeholders and community groups including government organisations and individuals.
- Participation in site inspections with members of the Estuary Management Committee, aimed at identifying areas of the estuary in need of rehabilitation or further study.
- Workshops with the Estuary Management Committee which aimed:
  - to reaffirm the key issues identified in the *Manning River Estuary Processes Study*, and from site inspections;
  - to identify essential features and attributes of the estuary;
  - to rank the key issues confronting the estuary and to assign a value to the attributes and essential features of different sections of the estuary;
  - to identify, confirm and rank an acceptable series of management objectives;
  - to identify potential strategies and works that would enable better management of the estuary; and,
  - to resolve actions and timing for the implementation of agreed strategies (*to be incorporated in the Estuary Management Plan*).

### **2.1.1 Committee Workshop #1**

An initial workshop was held with the Committee at the offices of Greater Taree City Council on Thursday 17<sup>th</sup> November 2005. The primary purpose of the workshop was to ensure that the key issues established through completion of the *Manning River Estuary Processes Study* reflected the current concerns of the community. The workshop was also used as a venue for determining the essential features of the estuary, or those features considered to be most significant and worthy of actions to ensure they are protected and where possible, enhanced.

Proformas requesting feedback on these aspects of the Estuary Management Study were distributed to attendees for their consideration and submission of responses on the relative ranking of key issues and the value of estuary attributes.

Committee Workshop #1 was preceded by site inspections with the Committee, during which the estuary was toured by boat between Taree and the river entrances at Farquhar and Harrington Inlets.

### **2.1.2 Committee Workshop #2**

A second workshop was held with members of the Manning River Estuary Management Committee at the Greater Taree City Council offices on 5<sup>th</sup> June 2006. The purpose of this workshop was to discuss the outcomes of Committee Workshop #1 (*including a review of the responses to subsequent submissions in the form of completed proformas*), and to establish an agreed list of management objectives for the Manning River Estuary.

### **2.1.3 Committee Workshop #3**

On 3<sup>rd</sup> August 2006 a third workshop was held with members of the Manning River Estuary Management Committee. The purpose of this workshop was to discuss the outcomes of the workshops to date and establish a clearing ranking for estuary management objectives previously identified.

A list of provisional management strategies and works was also provided to the Committee for comment. Their feedback was requested to enable the development of a refined list of management strategies for inclusion in the Estuary Management Study and Plan.

### **2.1.4 Committee Workshop #4**

A fourth workshop was held with members of the Manning River Estuary Management Committee at the Greater Taree City Council offices on 20<sup>th</sup> February 2007.

A draft schedule of estuary management strategies was presented to the Committee and discussed at the workshop, prior to establishing the future direction of investigations to prepare the Estuary Management Study report and Estuary Management Plan.

### 2.1.5 Consultation with Key Stakeholders

The following additional consultation was undertaken with key stakeholders in the development of the Estuary Management Study report:

- Meeting with DELTA landholders on 5<sup>th</sup> June 2006 to discuss land and waterway management activities.
- A site meeting was held at Farquhar Inlet on 4<sup>th</sup> August 2006 with George Townsend (*Committee member*), Bruce Cowan (*DELTA*) and representatives from the oyster growing community to discuss options for managing the entrance at Farquhar Inlet.
- A Technical Sub-committee meeting at Council's offices on 9<sup>th</sup> March 2007 to discuss Council's preferred management strategies relating to planning measures.
- Contact was made with Amanda Gregory, former representative from the Waterwatch program and now with MidCoast Water, to discuss the potential for compilation of water quality monitoring data for the Manning River.
- Regular discussions with Council's engineering and planning staff regarding the implementation of recommended estuary management strategies.

## 3 SIGNIFICANCE OF THE ESTUARY

---

### 3.1 ESTUARY SIGNIFICANCE

The main landscape components of the Manning River Estuary are common to other coastal locations of NSW.

However, as discussed, the estuary is unique as it has two natural ocean entrances, one at Harrington and the other 12km to the south, known as the Farquhar Inlet, at Old Bar. The main entrance at Harrington is permanently open and has an artificial breakwater on the northern bank and extensive rock training walls on both banks extending up the river. Farquhar Inlet is untrained and has a history of periodic closure.

The Manning provides a wide variety of estuarine conditions that produce a range of habitat types, which in turn result in a range of biota, including micro plankton and algae through to mangrove forests, aquatic birds and dolphins. The estuary comprises ecologically valuable areas of SEPP 14 Wetlands and SEPP 26 Littoral Rainforests. Significant areas of National Park, State Forest and State Park are also located within the Manning River catchment.

Crowdy Bay National Park extends north along the coast from Harrington and extends inland to Pipeclay Canal. The much smaller Towibakh Nature Reserve is located on Mitchells Island and has a gazetted area of 63 hectares. Kappinghat Nature Reserve is a larger National Park located to the south and west of Old Bar and includes area south of Taree South.

The State Forests located within the catchment include:

- The Lansdowne State Forest;
- The Yarrat State Forest; and
- The Kiwarrak State Forest.

The Manning Entrance State Park is located along the coast between Old Bar and Manning Point. The Harrington Beach State Park is located to the north, between Harrington and Crowdy Head.

The Manning River also has significant economic and social value as a popular tourist destination and is home to a valuable fishery and aquaculture industry.

### 3.2 ESSENTIAL FEATURES OF THE ESTUARY

Prior to considering management measures for an estuary, it is beneficial to assess those aspects that are significant or essential features. These comprise features which, until threatened, can be taken for granted. Therefore, it is appropriate to identify them so that measures can be implemented to prevent their degradation or the realisation of potential threats. In this way, management of the estuary can be preventative rather than purely reactive, and thereby minimise potential future expenditure to rectify problems that could adversely impact on the primary estuarine processes.

### 3.2.1 Assessment of Value of Estuary Attributes

The “essential features” of an estuary are those which make the estuary important in a local, regional or national sense. Based on work completed in preparing the ‘*Manning River Estuary Processes Study*’ (GTCC, 1997), it was possible to develop a provisional list of estuary features that can be considered as being of value to the estuary. A list of features was developed for each of the following categories of estuary attributes:

- Aesthetic attributes;
- Ecological attributes;
- Social attributes; and,
- Economic attributes.

Proformas were prepared listing the special features for each of the above categories of estuary attributes. Prior to Committee Workshop #1, members of the Manning River Estuary Management Committee were asked to complete these proformas by attaching a value of between 1 and 10 to each feature of significance in both a regional and local context. The following value scoring was applied:

- 8-10 An attribute of very high to extremely high value due to its rarity in the state and local area. Considered to be essential to the functioning of the estuary and important to continued estuary activities (*both in a productive sense and in terms of protection*)
- 7-8 An attribute of high value, but which is encountered elsewhere and which may be significant to the functioning of the estuary.
- 5-7 An attribute of moderate value that is commonly found within the estuary, and which although beneficial, is not essential to the functioning of the estuary.
- 1-5 An attribute of low value that may be construed as not necessarily being an essential feature to the estuary.

As discussed above, proformas were prepared listing the special features for each of these categories.

Unfortunately, due to time constraints, the rankings for the essential features of the estuary and the related management objectives were not discussed during Committee Workshop #1.

However, as the associated proforma was completed and submitted at the end of the workshop, a list of the essential features as ranked by individual members of the Committee was developed. Respondents to the proformas also highlighted a range of additional attributes that were considered for inclusion in the final list of attributes.

The most important essential features of the estuary were determined to be:

### Ecological Attributes

- Breeding ground for water birds
- Endangered water birds
- Fish and crustaceans
- Mangroves
- National Parks and reserves
- Seagrass beds
- Aquatic mammals
- Large areas of SEPP 14 wetlands
- Pockets of sub-tropical rainforest
- Saltmarsh / sedges / rushes
- Coastal swamps
- Terrestrial fauna
- Dry open forest
- Freshwater macrophytes
- Riparian vegetation / corridors
- Algae
- SEPP 26 Littoral Rainforest areas

### Aesthetic Attributes

- Farquhar Inlet
- Two natural entrances
- Forests
- Mangrove stands
- Large areas of wetland
- Steep landforms
- Areas of wide open waterway
- Ridges and valleys
- Beaches
- Uplands and plateaus
- Sedges and rushes
- Intertidal shoals
- Coastal plains
- Dunes
- Saltmarshes
- Oyster industry infrastructure
- Training wall at Harrington Inlet

### Social Attributes

- Recreational fishing
- Picnicking and foreshore access
- Swimming / snorkelling
- Camping and caravan parks
- Sailing and sailboarding
- Cultural heritage sites
- Rowing, kayaking and canoeing
- Boat launching ramps
- Recreational power-boating and water-skiing
- Wharves and jetties
- Houseboats
- Boat cruises
- Residential area
- Sewage Treatment Plants (*STPs*)

### Economic Attributes

- Tourism
- Dairy industry
- Beef production
- Oyster / aquaculture industry
- Industry
- Commercial fishing
- Sand and gravel resources
- Commercial boating – cruises and hire boats

Ecological and aesthetic attributes were the most highly valued. Particular social and economic attributes such as passive recreation and tourism were also assigned a high value. This reflects the predominantly natural characteristics of the estuary catchment and the importance placed by the community on the estuary being considered to be valued from an ecological perspective on both a local and regional level.

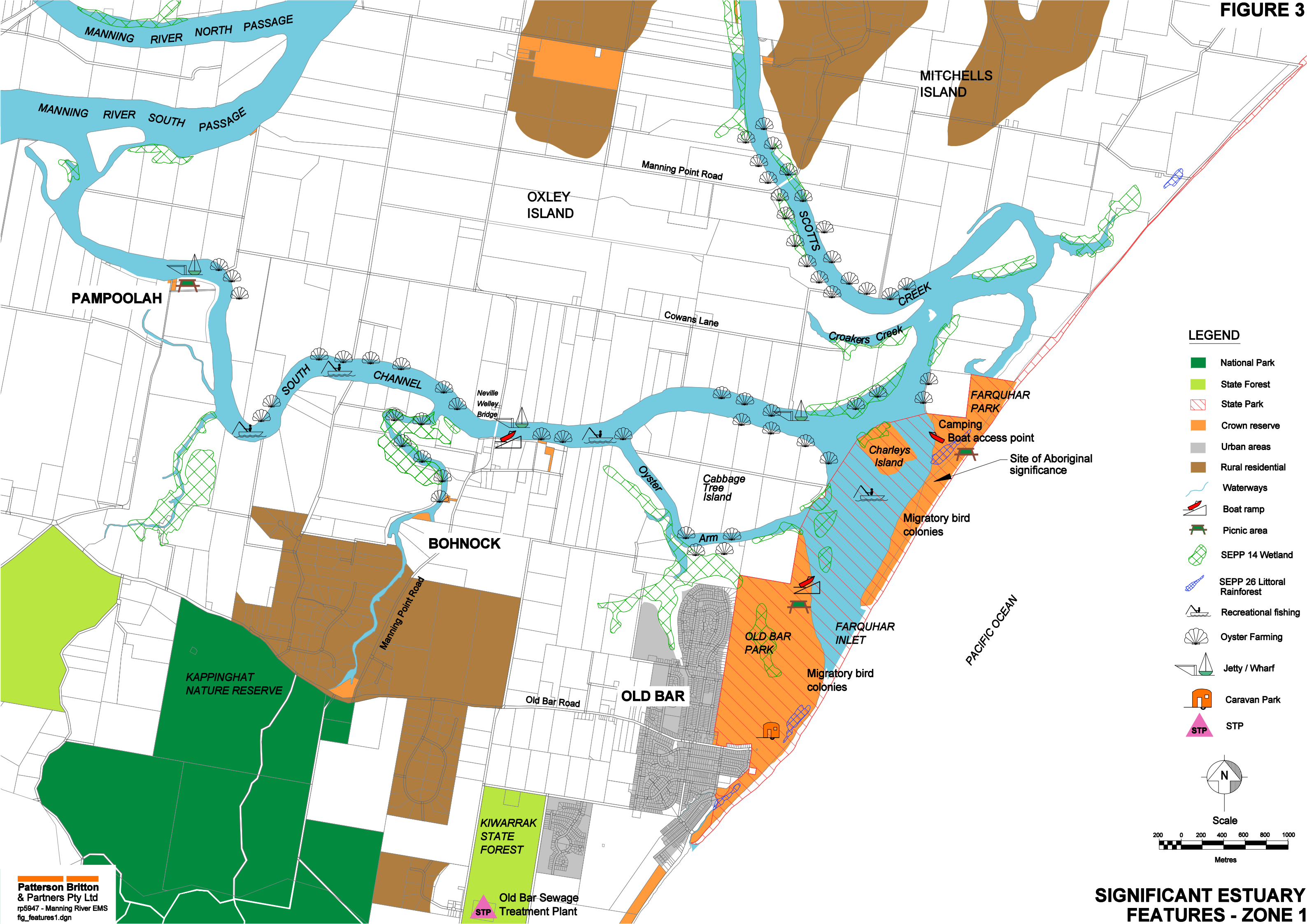
The significant features of the Manning River estuary are shown graphically (*where applicable*) in **Figures 3 to 6**.

### **3.2.2 Essential Features**

The essential estuary features are those that are considered to be regionally or locally significant. Based on the value assessment undertaken through consultation with the Committee and review of existing documentation, the essential features of the estuary can be considered to include:

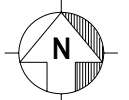
- Wetland areas, particularly as habitat for endangered fauna;
- Two entrances, both with social, ecological, economic and scenic value;
- Passive recreational activities such as foreshore picnicking;
- Significant historical and cultural heritage sites;
- Breeding grounds for wildlife, including waterbirds and aquatic fauna; and,
- Opportunities for recreational fishing, rowing and kayaking.



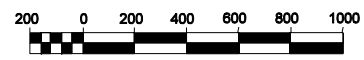


LEGEND

- National Park
- State Forest
- State Park
- Crown reserve
- Urban areas
- Rural residential
- Waterways
- Boat ramp
- Picnic area
- SEPP 14 Wetland
- SEPP 26 Littoral Rainforest
- Recreational fishing
- Oyster Farming
- Jetty / Wharf
- Caravan Park
- STP



Scale

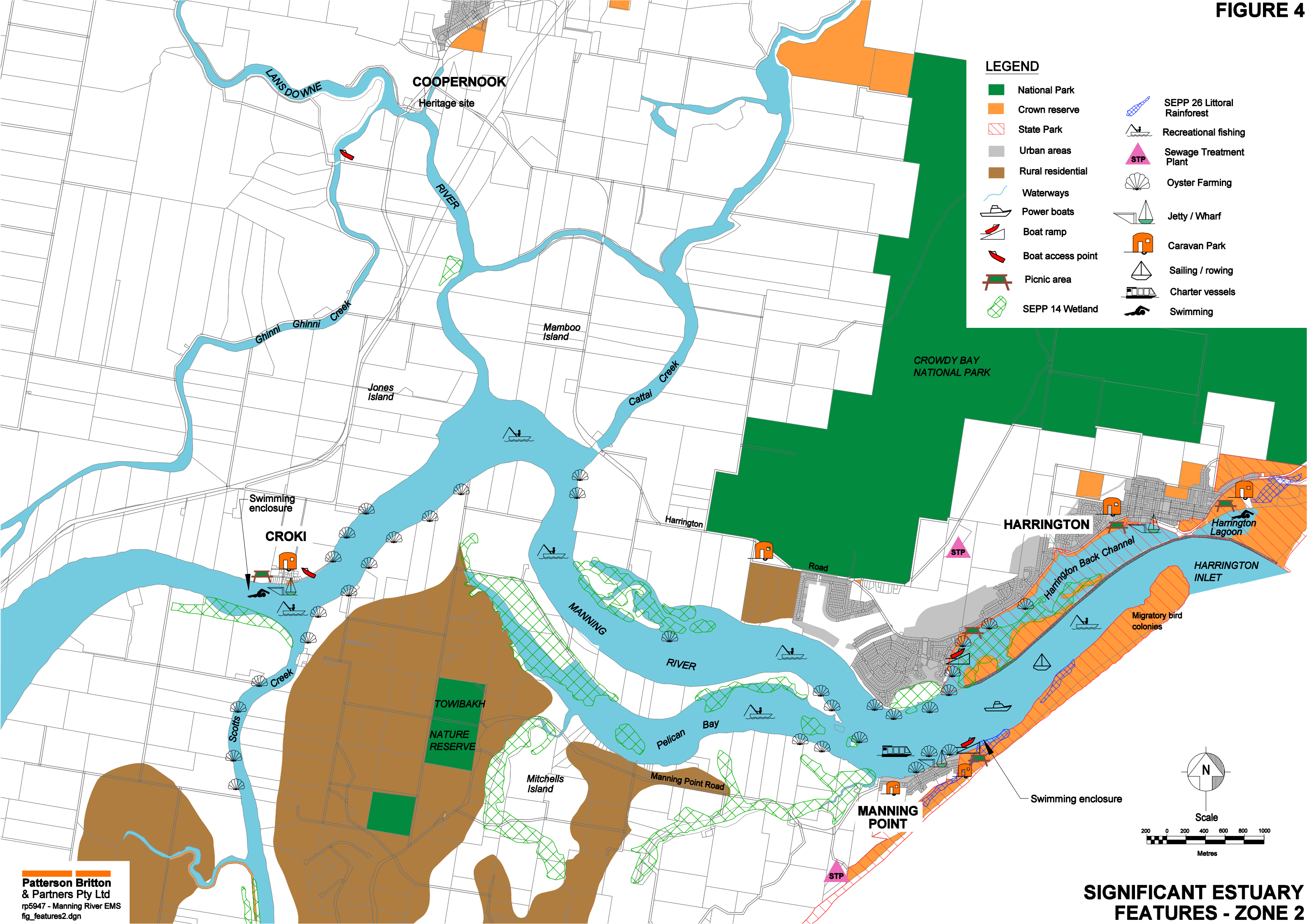


Metres

SIGNIFICANT ESTUARY FEATURES - ZONE 1

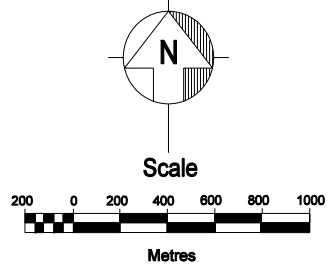
Old Bar Sewage Treatment Plant  
 STP



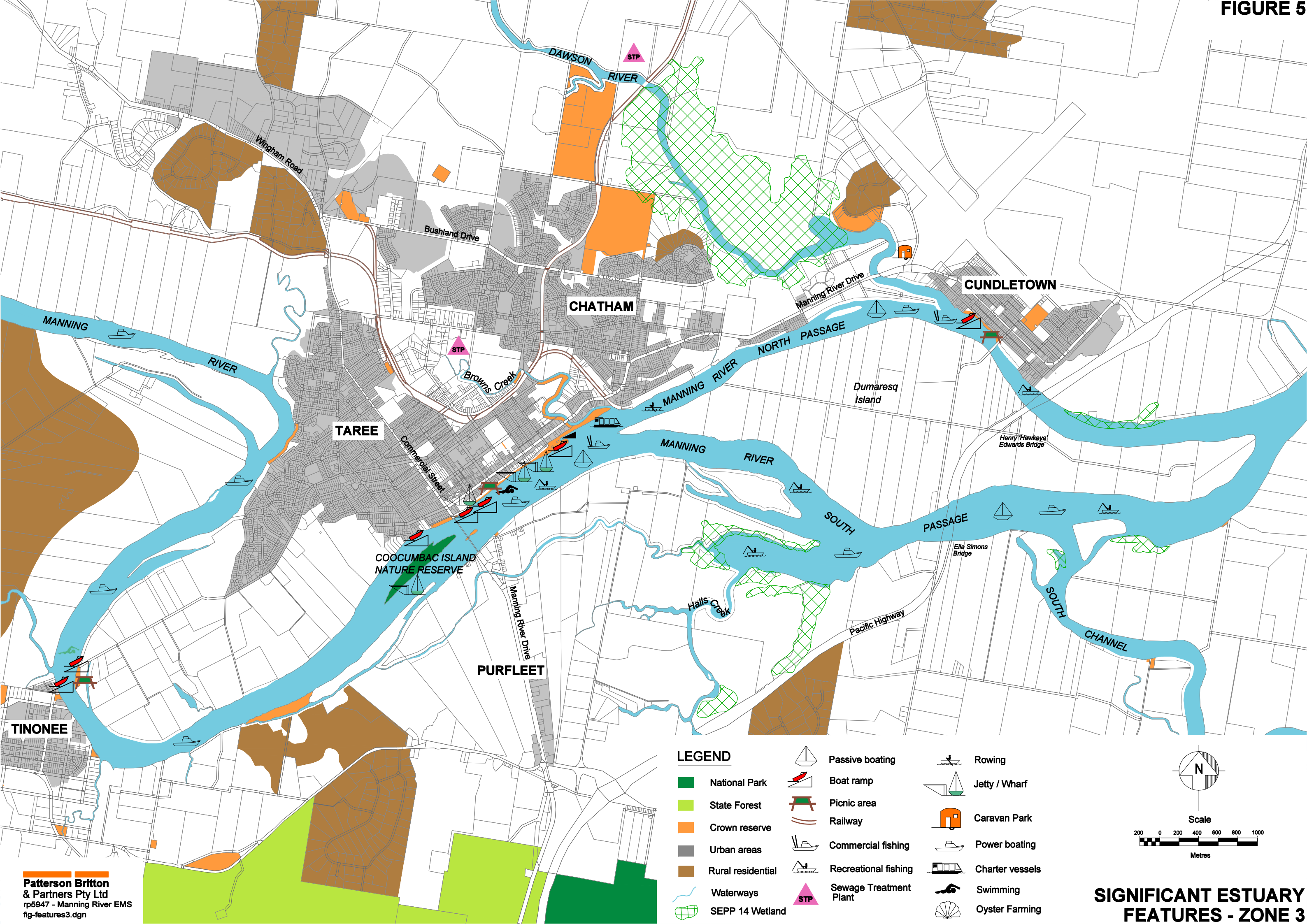


**LEGEND**






















	National Park		SEPP 26 Littoral Rainforest
	Crown reserve		Recreational fishing
	State Park		Sewage Treatment Plant
	Urban areas		Oyster Farming
	Rural residential		Jetty / Wharf
	Waterways		Caravan Park
	Power boats		Sailing / rowing
	Boat ramp		Charter vessels
	Boat access point		Swimming
	Picnic area		
	SEPP 14 Wetland		

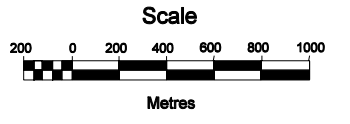
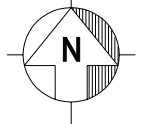




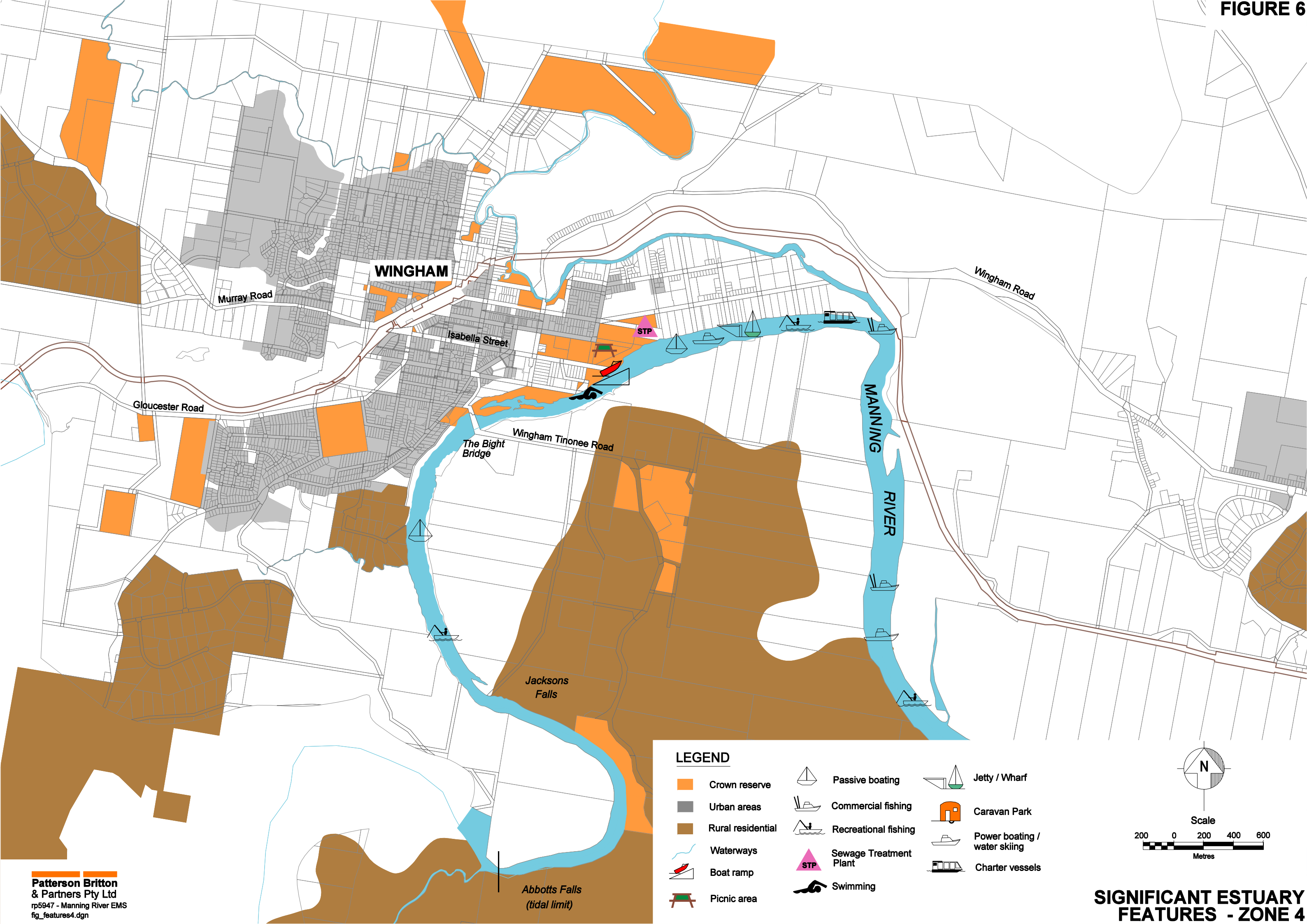


**LEGEND**

- |   |  |   |
|---|--|---|
|  National Park     |  Passive boating        |  Rowing          |
|  State Forest      |  Boat ramp              |  Jetty / Wharf   |
|  Crown reserve     |  Picnic area            |  Caravan Park    |
|  Urban areas       |  Railway                |  Power boating   |
|  Rural residential |  Commercial fishing     |  Charter vessels |
|  Waterways         |  Recreational fishing   |  Swimming        |
|  SEPP 14 Wetland   |  Sewage Treatment Plant |  Oyster Farming  |

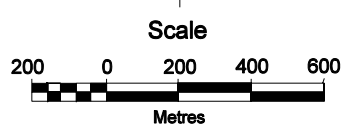
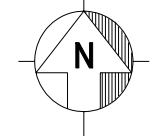






**LEGEND**

- Crown reserve
- Urban areas
- Rural residential
- Waterways
- Boat ramp
- Picnic area
- STP
- Swimming
- Passive boating
- Commercial fishing
- Recreational fishing
- Sewage Treatment Plant
- Jetty / Wharf
- Caravan Park
- Power boating / water skiing
- Charter vessels



## 4 KEY ISSUES, CONFLICTS AND CONCERNS

---

### 4.1 KEY ESTUARY MANAGEMENT ISSUES

The identification of the key issues confronting the future management of the estuary is an essential step in developing the Estuary Management Plan. A previous assessment of key issues was identified from a review of the '*Manning River Estuary Processes Study*' (Webb McKeown & Associates, 1997).

#### 4.1.1 Previous Assessment of Key Issues

During completion of the *Estuary Processes Study* (GTCC, 1997), the Estuary Management Committee established a preliminary list of issues they consider to confront the future management of the estuary. The preliminary issues are listed in **Table 1**.

**Table 1 PREVIOUSLY IDENTIFIED KEY ISSUES**

KEY ISSUE	RELATED ISSUE
Water Quality	<ul style="list-style-type: none"><li>• Nutrients</li><li>• Suspended solids from bank erosion and excessive clearing</li><li>• Organic matter with a high oxygen demand</li><li>• Concentrated pollutant input from Taree-Wingham urban areas (urban runoff)</li><li>• Rural runoff</li><li>• Sewage effluent discharges</li><li>• Poor mixing in mid-estuary as a result of density stratification resulting in low estuarine flushing in this part of the estuary</li><li>• Acid soil leachate in the Lansdowne River and Cattai Creek areas</li><li>• Effects on oyster industry and commercial fisheries</li></ul>
Riverbank Erosion	<ul style="list-style-type: none"><li>• Riverbank and catchment clearing for grazing and agriculture</li><li>• Water logging and tree collapse</li><li>• Cattle denuding and wave attack</li><li>• Current scour</li><li>• Wind generated waves</li><li>• Water skiing boat wash</li><li>• Fishing boat wash</li></ul>

KEY ISSUE	RELATED ISSUE
Sedimentation	<ul style="list-style-type: none"> <li>• Bank erosion</li> <li>• Remobilisation and deposition of existing bed sediments</li> <li>• Natural build up of marine sands on marine deltas</li> <li>• Cessation of dredging</li> <li>• Reduced navigability</li> <li>• Impacts on aquatic habitats such as seagrass beds</li> <li>• Limited movement of fluvial bed sediments</li> <li>• Increased catchment inputs as a result of clearing and urbanisation</li> </ul>
Entrance Conditions	<ul style="list-style-type: none"> <li>• Extensive shoaling at both entrances</li> <li>• Reduced navigability of Harrington entrance</li> <li>• Entrance training works at Harrington – increased flows in northern channel causing closure of Farquhar Inlet</li> <li>• Rate of entrance infilling and shoaling</li> <li>• 4WD access</li> </ul>
The Fishery	<ul style="list-style-type: none"> <li>• Flood gates and drainage culverts limiting fish passage</li> <li>• High nutrient, suspended sediment and organic carbon inputs to the upper estuary which are retained in the upper estuary due to density stratification in the mid-estuary</li> <li>• Faecal contamination in some areas, such as Browns Creek</li> <li>• Acid leachate problems in the Lansdowne River and lower estuary</li> <li>• Lower than expected levels of fish productivity</li> <li>• Comparison of recreational fishing catch and commercial fishing</li> <li>• Perceived conflict between recreational and commercial fisheries</li> </ul>
Waterway Access	<ul style="list-style-type: none"> <li>• Lack of major launching facilities on the river</li> <li>• Lack of associated facilities, such as beaches and safe swimming areas, picnic areas, amenities</li> <li>• Conflicts of use (Tinonee)</li> <li>• Competition for space</li> <li>• Navigational hazards created by old ballast sites</li> </ul>
Nature Conservation	<ul style="list-style-type: none"> <li>• Loss of estuarine foreshore, inter-tidal and riparian habitats as a result of general land / catchment clearing and degradation</li> <li>• Need to conserve and expand existing areas of significant natural habitat</li> <li>• Limited foreshore mangrove, reed and seagrass strips</li> </ul>

Source: Webb, McKeown & Associates, 1997

#### 4.1.2 Committee Response to Potential Key Issues

The key issues identified through the *Estuary Study* were presented to the Estuary Management Committee and a group of Key Stakeholders. This consultation was undertaken via a half day site inspection of the estuary by foot, car and boat on Thursday 17<sup>th</sup> November 2005 and a workshop on the morning of the same day.

The site inspection and workshop was attended by representatives from Patterson Britton & Partners, Greater Taree City Council, the community, government agencies and local interest groups. Areas where concerns exist regarding the environmental or physical condition of the estuary were identified, inspected and photographed. The relative importance of each key issue was workshopped to develop a ranking of the relative importance as viewed by those who attended the workshop.

The results of the ranking of key issues undertaken during the workshop on 17<sup>th</sup> November 2005 are summarised in **Table 2**. A total of 23 key issues were identified, discussed and ranked during the workshop.

**Table 2 KEY ISSUE RANKINGS FROM DISCUSSIONS AT COMMITTEE WORKSHOP #1**

RANKING	KEY ISSUE
1	Understanding the development potential of the estuary
2	Loss of riparian vegetation
3	Reduction in fish stocks
4	Navigation
5	River bank erosion
6	Entrance conditions at Farquhar Inlet
7	Flooding ( <i>general</i> )
8	Acid Sulphate Soils
9	Waterway access
10	Loss of biodiversity
11	Water quality throughout the estuary
12	Waterway usage and need for more public facilities
13	Waterway conflicts
14	Lack of dissemination of information ( <i>departments / public</i> )
15	Lack of education
16	Entrance conditions at Harrington
17	Suitability of development controls for the estuary
18	Sedimentation of Harrington Back Channel and upstream of Farquhar Inlet
19	Lack of knowledge about estuary processes
20	Reduction in seagrasses ( <i>due to dredging</i> )
21	Liability associated with access
22	Sea level rise and global warming
23	Beach erosion



Rankings from the workshop have also been compared with the rankings supplied by individuals on the Committee through completion of the proformas that were distributed prior to Committee Workshop #1. The proforma listed a total of nine key issues which were identified from our review of the Estuary Processes Study:

<i>Water Quality</i>	<i>Waterway Access</i>
<i>Riverbank Erosion</i>	<i>Nature Conservation</i>
<i>Sedimentation</i>	<i>Waterway Usage</i>
<i>Entrance Conditions</i>	<i>Development Controls</i>
<i>The Fishery</i>	

These issues which were then divided into 46 issue sub-sets that targeted specific problems related to the health and management of the estuary. A total of 11 responses for the proforma were received from the Committee.

A comparison was made of the Workshop rankings and the individual rankings from the proformas. There were a few noticeable differences between the two sets of rankings:

1. The Committee ranked the “suitability of development controls for the estuary” 17<sup>th</sup> out of the 23 key issues, while in the individual rankings “development controls” was ranked 3<sup>rd</sup> out of 9.
2. In the Committee rankings, “reduction in fish stocks” was ranked 3<sup>rd</sup> out of the 23 key issues, however, in the individual rankings “the fishery” was ranked 7<sup>th</sup> out of 9.
3. “Entrance conditions at Farquhar Inlet” was ranked 6<sup>th</sup> out of 23 by the Committee, while “entrance conditions” was ranked last out of the 9 key issues in the individual rankings. The difference here is most likely due to the separation of issues at Farquhar Inlet and Harrington Inlet, with issues at Farquhar being considered as more contentious than those at Harrington (*see below for further discussion*).
4. The Committee ranked “loss of biodiversity” 10<sup>th</sup> out of the 23 key issues (*about mid-way*), however in the individual rankings “nature conservation” was ranked 2<sup>nd</sup> out of the 9 key issues.
5. In the individual rankings the “shallowing of rivers and creeks” was ranked just over mid-way as a sub-set of sedimentation, which was ranked 6<sup>th</sup> out of 9. However, the issue of “navigation” was ranked 4<sup>th</sup> out of 23 by the Committee during the workshop.

Although there were some differences between the Committee and individual rankings, there were also quite a few similarities. This reinforces these issues as being of high importance to all stakeholders and Committee members:

1. “Riverbank erosion” was ranked highly in both the Committee Workshop and individual assessments, ranking 1<sup>st</sup> (*out of 9*) and 5<sup>th</sup> (*out of 23*) respectively.
2. “Clearing of riparian vegetation” was the highest ranked sub-set issue of “riverbank erosion” while “loss of riparian vegetation” was ranked 2<sup>nd</sup> (*out of 23*) by the Committee.

3. “Understanding the development potential of the estuary” was the highest ranking issue identified by the Committee at the workshop. Similarly, “coastal urbanisation” was ranked highly in the individual assessments.
4. “Waterway access”, “waterway usage” and “waterway conflicts” were all ranked as medium priority issues in both the individual and workshop assessments.

Eight new issues were identified by the Committee during Committee Workshop #1. However, most of these were ranked between 14<sup>th</sup> and 23<sup>rd</sup> in the workshop rankings.

There was some discussion over the relevance of “flooding” as being included as an issue within the estuary management plan. Some Committee members felt that issues associated with flooding should be addressed separately under the NSW Government Floodplain Management process.

Notwithstanding, it was agreed that flooding was an issue within the estuary and any management strategies arising from the estuary management process could reinforce the need for a Floodplain Management Plan for the Manning River. “Flooding” was subsequently ranked 7<sup>th</sup> in the Committee Workshop issues list.

#### **4.1.3 Entrance Condition Issues**

As discussed above, the main entrance at Harrington is permanently open and has an artificial breakwater on the northern bank. Farquhar Inlet, to the north of Old Bar, is untrained and has a history of periodic closure. At the time of writing (2007), Farquhar Inlet had been blocked for some time by the back beach berm at Old Bar Beach.

Ocean entrance conditions have been the topic of much discussion since European settlement of the area in the early 1800s. The basis for this discussion has varied at different times over this period and has also varied according to the locale of those that have raised concerns.

The concerns that have been raised include:

- concerns over navigability, particularly at Harrington;
- concerns about flooding and the potential for a second permanent entrance to reduce the perceived flood risk; and,
- concerns over long flushing times and associated impacts on water quality and salinity.

These concerns and the times when they have been raised, are typically a reflection of the condition of each of the entrances. For example, current concerns about flushing times and poor water quality appear to be more significant in the minds of the community due to the long period since the last major flood (*back in 1990*), and the subsequent reduction in frequency of opening of Farquhar Inlet since that time.

Accordingly, it is important to understand the history of the condition of each entrance over time, and the variability in that condition which is directly linked to the natural estuary processes that control it.

### History of Entrance Conditions

A brief description of the change in entrance condition at the Harrington entrance is as follows:

- Northern Breakwater constructed circa **1904**
- **1904 – 1915** → Entrance channel adjacent to northern training wall
- **1919** → Sand build up against northern training wall. Channel relocated 1.2 km to south.
- **1927** → Shoaling against northern training wall substantially increased
- **1927** → Spur Walls constructed
- **1933** → Entrance channel moving toward northern training wall
- **1965 – 1970** → Entrance channel relocates southward similar to 1927 position. Large sand shoal against northern training wall.
- **1978** → Entrance channel closer to northern training wall; reduced shoaling.
- **1980 – 1990** → Entrance channel adjacent to northern training wall.
- **1990 – Present** → Intermittent shoaling of the entrance and progressive increase in shoal extent in response to reduced frequency of flooding.

A brief description of the change in entrance condition for the Farquhar Inlet is as follows:

- Never trained → No breakwater
- Earliest European records date to 1818 and indicate entrance at that time was open sufficiently to allow access for sailing craft
- 1827 → historic survey prepared by John Armstrong (*refer Plate 1*), which indicates that the entrance was located near the southern limit of the inlet at this time
- **1818 – 1981** → Entrance open 26 times out of 38 records of entrance conditions; viz.,:
  - 1886 to 1920 → Open
  - 1920 to 1924 → Closed
  - 1924 to 1926 (large seas) → Closed
  - 1926 to 1929 → Closed
  - 1929 to 1941 → Open
  - 1942 to 1946 → Closed
  - 1949 to 1981 → Intermittently Open
  - 1981 to 1983 → Open, but heavily constricted
  - 1985 → Closed
  - 1986 to 1991 → Open
  - 1992 to present → Periodically Closed
- Air photo evidence since 1940 indicates that entrance position (closed and open) has fluctuated along Old Bar Beach.

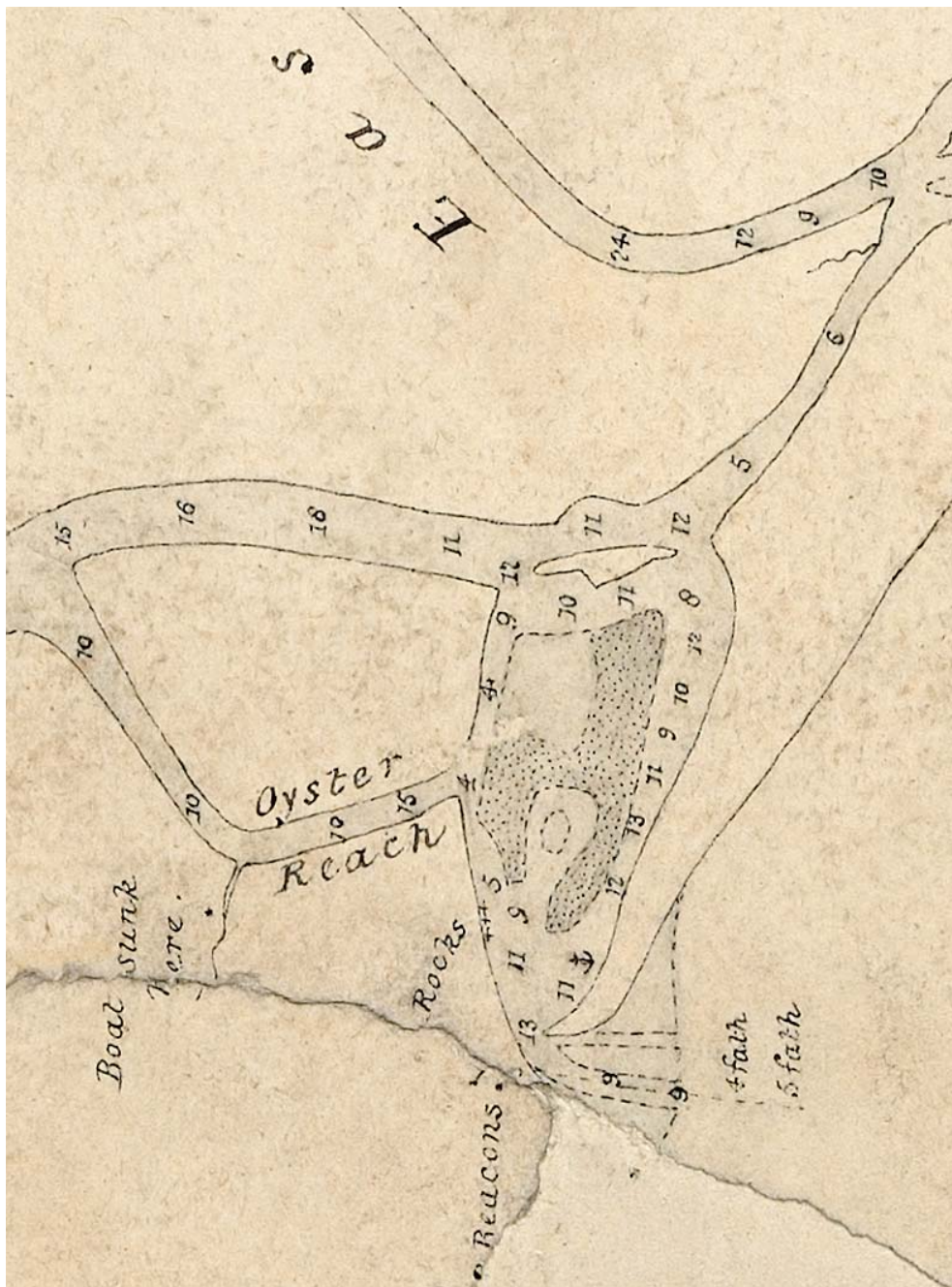


Plate 1: 1827 survey prepared by John Armstrong  
(depth soundings likely to be in feet below MWL)

### Entrance Opening Investigations

In recognition of community concerns about the entrance conditions, GTCC and its predecessor have undertaken a range of studies that have investigated options for improving channel entrance conditions. These investigations have included building new breakwaters and training walls, undertaking periodic channel dredging and constructing pilot channels to alleviate flood risks. These investigations extend back many years and can typically be linked to representations made by community groups and industry to a range of government departments.

For example, in 1987 Public Works published a study titled, '*Manning River Entrance Study - Background & Issues of Concern*', which highlighted the following "issues of concern":

- heavy shoaling and treacherous entrance conditions at the permanent entrance at Harrington;
- the impact that the entrance at Old Bar has on flood levels and the time of inundation for various locations on the river;
- the effect, both positive and negative, that the entrance at Old Bar has on local oyster and other farming industries;
- the impact that the entrance at Old Bar has on the entrance at Harrington;
- general concerns about the detrimental effect to the local community and business that the continued shoaling and erosion problems have had along various reaches of the river and its entrances.

In more recent times, Council's Estuary Management Committee has overseen detailed investigations to address these issues. In that regard, the following studies have been prepared under the stewardship of the Committee:

- '*Manning River Estuary Processes Study*' (1997)
- '*Manning River Estuary Management Study- Numerical Modelling Investigation*'(2001)
- '*Manning River Floodplain Management Study & Plan*' (2001)
- '*Manning River Estuary – Pilot Value Management Report*' (2002)
- '*Economic Scoping Study – Manning River Entrance Improvement Project*' (2003)
- '*Harrington Northern Breakwater Investigation*' (2004)
- '*Manning River Estuary Management Study (Part 2) and Plan*' (in draft, 2008).

These investigations have considered the technical aspects of various proposals to address each of the issues raised in the 1987 Report, as well as the economic and social benefits and impacts of proceeding with works to improve navigability and increase entrance opening frequency.

The fundamental outcome from these investigations is that major works would be required to improve estuary flushing times and entrance navigability. It also needs to be recognised that these works would require further justification on environmental grounds, and are likely to require a commitment for ongoing maintenance (*for example in the case of dredging of Harrington entrance*) in order for them to be viable.

Shoaling in the lower sections of the estuary at both Harrington and Farquhar Inlet is a consequence of natural coastal processes. Works to reduce the extent and frequency of shoaling that presents as a navigational impediment will require ongoing maintenance for the life of those works.

Through the investigations listed above, Council's Committee has identified the need for substantial additional funding should the community wish to proceed with the next steps involved in progressing the various proposals for improved entrance management at Harrington and Farquhar Inlet.

In this context, Council has sought financial support from the State Government, but it needs to be recognised that the funds required would be in the tens of millions of dollars should permanent entrance works be pursued.

Notwithstanding, it is recognised that many of the issues raised in the 1987 Report are still of concern to members of the Committee and the broader community. Furthermore, it is apparent that many in the community are not aware of the extent of the investigations that have been undertaken to-date or the cost implications of implementing permanent works to improve entrance conditions.

#### **4.1.4 Adopted Key Issues**

Through interpretation of both the Committee's response to the individual proformas and also discussions during Committee Workshop #1, a set of ranked key issues has been established for adoption in the Estuary Management Study and Plan.

The adopted key issues for management of the Manning River Estuary, in order of rank, are listed in **Table 3**. In light of growing concern over the entrance conditions at Farquhar Inlet and Harrington, the issue of "ocean entrance conditions" has been ranked as the number one issue.

The water quality of the Manning River and its tributaries is considered to be relatively good. And therefore, "water quality" is not a highly ranked issue in **Table 3**.

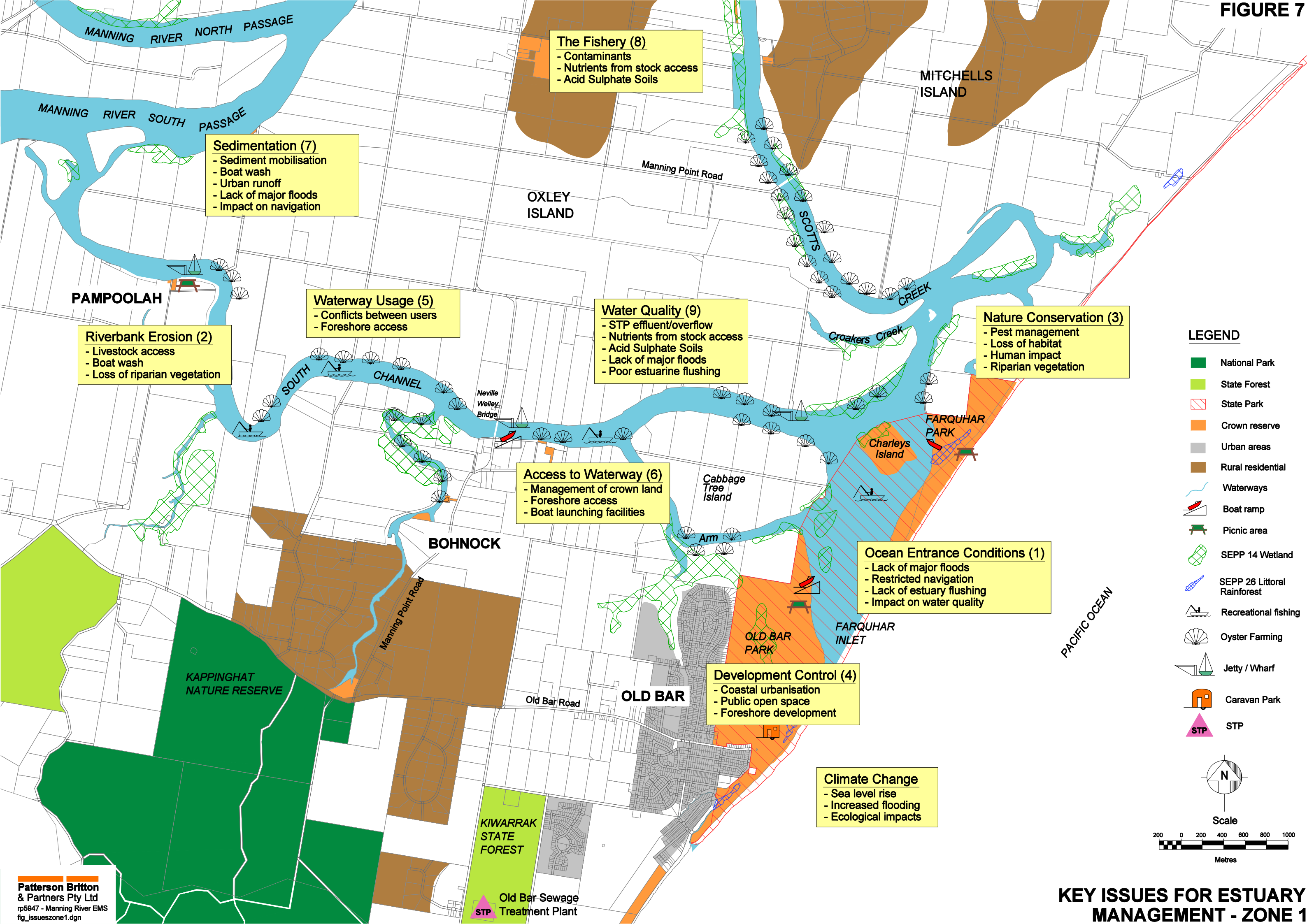
Furthermore, it should be noted that several issues listed within **Table 3** are linked to water quality. For example, if the issue of the ocean entrance conditions is addressed, then this naturally results in benefit to the water quality of the estuary in terms of increased potential for tidal flushing.

The issue of "climate change" has not been ranked in **Table 3**. This issue can also be indirectly related to almost all other issues identified in the table and therefore should be treated as an overriding management issue to be considered when determining actions to address the other issues.

For example, the currently predicted rise in sea level as a result of climate change is likely to impact on the rate and location of bank erosion, the extent of riparian vegetation and foreshore ecosystems, primary productivity, water quality and future development controls.

A summary of the key management issues is shown graphically in **Figures 7 to 10**.





**The Fishery (8)**  
 - Contaminants  
 - Nutrients from stock access  
 - Acid Sulphate Soils

**Sedimentation (7)**  
 - Sediment mobilisation  
 - Boat wash  
 - Urban runoff  
 - Lack of major floods  
 - Impact on navigation

**Riverbank Erosion (2)**  
 - Livestock access  
 - Boat wash  
 - Loss of riparian vegetation

**Waterway Usage (5)**  
 - Conflicts between users  
 - Foreshore access

**Water Quality (9)**  
 - STP effluent/overflow  
 - Nutrients from stock access  
 - Acid Sulphate Soils  
 - Lack of major floods  
 - Poor estuarine flushing

**Nature Conservation (3)**  
 - Pest management  
 - Loss of habitat  
 - Human impact  
 - Riparian vegetation

**Access to Waterway (6)**  
 - Management of crown land  
 - Foreshore access  
 - Boat launching facilities

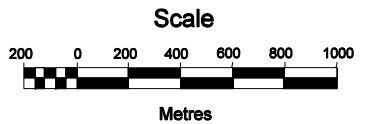
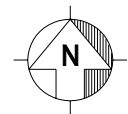
**Ocean Entrance Conditions (1)**  
 - Lack of major floods  
 - Restricted navigation  
 - Lack of estuary flushing  
 - Impact on water quality

**Development Control (4)**  
 - Coastal urbanisation  
 - Public open space  
 - Foreshore development

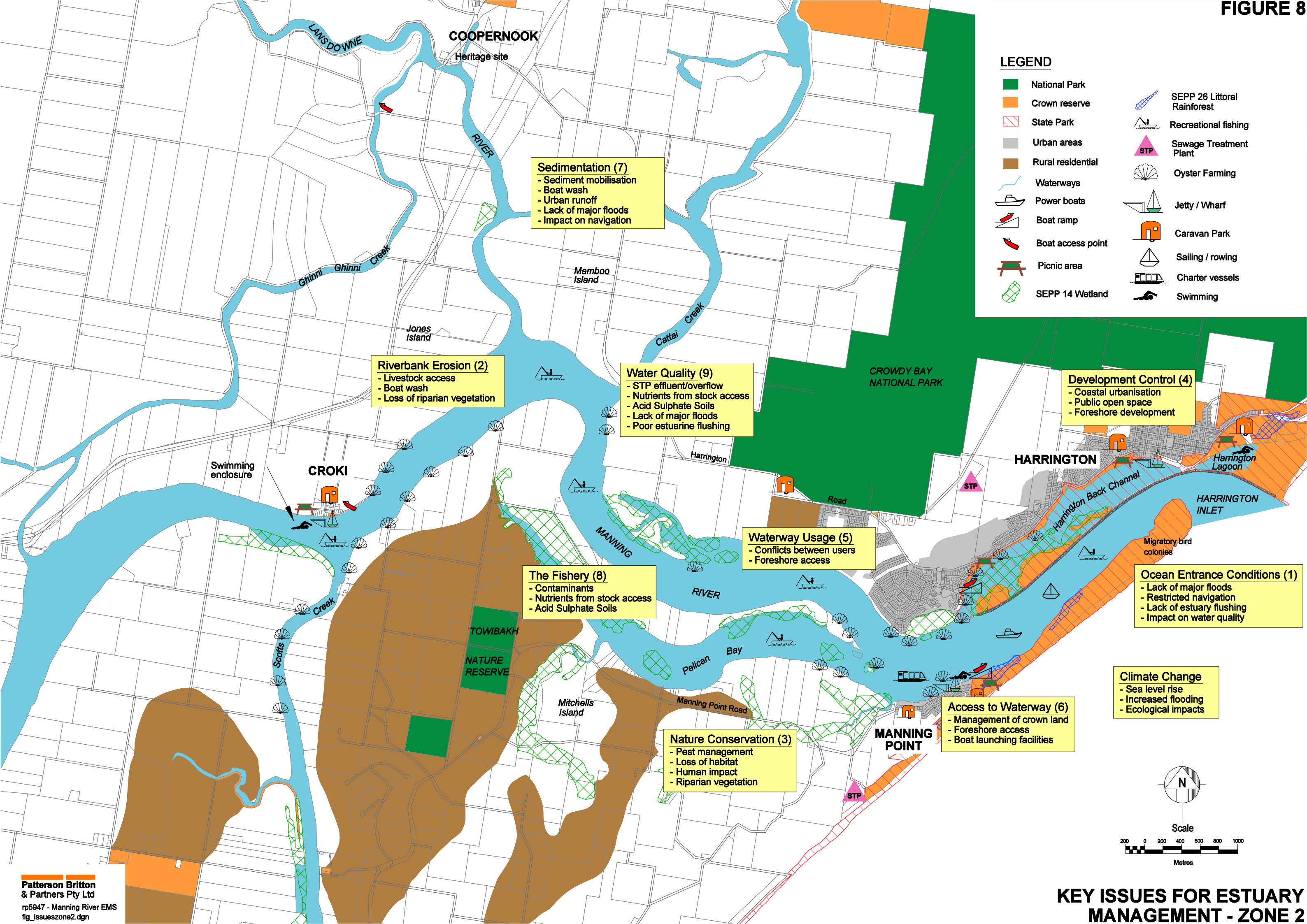
**Climate Change**  
 - Sea level rise  
 - Increased flooding  
 - Ecological impacts

**LEGEND**

- National Park
- State Forest
- State Park
- Crown reserve
- Urban areas
- Rural residential
- Waterways
- Boat ramp
- Picnic area
- SEPP 14 Wetland
- SEPP 26 Littoral Rainforest
- Recreational fishing
- Oyster Farming
- Jetty / Wharf
- Caravan Park
- STP







**LEGEND**

- |  |                   |  |                             |
|--|-------------------|--|-----------------------------|
|  | National Park     |  | SEPP 26 Littoral Rainforest |
|  | Crown reserve     |  | Recreational fishing        |
|  | State Park        |  | Sewage Treatment Plant      |
|  | Urban areas       |  | Oyster Farming              |
|  | Rural residential |  | Jetty / Wharf               |
|  | Waterways         |  | Caravan Park                |
|  | Power boats       |  | Sailing / rowing            |
|  | Boat ramp         |  | Charter vessels             |
|  | Boat access point |  | Swimming                    |
|  | Picnic area       |  |                             |
|  | SEPP 14 Wetland   |  |                             |

**Sedimentation (7)**  
 - Sediment mobilisation  
 - Boat wash  
 - Urban runoff  
 - Lack of major floods  
 - Impact on navigation

**Riverbank Erosion (2)**  
 - Livestock access  
 - Boat wash  
 - Loss of riparian vegetation

**Water Quality (9)**  
 - STP effluent/overflow  
 - Nutrients from stock access  
 - Acid Sulphate Soils  
 - Lack of major floods  
 - Poor estuarine flushing

**Development Control (4)**  
 - Coastal urbanisation  
 - Public open space  
 - Foreshore development

**Waterway Usage (5)**  
 - Conflicts between users  
 - Foreshore access

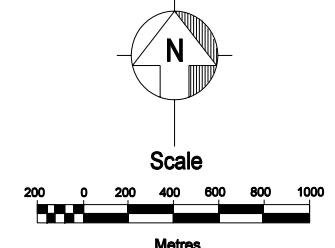
**The Fishery (8)**  
 - Contaminants  
 - Nutrients from stock access  
 - Acid Sulphate Soils

**Ocean Entrance Conditions (1)**  
 - Lack of major floods  
 - Restricted navigation  
 - Lack of estuary flushing  
 - Impact on water quality

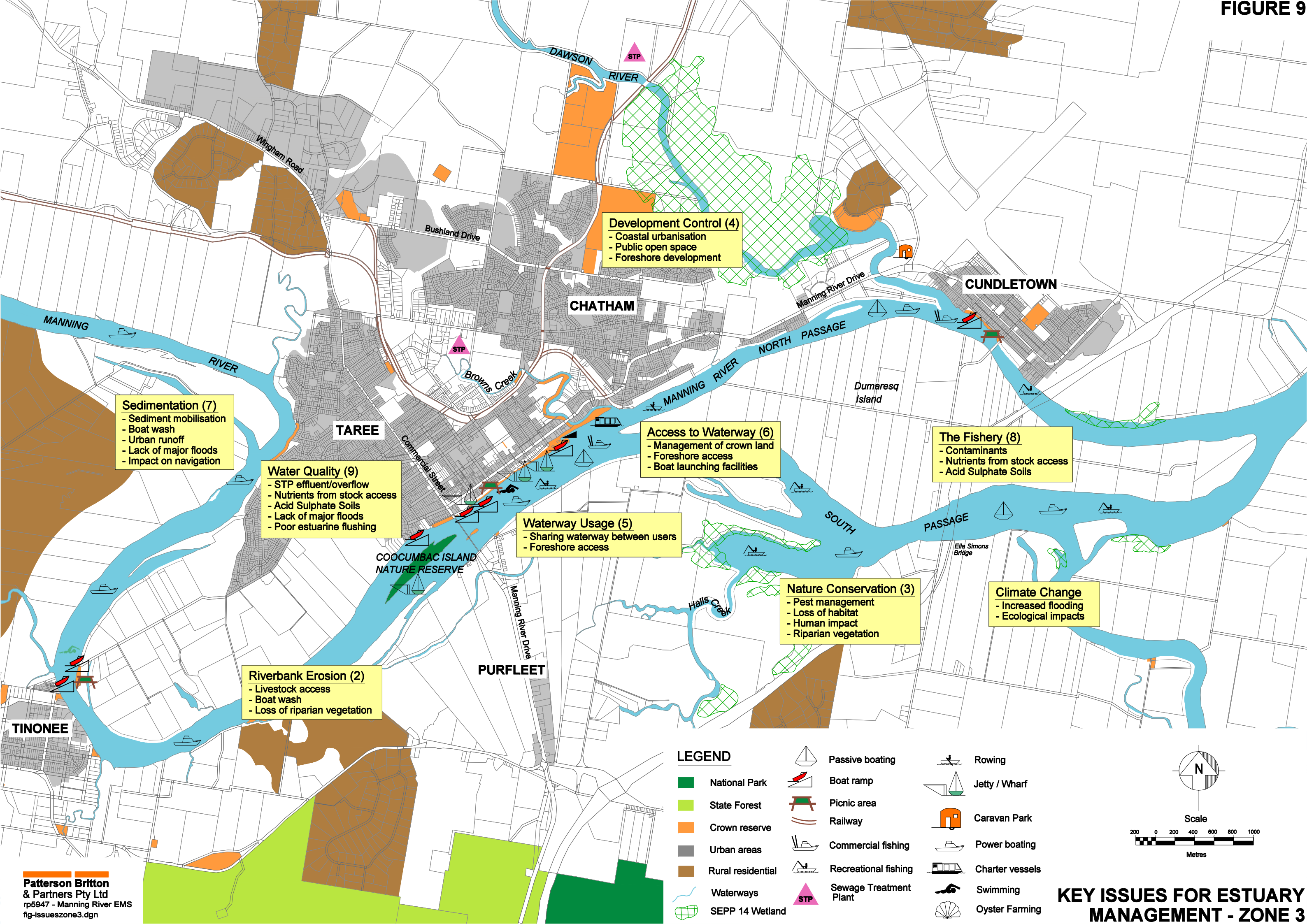
**Access to Waterway (6)**  
 - Management of crown land  
 - Foreshore access  
 - Boat launching facilities

**Nature Conservation (3)**  
 - Pest management  
 - Loss of habitat  
 - Human impact  
 - Riparian vegetation

**Climate Change**  
 - Sea level rise  
 - Increased flooding  
 - Ecological impacts







**Sedimentation (7)**  
 - Sediment mobilisation  
 - Boat wash  
 - Urban runoff  
 - Lack of major floods  
 - Impact on navigation

**Water Quality (9)**  
 - STP effluent/overflow  
 - Nutrients from stock access  
 - Acid Sulphate Soils  
 - Lack of major floods  
 - Poor estuarine flushing

**Riverbank Erosion (2)**  
 - Livestock access  
 - Boat wash  
 - Loss of riparian vegetation

**Development Control (4)**  
 - Coastal urbanisation  
 - Public open space  
 - Foreshore development

**Access to Waterway (6)**  
 - Management of crown land  
 - Foreshore access  
 - Boat launching facilities

**Waterway Usage (5)**  
 - Sharing waterway between users  
 - Foreshore access

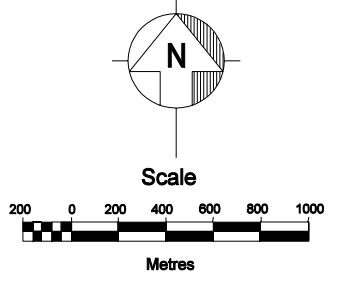
**Nature Conservation (3)**  
 - Pest management  
 - Loss of habitat  
 - Human impact  
 - Riparian vegetation

**The Fishery (8)**  
 - Contaminants  
 - Nutrients from stock access  
 - Acid Sulphate Soils

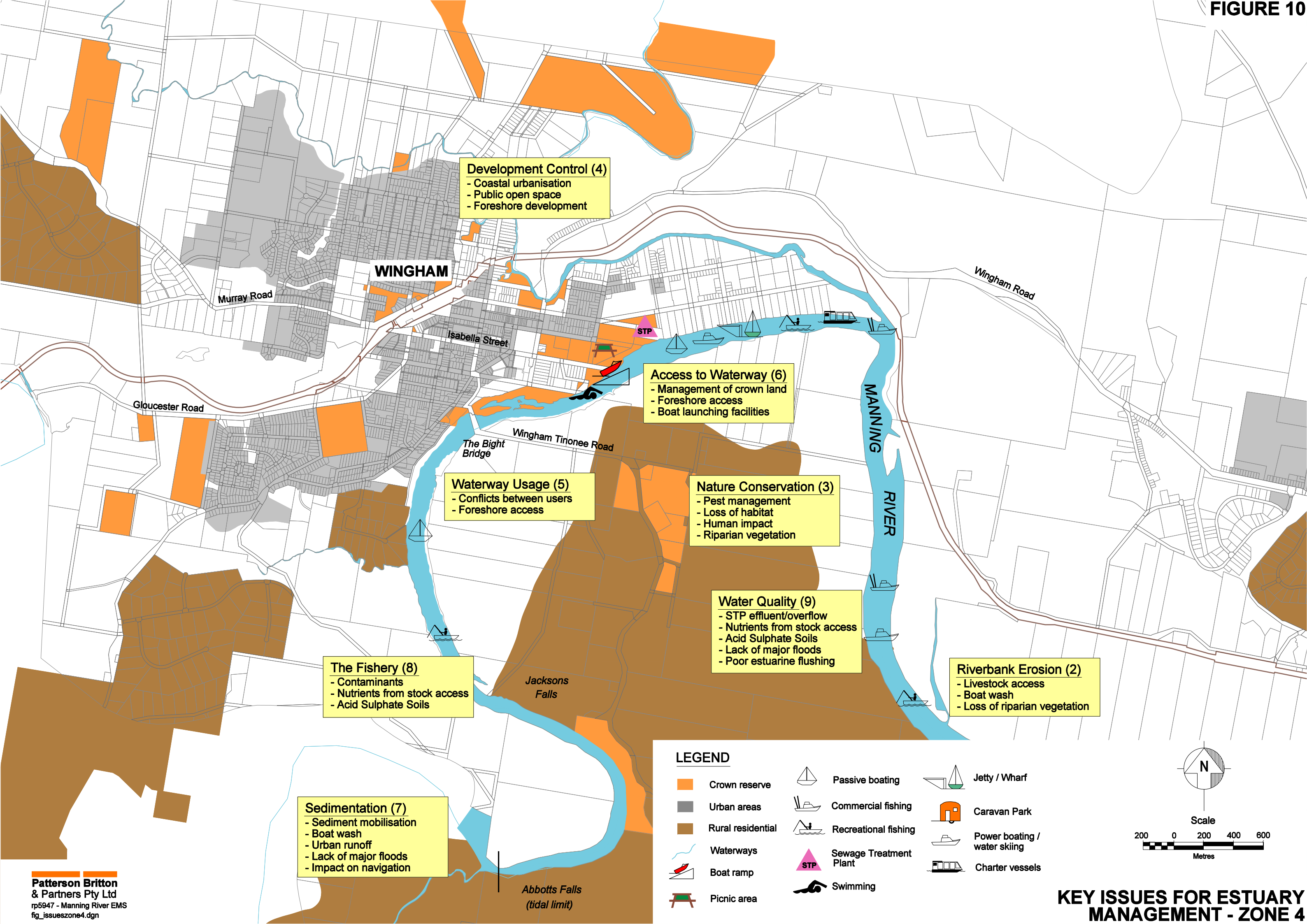
**Climate Change**  
 - Increased flooding  
 - Ecological impacts

**LEGEND**

- |                   |                        |                 |
|-------------------|------------------------|-----------------|
| National Park     | Passive boating        | Rowing          |
| State Forest      | Boat ramp              | Jetty / Wharf   |
| Crown reserve     | Picnic area            | Caravan Park    |
| Urban areas       | Railway                | Power boating   |
| Rural residential | Commercial fishing     | Charter vessels |
| Waterways         | Recreational fishing   | Swimming        |
| SEPP 14 Wetland   | Sewage Treatment Plant | Oyster Farming  |







**Development Control (4)**  
 - Coastal urbanisation  
 - Public open space  
 - Foreshore development

**WINGHAM**

**Access to Waterway (6)**  
 - Management of crown land  
 - Foreshore access  
 - Boat launching facilities

**Waterway Usage (5)**  
 - Conflicts between users  
 - Foreshore access

**Nature Conservation (3)**  
 - Pest management  
 - Loss of habitat  
 - Human impact  
 - Riparian vegetation

**Water Quality (9)**  
 - STP effluent/overflow  
 - Nutrients from stock access  
 - Acid Sulphate Soils  
 - Lack of major floods  
 - Poor estuarine flushing

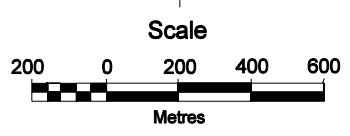
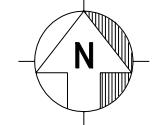
**Riverbank Erosion (2)**  
 - Livestock access  
 - Boat wash  
 - Loss of riparian vegetation

**The Fishery (8)**  
 - Contaminants  
 - Nutrients from stock access  
 - Acid Sulphate Soils

**Sedimentation (7)**  
 - Sediment mobilisation  
 - Boat wash  
 - Urban runoff  
 - Lack of major floods  
 - Impact on navigation

**LEGEND**

- Crown reserve
- Urban areas
- Rural residential
- Waterways
- Boat ramp
- Picnic area
- STP
- Swimming
- Passive boating
- Commercial fishing
- Recreational fishing
- Sewage Treatment Plant
- Jetty / Wharf
- Caravan Park
- Power boating / water skiing
- Charter vessels



**Table 3 ADOPTED RANKING FOR KEY ISSUES**

KEY ISSUES	RANKING
<b>OCEAN ENTRANCE CONDITIONS</b> – Excessive shoaling due to the absence of major flooding in recent times – Restricted navigability and estuary flushing	1
<b>RIVERBANK EROSION</b> – Clearing of riparian vegetation – Bank collapse due to current scour, boat wash or stock access	2
<b>NATURE CONSERVATION</b> – Preservation and expansion of significant natural habitat, including the riparian zone – Preservation and expansion of foreshore mangrove, reed and seagrass areas	3
<b>DEVELOPMENT CONTROLS</b> – Coastal urbanisation – Public open space – Foreshore development	4
<b>WATERWAY USAGE</b> – Conflicts between users	5
<b>ACCESS TO THE WATERWAY</b> – Foreshore access – Unrestricted boat launching – Shoaling at existing boat ramps	6
<b>SEDIMENTATION</b> – Shallowing of rivers and creeks – Natural build up of marine sand in lower estuary entrance areas – Sediment mobilisation in the upper catchment – Lack of recent flooding	7
<b>THE FISHERY</b> – Fish stocks – Acid leachates in Lansdowne River and Cattai Creek – Faecal contamination in Browns Creek and Dawson River – Aquaculture	8
<b>WATER QUALITY</b> – Sewage effluent inflows/STPs – Nutrients from stock access and urban runoff – Acid Sulphate Soils. – Poor estuary flushing	9
<b>CLIMATE CHANGE</b> – potential impacts of sea level rise and changes to catchment hydrology	

## 4.2 CONFLICTS OF ESTUARY USE

The estuary waterways and associated catchment areas are valued for their passive and active recreational uses as well as their ecological and economic value. Due to the variability in the range of these activities there are often conflicts of use on the waterway and within the immediate estuarine catchment.

### 4.2.1 Waterway Conflicts

Waterway conflicts can occur between parties involved with the following estuary uses:

- power boating vs oyster farmers (*impact of boat wake*);
- power boating vs passive recreation (*non-motorised craft, fishing, swimming*);
- power boating vs landholders;
- overcrowding of passive recreation; and,
- recreational fishing vs commercial fishing.

During holiday periods, the increased number of waterway users can result in overcrowding of the waterway and cause conflicts between users. For example, some tourists that operate power boats can affect other passive recreational users.

### 4.2.2 Power Boating

There are several formalised facilities for boat usage on the Manning River, including boat launching ramps at Taree, Wingham, Cundletown, Old Bar and Harrington.

#### Impact on Oyster Growing

The disturbance caused by boats has the potential to impact on the oyster industry of the Manning River. In particular, the wake from large power boats can reduce the productivity of oyster farms.

Notwithstanding, the extent of oysters farms can impact on boating, in terms of limiting the movement of power boats, particularly in the lower estuary. In this manner, the impact of boating on oyster farming and the resulting conflict between estuary users can be reduced.

#### Safety of Other Recreational Waterway Users

It can be the view of many community members that water skiing and power boating activities present a safety hazard to other users of the river. Other uses include non-motorised boating such as kayaking and rowing, as well as swimming. The noise associated with the power boating can also be seen as a nuisance by residents.

#### Water Quality and Aquatic Vegetation

Fuel, lubricant and anti-fouling agents from power boats have the potential to pollute the estuary. In addition, turbidity caused by motors and anchor chains can smother and / or damage seagrass beds.

## Bank Erosion

The waves generated by power boat wake are commonly considered to have an impact on the rate of erosion of natural river banks. In particular, wake-boarding activities have been shown to exacerbate bank erosion. The power boats used for wake-boarding are weighted so that the boat lies low in the water. This produces increased boat wake, which is used by wake-boarders to perform stunts. The resulting increased wave height and power of the boat wake is considered to be responsible for increased bank erosion.

### 4.2.3 Passive Recreation

It is not uncommon for there to be a large number of recreational users on the waterway at the same time, particularly in the vicinity of Taree. Regular activities and events are operated by sailing clubs, rowing clubs and other users who require access to the river.

These users sometimes find themselves competing for space on the estuary, which can culminate in conflict. It is understood that similar issues exist on the waterways around the township of Wingham.

### 4.2.4 Fish Stocks

Fishing is a popular recreational activity in the Manning River Estuary (*refer Figures 3 to 6*). Council has previously undertaken studies to gather data on fishing effort (*GTCC, 2002*). This has included recording of the number of fishers on the estuary and also the number of cormorants that live and fish along the river..

A Recreational Fishing Haven was declared for the Manning River in 2003. The extent of the haven is shown in **Plate 2**. The haven is one of 30 havens located along the NSW coast.

Commercial fishing operations are prohibited within the recreational fishing haven, which extends downstream from Ghinni Ghinni Creek on the North Passage and downstream from Berady Creek on the South Channel, including Scotts Creek.

Despite this arrangement, there is a need to better understand the importance of the estuary as a fish habitat. Fish stocks and recreational and commercial catches should be investigated and monitored in close collaboration with the local NSW Fisheries Conservation Manager, commercial fishers, and representatives of the recreational fishing groups.

### Manning River Recreational Fishing Haven Map

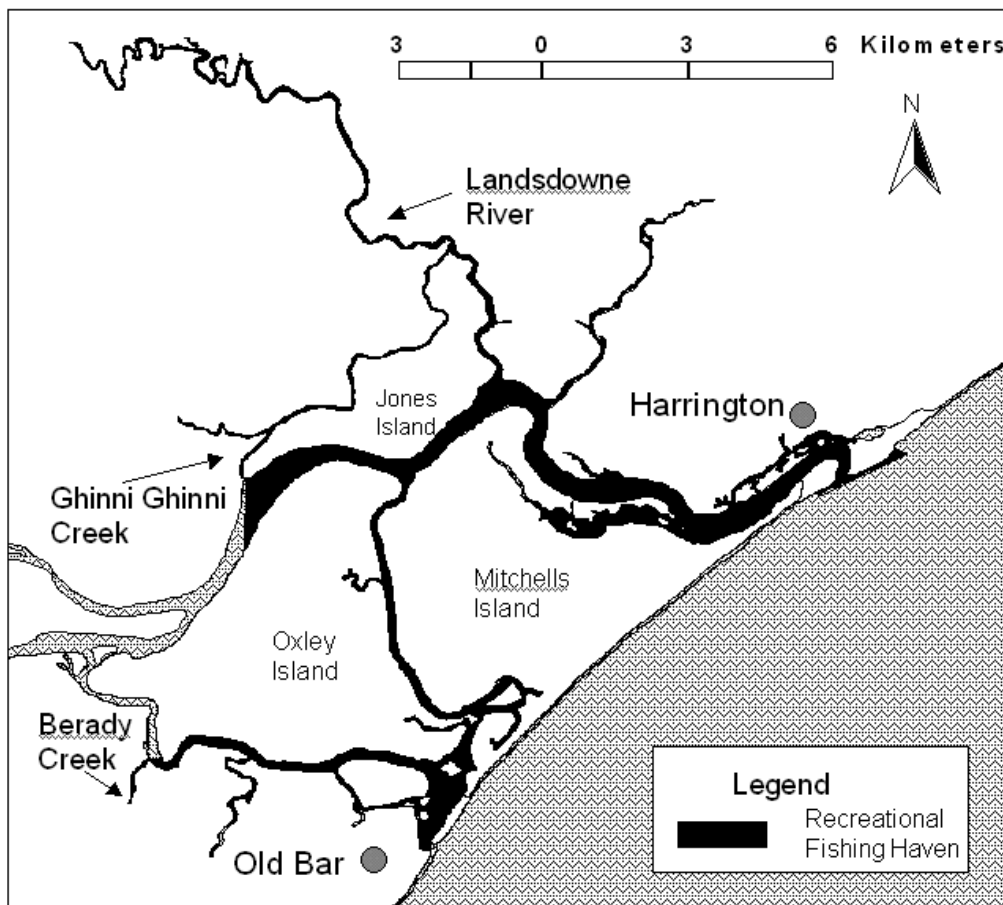


Plate 2: The Manning River Recreational Fishing Haven

#### 4.3 IMPACTS OF HUMAN ACTIVITIES ON KEY ESTUARY PROCESSES

In addition to the conflicts between estuary uses that are outlined above, there is also concern regarding the overall impact of human activities on the environmental health of the estuary.

Urban areas within the Manning River catchment are primarily located adjacent to the estuary. As is the case with many estuaries on the coast of NSW, human activities are having a negative impact on key estuary processes. The critical activities that are having or have had adverse impacts on the estuary include:

- non-point source discharges from urban and rural areas;
- point source discharges, such as can occur from the Sewage Treatment Plants located at Taree, Wingham, Harrington and on the Dawson River;
- clearing of catchment and riparian vegetation;
- urban and rural development;
- commercial and recreational fishing;
- waterway structures such as weirs, rock protection works and training walls; and,
- climate change.

### 4.3.1 Urban Stormwater Management

Significant urbanisation in the townships of Taree, Wingham, Harrington, Old Bar, which are located adjacent to the estuary, has resulted in the creation of large areas of impervious surfaces (*e.g., roads and the roofs of buildings*) which decrease rainfall infiltration, increase runoff volumes and accelerate overland flow velocities.

Stormwater runoff from urban areas has the potential to cause a range of direct and indirect impacts on human health and safety and the aquatic environment. The potential impacts on aquatic ecosystems are currently not well known but may include:

- increased frequency of disturbance, which is likely to reduce the diversity of macroinvertebrates and favour more resilient species;
- hindering the drift of macroinvertebrates through the water column and substrate by reducing the inter-flood period, possibly hindering recolonisation; and,
- disrupting spawning cycles for some native fish species which are often triggered by seasonal floods (*EPA, 1996*).

Stormwater from the catchment may contain a range of pollutants which ultimately end up in the waterways. Pollutants may include garbage, nutrients, trace metals, oil and grease. Nutrients in stormwater may be derived from garden fertilisers, animal feedlots, construction activities, animal waste and washing powders.

Previous water quality monitoring activities at the Manning River have been undertaken by several different organisations to various levels of accuracy for a range of projects. These activities include:

- sampling and analysis through the Waterwatch program, which is typically undertaken by school students and community groups;
- water quality monitoring activities by Council that are targeted towards the assessment of Gross Pollutant Traps (*GPTs*) and for lagoons at Manning Point and Farquhar Park; and,
- water quality monitoring by MidCoast Water at 15 sites, which spans 18 years.

A Water Quality Partnership has recently been established. The partnership includes representatives from Council, MidCoast Water, Hunter-Central Rivers CMA, Gloucester Council, Great Lakes Council and the DECC. The current objective of the partnership is to compile a water quality database of all previous water quality monitoring results, including data collected by the oyster industry.

### 4.3.2 Wastewater Management

As discussed above, Sewage Treatment Plants are in operation at Taree, Wingham, Dawson and Harrington (*refer Figures 7 to 10*). The STPs discharge tertiary treated wastewater into the Manning River, Browns Creek and the Dawson River.

Although discharges are suitably treated, the pathogens associated with faecal contamination have the potential to kill aquatic organisms and therefore impact heavily on

aquatic ecosystems. Oysters may be affected by faecal contamination which also presents a risk to human health. Blue-green algal blooms are attributable to nutrient loading and faecal contamination.

#### **4.3.3 Agriculture and Forestry**

Maintenance of riparian vegetation along the estuary foreshore is important for the preservation valuable habitat for terrestrial and aquatic wildlife. Riparian vegetation also benefits the water quality of the estuary through natural mechanisms that treat stormwater runoff before it enters the waterway.

Large areas of land along the Manning River Estuary have been cleared for agricultural purposes. The reduction in vegetated areas adjacent to the waterways may result in degradation of creek / river banks and threaten water quality and sedimentary processes. Without careful management, clearing of vegetation adjacent to waterways for rural pastures removes stabilising vegetation from the banks resulting in bank erosion and increasing sediment loads to the estuary.

In addition, trampling of bank by livestock causes severe degradation of riverbanks accelerating erosion and increasing sediment loads to the waterways. Livestock access to the waterway may also impact on water quality processes due to the potential for increased discharge of nutrient to the creeks, resulting in a decline in water quality.

#### **4.3.4 Development Pressures**

The Greater Taree Draft Conservation and Development Strategy (*GTCC, 2005*) contains predictions for population growth in the Greater Taree LGA.

The population of the area is expected to grow by at least 7,000 by 2020. However, there is potential for growth to be up to more than 25,000 by this time. Assuming the higher estimate, the total number of dwellings within the LGA could grow to almost 35,000 by 2020.

As discussed, urban and rural development has the potential to cause an increase in nutrient loading and other pollutants to the estuary from sewage effluent, wet weather sewer overflows and stormwater runoff. Turbidity and litter can also become a problem.

Development adjacent to waterways, such as at Taree, Harrington, Cundletown and Tinonee, the construction of breakwaters and training walls, has resulted in the loss of critical riparian and wetland habitats, and the ecological value that they attribute to the estuary.

#### **4.3.5 Commercial and Recreational Fishing**

As discussed, fishing is a popular activity on the Manning River. Both commercial operators and recreational fishers can impact on the level of fish stocks in the estuary, particularly if juvenile fish are inadvertently caught and taken during fishing activities.



Fishing activities can also have other environmental impacts within the estuary. Ecologically valuable seagrass beds are susceptible to damage by the hauling nets used by commercial operators.

Bait collecting activities across the sandflats and foreshore of the estuary can impact on populations of invertebrate species, which are prey for fish, migratory birds and resident water birds.

#### **4.3.6 Acid Sulphate Soils**

Acid sulphate soils (ASS) and the associated acidic runoff that discharges to the estuary from areas of exposed acid sulphate soils, is a significant management issue for the Manning River Estuary. Land clearing and drainage for agricultural and urban land-uses has led to the exposure and oxidation of these soils at a number of sites within the Manning River floodplain.

In particular, acid sulphate soil “hotspots” exist at Cattai-Pipeclay, Lower Lansdowne – Moto – Ghinni Ghinni Creek, Dickensons Creek, Cattair Creek and North Oxley Island. These areas have been identified in the report, ‘*Acid Sulfate Soil Priority Management Areas in the Lower Manning Floodplain*’ (Tulau 1999).

As development and clearing for agriculture continues along the shores of the estuary, there is likely to be an increase in the incidence of acid sulphate soils unless appropriate management measures and development controls are implemented. The priority areas identified in Tulau’s report (1999) are areas where land management decisions have contributed to and lead to further severe soil acidification, poor water quality, reduction in agricultural productivity and capability, loss of estuarine habitat and/or degraded vegetation and wildlife.

#### **4.3.7 Waterway Structures**

Man-made waterway structures can impact on estuary processes in a variety of ways, including modification to estuarine hydrodynamics, impacts to water quality, the passage of aquatic fauna and the movement of sediment.

The installation of man-made drains and floodgates within the floodplain can impact on water quality and is directly linked to the potential for acidic discharges to the estuary that are associated with runoff from areas of acid sulphate soils.

It is understood that Greater Taree City Council is compiling an inventory of floodgate structures and drains with the assistance of NSW DPI Fisheries and the Hunter-Central Rivers Catchment Management Authority (*H-CR CMA*). This work is part of an ongoing program by Council to address the issue of acid sulphate soils. The program is targeted towards the remediation of man-made drainage channels to reinstate the natural conditions, such as wetland systems. Voluntary purchase of land encompassing areas of ASS and the location of drains has also been considered as part of rehabilitation works.

Construction of the entrance training wall at Harrington and the rock protection walls upstream from the entrance has lead to increased scour and sediment transport during

floods and from regular tidal currents along the base of the man-made structures. Sediment is transported to areas of lower energy where extensive shoals can form.

Foreshore structures, such as jetties and retaining walls have the potential to exacerbate localised bank erosion. Several informal structures are located along the foreshore at Manning Point. The high number of structures can also lead to conflict between estuary users.

#### 4.3.8 Climate Change

##### Background

Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (*typically decades or longer*). It may be due to natural internal processes or external influences, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

However, not all changes in climate are due to natural processes. Through a range of activities since the industrial era of the mid-19<sup>th</sup> century, such as accelerated use of fossil fuels and broadscale deforestation and land use changes, humans have also contributed to an enhancement of the natural greenhouse effect. This enhanced greenhouse effect results from an increase in the atmospheric concentrations of the so-called greenhouse gases, such as carbon dioxide and methane. The Greenhouse Effect is widely believed to be responsible for the observed increase in global mean temperatures during the course of the 20<sup>th</sup> Century.

Greenhouse gases effectively absorb infrared radiation emitted by the earth's surface, by the atmosphere itself due to the same gases, and by clouds. Atmospheric radiation is emitted to all sides, including downward to the earth's surface. Thus greenhouse gases 'trap' heat within the surface-atmosphere and thereby lead to global warming.

Global warming has the potential to cause sea level rise and to alter rainfall and storm intensity. The potential for global warming to increase average ocean levels is regularly assessed by the Intergovernmental Panel on Climate Change (*IPCC*). Predictions have been made since the late 1980s. Current projections of global average sea level rise from 1990 to 2100 lie in the range of 0.09 to 0.88 metres (*National Committee on Coastal and Ocean Engineering, 2004*).

The available literature indicates a predicted increase in the range of 0.03 to 0.25 metres by 2040 (*0.075 to 0.15 metres in the median band*), and 0.09 to 0.88 metres by 2100 (*0.3 to 0.5 metres in the median band*). This of course will vary depending on location along the coastline.

Accordingly, in considering coastal or estuarine development, it is appropriate to allow for a median value increase of 0.2 metres over a 50 year timeframe and 0.5 metres over a 100 year timeframe. The latter corresponds to the upper bound of the median band specified by the IPCC and is therefore considered to be a conservative estimate of the predicted sea level rise.

### Potential Impacts on the Natural Environment

Natural systems are likely to have difficulty in adapting to climate change and its associated impacts. Sea level rise is considered to be a major consequence of climate change and is particularly relevant for coastal environments.

But there are additional concerns related to changes in weather and rainfall patterns, such as altered environmental flows, changes to the frequency and severity of flood events, increased storm intensity, periods of drought, changes in sedimentary processes and changes in estuarine biochemistry and the related impact on aquatic fauna and flora.

Sea level rise caused by climate change can have the following impacts on natural estuarine systems:

- forced landward migration of saltmarsh and mangrove communities, the pathway for which can be inhibited by physical impediments (*either natural or manmade*);
- reduction in width of the riparian zone and associated loss of wildlife habitat;
- increased salinity penetration to the upper estuary and associated impacts on estuarine biochemical processes, which can be exacerbated by extended periods of drought and altered catchment hydrology also caused by climate change; and,
- changes in the location and severity of bank erosion, which can also be influenced by changes in tidal current scour and flood scour resulting from climate change.

Wetlands that are already under threat from urban development, pollution and drainage may become more vulnerable with sea level rise and changes to salinity levels.

### Potential Impacts on Human Settlements

The primary concern is that coastal foreshore and floodplain development would increasingly become threatened by inundation as a consequence of sea level rise due to global warming. In addition, altered weather patterns may intensify storms and increase the severity of storm surge and catchment flooding.

Sea level rise may also affect the operation of stormwater infrastructure and the drainage efficiency of low lying agricultural lands.

## 5 LAND USE & WATERWAY PLANNING

---

### 5.1 HISTORICAL LAND USE DEVELOPMENT

John Oxley and George Evans first visited the Manning Valley in 1819. After travelling to the mouth of the Hastings and naming it Port Macquarie, they proceeded south to Camden Haven and to the northern mouth of the Manning at Harrington. At this time they did not realise it was a large river and named it Harrington Inlet (*Manning Valley Historical Society webpage*). Similarly, as they travelled further south, they reached the Old Bar Entrance, which they named Farquhar's Lake.

In 1827, the first sugar cane, maize and tobacco were planted by John Guilding on the Manning at Ghinni Ghinni. He was granted an estate which he called "Mooto" (*now called Moto*). William Wynter was granted land on the northern side of the Manning in 1829, which he named "Taree". By 1833 the Australian Agricultural Company had established a land grant on the Manning. Both sea and river travel by boat played an important role in European settlement of the Manning Valley.

In 1844 the village of Wingham was proclaimed and by 1854 a number of lots were sold to private owners. The first township settlement was "Bungay" as a farm settlement in the 1840s. Wingham and Tinonee were established in the 1850s as government towns, their function being river ports for the cedar trade.

In the 1850s, the river was the main transport artery. There was also a link road to Port Macquarie in the early days, crossing the Dawson River at what is now Kate Kelly's Crossing in Yarrat State Forest. Chatham was the first private town, the nucleus of what is now Taree. The railway first reached Taree in 1913, heralding a long period of strong commercial expansion.















Until 1940 the Pacific Highway passed through Gloucester and Tinonee on the way to Taree, with a ferry crossing at Tinonee to reach Taree Estate. In 1940 the Martin Bridge was built, allowing easy passage to Taree from the south. With easier access, the Manning Valley saw consistently strong growth to the present day (*GTCC website*).

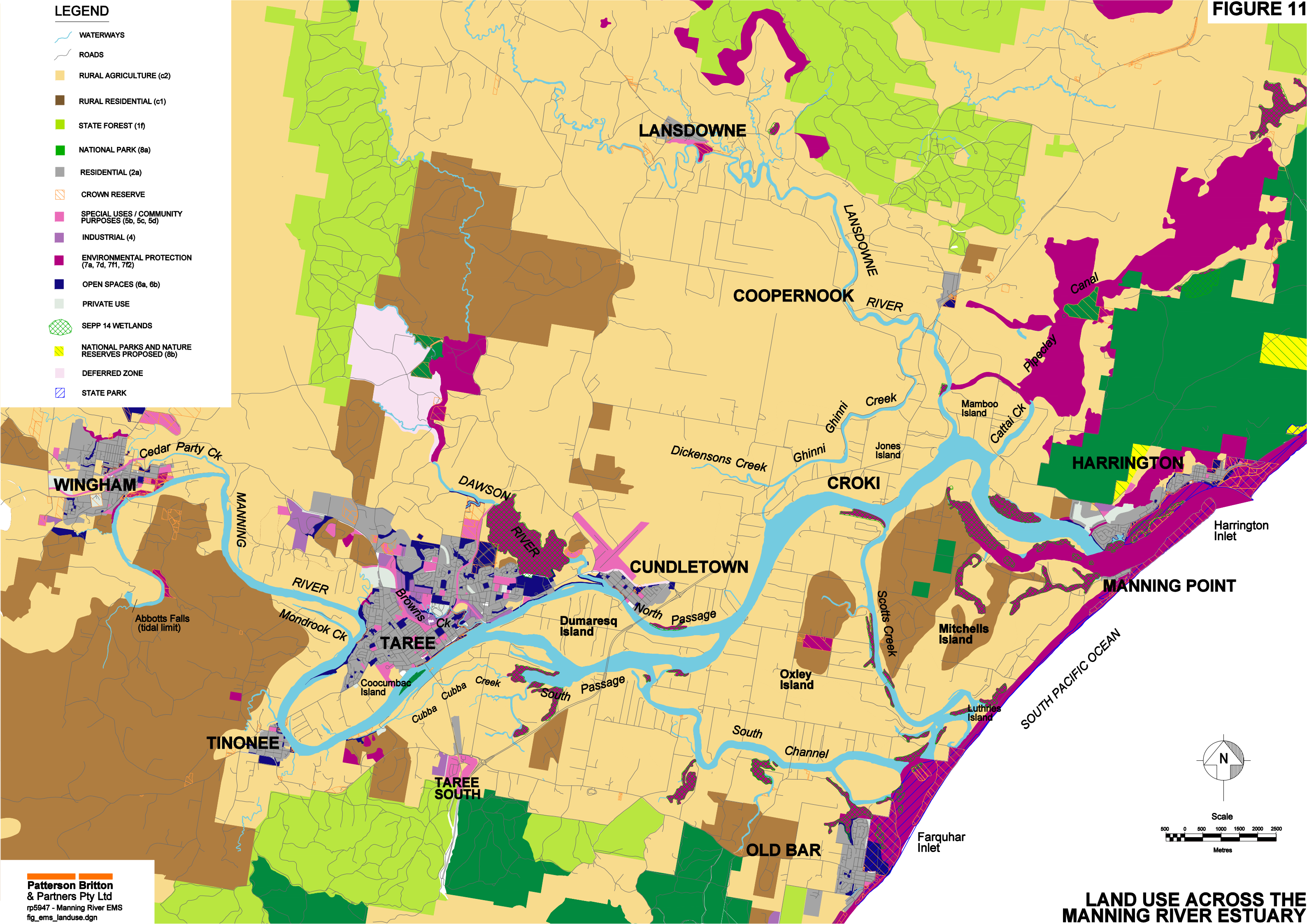
Land use within the Manning River catchment includes intensive cropping, dairy farming, beef cattle, forestry, aquaculture (*in the lower reaches of the Manning*), urban areas, sand and gravel extraction, national parks and nature reserves (*PWD 1990*).

### 5.2 CURRENT LAND USE

Land use mapping for the Manning River and its tributaries is provided in **Figure 11**. Aside from considerable areas of National Park, State Forest and State Park, a majority of the study area is classified as rural agriculture (c2) or rural residential (c1).

LEGEND

-  WATERWAYS
-  ROADS
-  RURAL AGRICULTURE (c2)
-  RURAL RESIDENTIAL (c1)
-  STATE FOREST (1f)
-  NATIONAL PARK (8a)
-  RESIDENTIAL (2a)
-  CROWN RESERVE
-  SPECIAL USES / COMMUNITY PURPOSES (5b, 5c, 5d)
-  INDUSTRIAL (4)
-  ENVIRONMENTAL PROTECTION (7a, 7d, 7f1, 7f2)
-  OPEN SPACES (6a, 6b)
-  PRIVATE USE
-  SEPP 14 WETLANDS
-  NATIONAL PARKS AND NATURE RESERVES PROPOSED (8b)
-  DEFERRED ZONE
-  STATE PARK



Urban residential areas along the foreshore of the Manning River and tributaries include Taree, Manning Point, Coopernook, Lansdowne, Old Bar, Cundletown, Wingham, Harrington and Tinonee.

Most of the land that is zoned for rural / agricultural purposes has been cleared of native vegetation. However, according to recent aerial photography, some rural areas still remain well vegetated. These include areas on Mitchells Island and Oxley Island and areas west of Coopernook, north-east of Taree and west of Old Bar. However, it should be noted that little of the foreshore areas remain well vegetated.

As shown in **Figure 11**, there are significant areas zoned for “Environmental Protection”. These areas can be further broken down into environmental protection for:

- Environmental Protection Habitat (*Zone 7a*);
- Environmental Protection Scenic (*Zone 7d*);
- Environmental Protection Coastal Lands (*Zone 7f1*); and,
- Environmental Protection Coastal Lands Acquisition (*Zone 7f2*).

As shown in **Figure 11**, the areas identified as SEPP 14 Wetlands are generally well covered by Environmental Protection zoning in the existing land use mapping.

### 5.3 PROPOSED FUTURE LAND USE

In order to cater for future population growth, the *Greater Taree Draft Conservation and Development Strategy (GTCC, 2005)* considers three options for urban growth within the Greater Taree area:

- Option 1 – growth of all existing settlements, including Harrington and Old Bar and the linking of urban areas at Taree and Wingham;
- Option 2 – growth of existing coastal settlements, including Harrington and Old Bar; and,
- Option 3 – limited expansion of Harrington and Old Bar in addition to a new urban area at Brimbin.

Based on strategic growth strategies and consideration of constraints to future development, such as floodprone land, topography, lack of services, native vegetation, heritage value and proximity to waterways, Greater Taree City Council has identified the following areas within the catchment of the Manning River for future urban growth:

- |                           |              |
|---------------------------|--------------|
| ▪ Taree                   | ▪ Lansdowne  |
| ▪ Wingham                 | ▪ Coopernook |
| ▪ Old Bar / Wallabi Point | ▪ Brimbin    |
| ▪ Harrington              | ▪ Cundletown |
| ▪ South Tinonee           |              |

The *Draft Conservation and Development Strategy (GTCC, 2005)* provides an assessment of growth and conservation requirements and identifies those areas appropriate for future land use changes / development. Sensitive environment areas would require detailed assessment of

characteristics and consideration of other legislation prior to any future development. It is important to note that future development may impact on the waterways and potential impacts should be considered in any development assessment

For example, an assessment for clearing of vegetated land for urban development, industrial development or rural pasture should assess sediment loads to the waterway, which could adversely impact on aquatic habitats such as seagrass beds. Increased deposition of sediment in the waterways may also compound navigation problems in the lower estuary near the river entrances.

Runoff from urban areas often carries pollutants due to fertilisers from these sources applied to gardens, detergents used to wash cars, and oil and grit from roads. Water quality processes may also be threatened by increased urban development in the catchment due to increased urban runoff and stormwater reaching the waterways. In particular, increased nutrient loads from these sources can cause a decline in water quality resulting in algal blooms.

### **5.3.1 Future Land Use in the Vicinity of Taree**

Future land use on the northern limit of Taree includes two urban expansion areas and a back-zoning area (*GTCC, 2005*).

Urban expansion is proposed for a large parcel of land adjacent to Kanangra Drive that is currently zone as Rural Agriculture. Urban expansion is also proposed for a smaller area west of Kolodong Road.

It is considered that the proposed urban expansion area west of Kolodong Road will not present a significant threat to the natural estuary processes of the Manning River. According to recent aerial photography, it is apparent that minimal native vegetation will be removed as part of development of this section of land. However, any further expansion to the west in the future should be considered carefully due to the proximity of the land to the Manning River.

The proposed urban expansion at Kanangra Drive is also expected to have a minimal impact in terms of removal of native vegetation. However, the proposed expansion area is located within 300 metres of a tributary of the Dawson River. It will likely result in an increased proportion of impervious areas, and therefore an increased rate of stormwater runoff and stormwater volume that will discharge to the Dawson River and in turn to the Manning River.

The stormwater management system for this area should incorporate appropriate methods to address the expected increase in stormwater runoff as a result of development. It should also cater for an increase in the load of nutrients and gross pollutants that are associated with residential development.

In the *Draft Conservation and Development Strategy* it is also proposed that the existing industrial area at Taree South is expanded to include additional land to the north and south of Bucketts Way (*GTCC, 2005*). Light industrial development is likely to result in increased stormwater runoff and potential pollutants to Cubba Cubba Creek, which is located within 1 kilometre of the expansion area. Specific stormwater management



systems for industrial development will be required and should be installed as part of the future expansion.

It is likely that some existing vegetation will need to be removed as part of the expansion, both to the north and south of Bucketts Way. Though not a critical link as a wildlife corridor, the area does fringe the strip of vegetation that links State Forest and National Park in the south to wetland areas adjacent to South Passage along the alignment of the Pacific Highway upgrade. Accordingly, an appropriate assessment of the impact of vegetation removal should be undertaken.

### **5.3.2 Future Land Use at Wingham**

Three areas have been recommended for urban expansion at Wingham, to be converted from existing Rural Agricultural land (*GTCC, 2005*).

A significant area is to be expanded to the north of Wingham Road at the eastern approach to the town. This area comes to within 200 metres of Cedar Party Creek and therefore the potential impacts of increased runoff and potential for pollutant loading should be considered in the design of a stormwater management system for this area.

The other two areas of urban expansion are located to the north of Murray Road to the west of the town. One area borders the edge of a small tributary that drains to Cedar Party Creek. Measures will be required to ensure that development does not occur within the riparian zone of the creek and that the existing strip of riparian vegetation is not damaged during and after any construction works. Appropriate management of the resultant urban runoff is also required.

### **5.3.3 Future Land Use at Harrington**

The *Draft Conservation and Development Strategy* also proposes that existing Rural Agriculture areas on the northern fringe of Harrington be rezoned for urban expansion.

The areas are located to the west of Scott Street and Shearwater Crescent. It should be noted that these expansion areas lie immediately adjacent to areas of Environment Protection zone. Significant vegetation removal is required for both areas and therefore the associated impact on wildlife movement and potentially water quality should be investigated.

The expansion area adjacent to Shearwater Crescent will front an existing inlet that is linked to the Harrington Back Channel. Development of urban lots should therefore make allowance for connection of riparian vegetation to the waterway so that access by wildlife is not affected.

### **5.3.4 Future Land Use at Old Bar / Wallabi Point**

A considerable area of land is proposed for urban expansion to the west and south of Old Bar in the *Draft Conservation and Development Strategy* (*GTCC, 2005*).



Of most concern is the northern limits of the expansion area, which may border and even overlap with existing SEPP 14 Wetlands and Environment Protection zones. Wetland areas must be avoided and sufficient riparian buffer zones incorporated into any future subdivisions.

A significant area for expansion between Old Bar and Wallabi Point borders a section of Environment Protection zone along the coast and therefore the impact on coastal dunes and habitat should be considered.

### **5.3.5 Future Land Use at Lansdowne**

Urban expansion is proposed to the north and north-west of the existing urban areas at Lansdowne (*GTCC, 2005*). This will involve development of land adjacent to a tributary of the Lansdowne River to the north of Croki Street.

Measures will be required to ensure that the riparian zone is not disturbed and that the existing strip of riparian vegetation is not damaged as a result of development. Appropriate management of increased urban runoff and potential pollutant loading is also required.

### **5.3.6 Future Land Use at Cooperook**

According to the *Draft Conservation and Development Strategy (GTCC, 2005)*, two areas of urban expansion are proposed at Cooperook. The expansion area to the west of Macquarie Street will come within about 500 metres of the Lansdowne River. Management of urban runoff from this area should therefore consider the increased volume of stormwater associated with increased impervious areas and the potential for increased sediment and pollution loading.

The expansion area to the north-east of town is likely to have less impact on estuary processes.

### **5.3.7 Future Land Use at Cundletown**

Future expansion of Cundletown will involve additional urban area and a commercial estate to the north of the existing town (*GTCC, 2005*). An area of existing vegetation is to be reserved for conservation and further investigations are required for an adjacent low-lying area. Land has also been marked for a potential bypass for Cundletown that would follow the perimeter of the new urban and investigation areas.

At its western extent, the proposed urban area is located within 200 metres of the Dawson River. It is likely that all stormwater runoff collected within the new zonings will drain to the Dawson River or the Manning River and therefore should be treated accordingly.

Alternatively, the expansion area could naturally drain to the low-lying vegetated area that is located centrally within it. If this is the case, it is possible that measures could be implemented to create an artificial wetland environment for the treatment of urban runoff, either within or adjacent to the proposed conservation zone.

### 5.3.8 Future Land Use at Tinonee

Future land use at Tinonee will involve expansion of the urban area to the west and south of the existing town along Ridge Road, Bull Hill Road and View Street. The associated impact on stormwater runoff volume and pollutant loading to the Manning River should be considered.

## 5.4 PLANNING CONTROLS

Land-use in the Manning River Estuary is controlled by a range of legislation, planning instruments and regulations, which are administered by government agencies at both the local, state and national level. A summary of the environmental and land-use legislation applicable within New South Wales is provided in **Table 4**. In addition to these Acts and Regulations, there are also State Environmental Planning Policies (*SEPPs*), regional environmental plans (*REPs*), local environmental plans (*LEPs*), development control plans (*DCPs*), and regional vegetation management plans (*RVMPs*).

**Table 4 ENVIRONMENTAL AND LAND USE LEGISLATION**

LEGISLATION	JURISDICTION WITH PRIMARY RESPONSIBILITY FOR IMPLEMENTING LEGISLATION
Catchment Management Authorities Act 2003	State
Coastal Protection Act 1979	State
Conveyancing Act 1919	State
Crown Lands Act 1989	State
Environmental Planning and Assessment Act 1979	State
Environmental Protection and Biodiversity Conservation Act 1999	Federal
Protection of the Environment and Operations Act 1997	State
Fisheries Management Act 1994	State
Heritage Act 1997	State
Local Government Act 1993	Local government
Marine Parks Act 1997	State
National Parks and Wildlife Act 1974	State
Native Vegetation Act 2003	State
Roads Act 1993	State
Rural Fires Act 1997	State and Local Government
Rural Lands Protection Act 1998	State
Soil Conservation Act 1938	State
Threatened Species Conservation Act 1995	State
Water Management Act 2000	State

These pieces of legislation grant certain powers to local government. However, they also act to either, limit the powers which may be exercised by local government under the *Environmental Planning and Assessment Act 1979*, or to impose additional requirements such as the referral of certain applications to State agencies.

The large number of potentially relevant Acts clearly indicates that the amount of regulation is extensive. On this basis, attempts to enforce Total Catchment Management (TCM) principles and objectives by using the range of legislation can prove a difficult proposition. As a consequence, mechanisms for implementation of TCM based on community participation and partnerships between local government and landowners are likely to achieve more rapid results than the enforcement of current legislation.

Notwithstanding, the extent of legislation and how it applies to the Manning River Estuary catchment needs to be understood. Accordingly, the following sections provide a brief description of the relevant legislation and planning controls, and their relevance to the managing land-use issues within the catchment.

## **5.5 RELEVANT LEGISLATION / PLANNING CONTROLS**

### **5.5.1 Link between Estuary Management and Legislation**

In recognition of the need for future sustainable use of these threatened resources, the Government has launched a number of key strategic initiatives. These include the establishment of water quality objectives for major estuaries under the water reform initiatives, and the expansion of the *NSW Coastal Policy* to include estuaries in the development of integrated sustainable management initiatives in coastal zone catchments. In addition, the management of estuarine and coastal waters has been included in the *Water Management Legislation* to protect estuary water flow, quality, and associated threatened ecosystems.

New initiatives to enable community industry and agency participation in developing solutions to local problems will be facilitated and integrated through newly formed *Catchment Management Authorities*.

Thirteen (13) Catchment Management Authorities (CMAs) have been established across the State by the NSW Government to ensure that regional communities have a significant say in how natural resources are managed in their catchments. The CMAs are statutory authorities with a responsible and accountable board. CMA boards report directly to the Minister for Climate Change and the Environment. Each CMA also has a general manager and a team of professional staff.

The CMAs are locally driven organisations that are responsible for involving regional communities in management of the natural resource management issues facing their region, and are the primary means for the delivery of funding from the NSW and Commonwealth Governments to help land managers improve and restore the natural resources of the State.

The CMAs work in partnership with the community, local government, State Government agencies, industry and individuals.

Hunter-Central Rivers CMA (*H-CR CMA*) has recently completed a Catchment Action Plan for the Hunter-Central Rivers region. Further details are included below in **Section 5.8.1**.

The Coastal Protection Act 1979 provides for the preparation of Coastal Zone Management Plans, including Estuary Management Plans and Coastline Management Plans. The Department of Environment and Climate Change (*DECC*) now administers this act and the Estuary Management Program, which supports the development of estuary management plans.

### 5.5.2 Statutory Powers

Those organisations empowered to administer the various land-use controls applicable to the Manning River Estuary are listed in **Table 5**, along with the legislation that they are responsible for administering.

**Table 5 ORGANISATIONS RESPONSIBLE FOR PLANNING CONTROLS APPLICABLE TO THE MANNING RIVER ESTUARY**

ORGANISATION	LEGISLATION
Greater Taree City Council	<ul style="list-style-type: none"> <li>▪ Environmental Planning and Assessment Act 1979</li> <li>▪ Greater Taree City Council LEP</li> <li>▪ Development Control Plans</li> </ul>
Department of Environment and Climate Change <i>(formerly DEC and now undertakes certain functions of former DNR)</i>	<ul style="list-style-type: none"> <li>▪ Coastal Protection Act 1979</li> <li>▪ Protection of the Environment Operations Act 1997</li> <li>▪ Native Vegetation Act 2003</li> <li>▪ Catchment Management Authorities Act 2003</li> <li>▪ Marine Parks Act 1997</li> <li>▪ Protection of the Environment Administration Act 1991</li> <li>▪ Environmentally Hazardous Chemicals Act, 1985</li> <li>▪ National Parks and Wildlife Act 1974</li> <li>▪ Wilderness Act 1987</li> <li>▪ Threatened Species Conservation Act, 1995</li> <li>▪ Responsibilities for a wide range of specific legislation</li> <li>▪ Soil Conservation Act 1938</li> </ul>
Department of Water and Energy <i>(divisions of former DNR and DEUS)</i>	<ul style="list-style-type: none"> <li>▪ Water Management Act 2000</li> </ul>
Department of Primary Industries	<ul style="list-style-type: none"> <li>▪ Fisheries Management Act 1994</li> </ul>
Department of Planning	<ul style="list-style-type: none"> <li>▪ Environmental Planning and Assessment Act 1979</li> <li>▪ State Environmental Planning Policies – No. 14 – Coastal Wetlands; No. 26 – Littoral Rainforests; No. 62 – Sustainable Aquaculture; No. 71 – Coastal Protection</li> <li>▪ Regional Environmental Plans</li> </ul>
Department of Lands	<ul style="list-style-type: none"> <li>▪ Crown Lands Act 1989</li> </ul>

Other organisations with activities and responsibilities that will impact upon land use include:

- Department of Commerce;
- Health Commission of NSW;
- State Rail;
- Telstra and telecommunication companies;
- Roads and Traffic Authority;
- Forestry;
- MidCoast Water;
- Electricity providers.

## 5.6 CONSOLIDATED ACTS AND NSW PLANNING CONTROLS

### 5.6.1 State Legislation

Details of the state legislation relevant to the management of Manning River Estuary are provided in **Appendix C**.

### 5.6.2 State Environment Planning Policies (SEPPs)

#### SEPP 14 - Coastal Wetlands

*State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14)* was gazetted on 12 December, 1985, with the aim of ensuring that coastal wetlands are preserved and protected in the environmental and economic interests of the State.

The policy applies to the cities, municipalities and shires with direct frontage onto the Pacific Ocean (*excluding those in the Sydney metropolitan area*), and is accompanied by a series of maps which identify the lands to which the policy applies.

Except with the consent of Council and the concurrence of the Director General, land to which this policy applies can not be cleared, drained, filled or have levees constructed on it.

#### SEPP 26 - Littoral Rainforests

*State Environmental Planning Policy No. 26 – Littoral Rainforests (SEPP 26)* commenced operation on 5 February 1988. SEPP 26 provides a level of protection to the core area of littoral rainforest and also to 100 metre buffer zones surrounding the core area. A significant feature of SEPP 26 is that, unlike other planning policies, it recognises the importance of buffer zones surrounding important ecological areas.

#### SEPP 62 – Sustainable Aquaculture

*State Environmental Planning Policy No.62 – Sustainable Aquaculture (SEPP 62)* commenced operation on 25th August 2000. SEPP 62 encourages the sustainable expansion of the industry in NSW. The policy implements the regional strategies already developed by creating a simple approach to identify and categorise aquaculture development on the basis of its potential environmental impact. The SEPP also identifies aquaculture development as a designated development only where there are potential environmental risks.

### SEPP 71 – Coastal Development

*State Environmental Planning Policy No. 71 – Coastal Development (SEPP 71)* commenced operation on 1 November 2002. It is a key element of the NSW Government's Coastal Protection Package to protect the State's beaches, headlands and other coastal features for future generations. The Policy has been made under the Environmental Planning and Assessment Act 1979 to:

- ensure that development in the NSW coastal zone is appropriate and suitably located;
- ensure that there is a consistent and strategic approach to coastal planning and management; and,
- ensure there is a clear development assessment framework for the coastal zone.

### SEPP 44 – Koala Habitat Protection

*State Environmental Planning Policy No. 44 – Koala Habitat Protection (SEPP 44)* commenced operation on 13 February 1995. SEPP 44 provides that before a council may issue consent to a development, it must be satisfied that the subject site is not 'potential koala habitat'. This is defined as areas of native vegetation where major koala food trees (*listed in Schedule 2 of SEPP 44*) constitute at least 15% of the total number of trees.

If the land is deemed to contain potential koala habitat, council must be satisfied that the subject site is not 'core koala habitat' before issuing development consent. The latter is defined as 'an area of land with a resident population of koalas, evidenced by attributes such as breeding females and recent sightings, and historical records, of a population.

### 5.6.3 NSW State Rivers and Estuaries Policy 1992

The *NSW State Rivers and Estuaries Policy*, adopted in 1992, committed the NSW government to reporting on the condition of each of the State's major river and estuary systems and the actions underway to halt degradation of these systems. The *State of the Rivers and Estuaries* reports will provide information for River Management Plans and Groundwater Management Plans and report on performance monitoring during resource security periods.

The objectives of the SoRE Reporting Program are to:

- provide an overall picture of the condition of rivers and estuaries in NSW;
- identify trends in resource degradation and improvement;
- identify critical gaps in natural resource information;
- identify management response activities and indicate their effectiveness;
- provide a mechanism for the exchange, integration and presentation of information on rivers and estuaries from a wide range of sources;
- provide a tool for local and regional decision making;
- support involvement in Total Catchment Management; and,
- provide input to State, national and international forums, policy processes and State of the Environment Reports.



The NSW Estuary Management Policy and NSW Wetlands Management Policy are policies that sit beneath the NSW State Rivers and Estuaries Policy.

### NSW Estuary Management Policy

The NSW Estuary Management Policy provides for the production of a sustainable management plan for each estuary in NSW through implementation of the estuary management process outlined above in **Section 1.2**.

### The NSW Wetlands Management Policy

In 1996 the NSW Government released *The NSW Wetlands Management Policy*. The State Catchment Management Coordinating Committee oversees the implementation of this Policy. It is the policy of the NSW Government to:

- Encourage the management of the wetlands of the State so as to halt, and where possible, reverse:
  - ⇒ loss of wetland vegetation;
  - ⇒ declining water quality;
  - ⇒ declining natural productivity;
  - ⇒ loss of biological diversity; and
  - ⇒ declining natural flood mitigation.
- Encourage projects and activities which will restore the quality of the State's wetlands, such as:
  - ⇒ rehabilitating wetlands;
  - ⇒ re-establishing areas of buffer vegetation around wetlands; and
  - ⇒ ensuring adequate water to restore wetland habitats. (*DLWC, 1996*).
- Management of wetlands is currently an ad hoc process. Typical influences on wetland management are evident from the role of government agencies, viz:
  - ⇒ 'A DEC officer decides how much industrial effluent can be discharged into a river upstream of a wetland;
  - ⇒ A DNR officer decides how much water to release from a dam or how much water can be extracted from a river upstream of a wetland;
  - ⇒ A council planner decides how a wetland should be zoned or what design or operating conditions to apply to a new development; and,
  - ⇒ A grazier decides how many head of cattle to graze in a swamp paddock.' (*DLWC, 1996*).

Legislation to establish procedural and permit requirements for activities affecting wetlands includes, but is not limited to, the *Environment Planning & Assessment Act 1979*, the *Clean Waters Act 1970*, the *Water Act 1912*, the *Crown Lands Act 1989*, the *National Parks and Wildlife Act 1974*, the *Coastal Protection Act 1979*, and the *Fisheries Management Act 1994* (*DLWC, 1996*).

### NSW Coastal Policy 1997

The *NSW Coastal Policy 1997* co-ordinates planning and management of the NSW Coastal Zone. The Policy co-ordinates various policies, programs and standards that apply at both state and local government level including the Estuary Management Policy. The goal of the Coastal Policy is to establish outcomes, and identify the specified objectives, strategic actions, and responsibility for each outcome. The Estuary Management Plan is an important tool used to meet the objectives of the Coastal Policy.

## 5.7 LOCAL PLANNING CONTROLS

### 5.7.1 Hunter Regional Environmental Plan 1989

A Regional Environmental Plan (*REP*) provides the broad regional framework and objectives which must be reflected in local planning instruments.

The REP covering the Hunter (*Hunter Regional Environmental Plan 1989*) was developed under the EP&A Act, and has specific objectives applying to environmental features. Specifically it requires local governments when developing a Local Environmental Plan (*LEP*) to observe the following objectives relating to mineral resources and extractive materials; soil, water and forest resources; pollution control; environmental hazards; natural areas and recreation.

#### Mineral Resources and Extractive Materials

**Objectives:** “to manage the coal and other mineral resources and extractive materials of the region in a co-ordinated manner so as to ensure that adverse impacts on the environment and the population likely to be affected are minimised”. Consent authorities, in considering proposals for mining or extraction (*including dredging*):

- should, in respect of extraction from river banks or channels, ensure that instability and erosion are avoided;
- should minimise any adverse effect of the proposed development on groundwater and surface water quality and flow characteristics; and,
- should have regard to any relevant Total Catchment Management strategies.

#### Soil, Water and Forest Resources

**Objectives:** “to manage the resources of the region in a co-ordinated manner so as to sustain their productivity and condition, and so as to meet community needs while ensuring that adverse impacts on the environment and the population likely to be affected are minimised”. This should be achieved in the LEP by:

- consulting with the authority responsible for water supply and water quality in that area and considering the impact the proposed development is likely to have on water quality and availability;
- providing for appropriate protective zoning in areas required by those authorities; and
- providing only for development which is compatible with maintenance of require water quality standards.

### Pollution Control

**Objectives:** “to control development so as to minimise air, noise and water pollution”. This should be achieved by ensuring that the LEP:

- permits the carrying out of any development in the catchment areas of significant waterways only after council has considered:-
  - (a) the likelihood of sedimentation or increases in nutrient level of the waterways associated with the proposed development;
  - (b) ways of mitigating any potential adverse impact, including cumulative impacts, on the water quality of the waterways; and,
  - (c) the DEC urban stormwater guidelines.

### Environmental Hazards

**Objectives:** The objectives of this plan relating to planning strategies concerning environmental hazards are to:

- minimise the effects of soil erosion and land slip;
- control developments on flood liable lands and encourage flood plain management practices which ensure maximum personal safety and appropriate land uses;
- control development so as to minimise the dangers of coastal erosion and storm damage;
- minimise the dangers of bushfires to all forms of development, especially residential development in fire prone areas; and,
- minimise the danger of mine subsidence to all forms of development.

### Natural Areas

**Objectives:** The objectives of this plan in relation to planning strategies concerning natural areas are to:

- protect natural areas of geological, ecological or scenic interest such as important forests, bushlands, wetlands, rivers, estuaries, lakes, beach and dune systems, headlands, mountain ridges and escarpments;
- strictly control any reduction in the extent of important natural areas, especially important habitats such as natural wetlands;
- protect and preserve bushland within larger urban areas because of its natural, aesthetic, recreational, educational, scientific, soil conservation and habitat values; and,
- improve the aesthetic appeal and image of the region where possible and preserve existing amenity.

This should be achieved in the LEP by:

- not altering or removing any existing environmental protection zonings, or controls within them, without undertaking a detailed analysis which confirms that there will be no adverse environmental effects from such action; and

- including rural environmental protection zones for appropriate areas as described in the “Rural Lands Evaluation Manual” of the Department dated 1981, in order to protect important wetlands, forests, water catchment areas, scenic and historic landscapes, escarpment and foreshore areas archaeological, historic, scientific sites or wildlife habitats or the like.

### Recreation

**Objectives:** The objectives of this plan in relation to planning strategies concerning recreation are:

- to ensure adequate provision of a wide range of recreation and leisure opportunities including a wide range of open space types in accordance with developing needs and capability of the land concerned;
- to encourage compatible recreation and nature conservation and other land and water uses wherever appropriate throughout the region, and in particular to improve public access to natural areas, including foreshore and waterways; and,
- to implement a regional open space program through a partnership of State and local government funding.

This should be achieved in the LEP by:

- not substantially reducing an area zoned for public open space unless this is justified having regard to the availability of appropriate alternative areas; and,
- not zoning land or enabling land to be developed for the purpose of a recreation vehicle area.

The Council’s LEP and specifically the environmental protection zones are clearly the key planning tools available for achieving environmental outcomes throughout the Manning River Estuary.

### 5.7.2 Greater Taree Local Environmental Plan (1995)

A comprehensive review of Council’s Strategic Plans and LEP 1995 is now being undertaken as Draft Local Environmental Plan 2008. This will replace the Greater Taree LEP 1995 and will apply to the entire Local Government Area.

The existing Greater Taree LEP covers all the land within the Greater Taree local government area. The LEP directs and manages development and its environmental impacts in the Greater Taree City Council area. It aims to promote sustainable development in Greater Taree by furthering the objectives of the Environmental Planning and Assessment Act 1979, particularly in regard to:

- promoting development which is environmentally sustainable and seeks to minimise use of non-renewable resources;
- providing flexibility in the development potential of the City by ensuring a wide range of land use options, while minimising conflict between incompatible land uses;
- ensuring the protection of significant environmentally sensitive areas;

- minimising risks to life and property from natural hazards, particularly bushfire and flooding, by avoiding development likely to be exposed unduly to those risks;
- providing for open space and community facilities sufficient to meet the needs of existing and future residents;
- providing for future arterial road needs;
- identifying heritage conservation areas, enable the protection of items of environmental significance and ensure the conservation of the natural, historic, architectural and aesthetic character of the land; and
- encouraging further development of tourism and recreational facilities, while minimising any adverse impact on the natural attractions and amenity enjoyed by permanent residents.

There are several zones that fall within the category “Environmental Protection”, that can strategically protect significant environmental areas within the Manning River Estuary. These significant environmental areas include Environmental Protection Habitat (Zone 7(a)); Environmental Protection Scenic (Zone 7(d)); Environmental Protection Coastal Lands (Zone 7(f1)); Environmental Protection Coastal Lands Acquisition (Zone 7(f2)). The zones prohibit development that is likely to have a detrimental effect on a significant environmental area but allow for development that would not have a detrimental effect on the area. In Zones 7(f1) and 7(f2), certain development is permissible only with the granted concurrence of the Director of Planning.

Land-use zoning for the Environmental Protection zones, as specified by the LEP, is shown in **Figure 11** (*note that particular colours used may differ from that in the LEP*).

Under the Environmental Protection Provisions of the LEP, subdivisions or dwellings within any of the environmental protection zones are prohibited unless the area of the allotment is greater than 40 hectares. Clauses 27, 28 and 29 of the LEP control agricultural or forestry development, the construction of a building or road, and the clearing, draining, excavating or filling of land adjacent to wetland areas and within all of the Environmental Protection land use zones.

Zone No. 8(a) (National Parks and Nature Reserves Existing) identifies land which is proclaimed under the National Parks and Wildlife Act 1974 and does not allow for any development within the zone. As shown in **Figure 11**, there are large areas of National Parks and Nature Reserves throughout the catchment, particularly to the north of Harrington, to the west of Old Bar and to the south of Taree.

#### Recommended Changes to the LEP

As a future recommendation, it is suggested that the clearing of land and the construction of any buildings (*such as dwellings and subdivisions*) should not be included as permissible, even with development consent, within any of the Environmental Protection Zones 7(a), 7(d), 7(f1) and 7(f2). In particular, any such development should not be allowed in those areas of land adjacent to waterways. There has already been a significant amount of land cleared throughout the catchment and the existing riparian and catchment vegetation should be retained wherever possible.

### 5.7.3 Development Control Plans and Policies

Development control plans (*DCPs*) are statutory documents formulated by Council to guide and facilitate orderly development within the entire local government area (*LGA*) or portion of the LGA as defined by the DCP. DCPs are planning instruments supplementary to the LEP. The DCPs relevant to the management of the Manning River Estuary have been extracted and are described below.

#### Greater Taree DCP 1995

The Greater Taree Development Control Plan 1995 (*Amended April 2002*) applies to all land within Greater Taree City, including all the land to which the Greater Taree LEP applies. The Greater Taree DCP has the underlying aim of promoting sensible, environmental sensitive development, rather than restricting development. To support the objectives of the Greater Taree LEP, the Plan generally aims to:

- Encourage a high standard of development that is sympathetic to the environment;
- Provide detailed requirements against which development proposals can be measured; and,
- Explain and document Council's requirements to encourage an understanding of its policies for development.

Section 4.10 of the DCP relates to effluent disposal. The Plan specifies that all development in rural locations will require a suitable system for treating sewage effluent. For on-site disposal of effluent, many types of system are permissible, provided that they comply with health and pollution standards.

Section 8 relates to heritage issues and Aboriginal heritage. The LEP provides controls for heritage items or buildings located in heritage conservation areas. The DCP provides guidelines to support these controls.

Section 9 provides development control guidelines relating to environmental hazards and sensitive lands, including flooding, wetland areas (*State Environmental Planning Policy No.14 wetland areas*), littoral rainforests, fisheries, coastal development, bushfire protection, urban and rural bushfire protection measures, water resources, soil erosion and tree clearing.

Section 10 deals with development that is inconsistent with the objectives of each zone. The DCP requires that an environmental impact report accompany a development application for inconsistent development.

It is understood that Council is currently preparing a new DCP to consolidate existing separate DCPs (*refer below*) into a single document.

#### ***Recommended Changes to the DCP***

The Greater Taree DCP does not provide any development control and guidelines for stormwater management within the LGA. The DCP should be amended such that it



provides controls and guidelines for stormwater management for development within Greater Taree. It should aim to:

- promote on-site sewage management practices;
- support a pre-development hydrological regime in surface flow, streams and groundwater;
- rainwater harvesting and on-site detention, retention and infiltration of stormwater;
- the better integration of stormwater management into new developments; and,
- ensure that on-site stormwater management facilities can be economically maintained.

It is also recommended that an additional Section (*Section 13*) be added to the DCP that refers to buffer zones adjacent to waterways (*i.e. a riparian buffer*). This should specify that a riparian buffer zone 50 metres wide free from all development and hard surfaces (*incorporating a 40 metre core riparian zone and 10 metre vegetated buffer*), should be incorporated adjacent to all new developments.

#### **DCP No. 38 Maintenance of Open Drains 1996**

This DCP has been prepared to provide clarification of the term “maintenance of open drains” which is used in Clause 53 of the LEP. The practical application of this DCP is that Council will not require development consent to be obtained for cleaning / clearing of open drains if the work is less than 30cm deep measured from the natural ground level around the drain and if the maintenance work is to be undertaken using techniques such as rotary drain cleaning methods.

The DCP does not apply to areas within the priority management areas for acid sulphate soils on the Lower Manning. It is understood that this DCP will be replaced by new Acid Sulphate Soils provisions in the new LEP.

#### **DCP No. 42 On-Site Effluent Disposal Policy 2003**

This policy provides clear guidelines for seeking approval for rezoning or subdivision in non-sewered areas or for developments which may involve the installation of effluent disposal systems on existing parcels of land. The objectives of the policy provide for the protection of watercourses (*natural or artificial*), protection of groundwaters, prevention of public health risk, protection of lands, resource utilization and community amenity.

The policy requires a number of assessments to be made as part of any application. These include a nutrient loading assessment and a water balance calculation. The policy also requires a chemical adsorption / buffer zone between the nearest part of any effluent application area and any watercourse to assimilate nutrients generated by the system over a 50 year period. The recommended buffer distance for all types of land application systems is 100 metres to permanent surface waters (*e.g. rivers, streams, lakes, etc*), 250 metres to a domestic groundwater well and/or bore, and 40 metres to other waters (*e.g. farm dams, intermittent waterways and drainage channels etc*).

#### **DCP No. 43 Erosion and Sediment Control Policy and Code of Practice 1999**

This document provides a uniform Policy and Code of Practice for erosion and sediment control for Greater Taree City Council. Erosion and sedimentation has occurred within

Greater Taree City LGA as a result of development within the Council area. This policy applies to all land within the Greater Taree City area. The objectives of this policy are:

- to prevent land from being degraded by soil erosion or unsatisfactory land and water management practices;
- to protect streams and waterways from being degraded by erosion and sediment caused by unsatisfactory land and water management practices; and,
- to promote and protect biodiversity.

The policy provides details on how to prepare an erosion and sediment control plan, and includes a sample plan.

#### DCP No. 47 "Bungay Estate" 2001

This DCP applies to land within Bungay Estate. One of the objectives of this DCP is:

*"to ensure any activity has minimal impact on the water quality and ecological integrity of the Manning River and associated Riparian Zone".*

The DCP requires a Community Management Statement to be prepared under the Community Land Development Act 1989 that must stipulate objectives and introduce measures relating to the:

- communal management of the foreshore reserve;
- management and use of the rural farmlets, with particular reference to the long-term protection of the vegetation and associated wildlife in the foreshore reserve;
- management of the common effluent disposal system for specific lots identified in the Plan; and
- the preparation of an Environmental Protection Management Plan which will include provision for water quality monitoring and environmental auditing.

It is also recommended that an additional Section (*Section 2.10*) be added to the DCP that refers to buffer zones adjacent to waterways (*i.e. a riparian buffer*). This should specify that a riparian buffer zone 50 metres wide, free from all development and hard surfaces (*incorporating a 40 metre core riparian zone and 10 metre vegetated buffer*), should be incorporated adjacent to all new developments / buildings.

#### DCP Exempt and Complying Development

This Development Control Plan plays an important role in planning and development that occurs within the Manning River catchment. It is understood that Exempt and Complying Development has been elevated to the LEP level as part of the Draft Greater Taree LEP 2008.

#### Interim Flood Management Policy 1987

This policy provides detailed controls for development in and around lands affected by flooding of the Manning River and its tributaries. Specifically, it identifies controls such as freeboard for minimum floor levels for dwellings in residential and rural zones, in addition

to controls for industrial development, subdivisions, parking areas and electrical installations.

It is understood that the new citywide DCP for Greater Taree will include provisions for floodplain management.

#### **Cattle Feedlots Code 1998**

Cattle feedlots are yards where cattle are closely confined for the purpose of feeding from troughs or bins.

Greater Taree City Council's code for cattle feedlots includes the following measures to protect the water quality of natural watercourses, such as the Manning River and its tributaries:

- Feedlot yard surfaces shall be graded and drained to an approved runoff, and not to pollute any dam or natural watercourse; and,
- Feedlots shall be located at least 50 metres from natural watercourses.

#### **Acid Sulphate Soils**

As discussed above, acidic stormwater runoff can impact on agricultural, fishing and aquaculture activities, in addition to ecological impacts, particularly when discharges occur to natural waterbodies and wetlands adjacent to the estuary.

In order to minimise future disturbance to potential acid sulphate soils, Greater Taree City Council commenced the drafting a Development Control Plan (*DCP No.48*) that would be designed to encourage best practice management of acid sulphate soils. The existing LEP (*1995*) does not have any special provisions regarding development on land containing potential acid sulphate soils.

Notwithstanding, Greater Taree City Council has provided considerable resources towards better management of areas of Acid Sulphate Soils. This includes preparation of DCP No.38 (*refer above*) and the document: '*Drain maintenance guidelines for Acid Sulphate Soils as defined by the ASS risk maps*' (*2005*).

Council and the Hunter-Central Rivers Catchment Management Authority implement a continuing program of rehabilitation of ASS areas, which often focuses on the maintenance of floodplain structures such as manmade drains and flood gates. NSW DPI Fisheries also has an interest in this work due to the potential for floodgates to impact on the passage of fish.

It is recommended that provisions for the management of acid sulphate soils and drainage channels within the Manning River floodplain be incorporated into the Draft LEP 2008.

#### **Water Sensitive Urban Design**

Water Sensitive Urban Design (*WSUD*) principles are not contained in any of Council's current DCPs or policies. However, it is understood that the new draft LEP 2008 and the

associated DCP will include provisions for WSUD. Development of the WSUD Strategy is a collaboration between Greater Taree City Council and the Great Lakes Council.

This initiative is strongly supported. The strategy will play an important role in the implementation of water sensitive urban design provisions within both Council areas.

The Hunter and Central Coast Regional Environmental Management Strategy (*refer below*) makes allowance for the preparation of a WSUD capacity building program to be used by Council staff and other catchment managers.

## 5.8 LOCAL STRATEGIES, PROGRAMS AND PLANS

### 5.8.1 Strategies and Plans

#### Greater Taree Draft Conservation and Development Strategy (2005)

As discussed in **Section 5.3**, the Greater Taree Conservation and Development Strategy includes recommendations for the future growth of urban centres within the Manning River valley.

These recommendations are based on a range of physical, environmental, social and economic constraints and targets such as conservation, natural hazards, provision of community services and infrastructure, and economic activity.

Accordingly, the Strategy makes provisions for environmental protection of water quality, the coastline, biodiversity, coastal wetlands, endangered fauna and habitat as part of the decision making process for future development in the LGA.

The Strategy also contains a list of recommended ‘actions’ to ensure that each aspect of future development is in accordance with the principles of ecologically sustainable development.

#### Hunter-Central Rivers Catchment Action Plan (2007)

The Draft Catchment Action Plan (CAP) was prepared under the Catchment Management Authorities Act 2003 to integrate, enhance and build on the Central Coast, Lower North Coast and Hunter Catchment Blueprints and regional plans and strategies. A list of priority “hotspots” and issues that require on-ground works, planning information exchange or other targets for investment, have been carried over from the Blueprints to the CAP.

The CAP includes a series of Resource Condition Targets for each natural resource management theme, including *Estuarine Health*. The CAP aims to improve or maintain the estuarine environments of the Hunter-Central Rivers region through the following management targets:

- **High level of influence targets** – enhance and protect wetlands, implement best practice urban stormwater management and manage nutrient runoff;
- **Medium level of influence targets** – enhance foreshore vegetation, protect and regenerate native riparian vegetation, undertake in-stream and foreshore stabilisation,

rehabilitate acid sulphate soils, develop an Environmental Management System, improve sewage management and floodgate management;

- **Lower level of influence targets** – treat weed affect lands, treat animal pests, restore fish passage, manage erosion and sediment control for roads, revegetate and stabilise highly erodible soils, implement sustainable grazing management and restore in-stream habitat.

### Healthy Rivers Commission - Independent Review of the North Coast Rivers: Final Report 2003

The North Coast Rivers report presents the Healthy Rivers Commission's final conclusions and recommendations, based on its analyses of the key issues most likely to determine the future health of the North Coast Rivers. It clarifies a number of issues, and provides judgements on conflicting views about matters raised in the Draft Report. The analyses are based on evidence presented to the Inquiry, including over one hundred and ninety written and verbal submissions, plus special investigations and stakeholder workshops.

Recommendations in the North Coast Rivers Final Report relate to:

- Ensuring joint agency accountability for implementation of Government decisions on the Final Report;
- Using market-based instruments and incentives to encourage farmers to implement sustainable agriculture, especially in coastal floodplains affected by acid sulphate soils;
- Protecting aquaculture and fisheries production in tandem with improving river health;
- Requiring local and regional planning to integrate river health and other natural resource goals into land use decision-making processes;
- Integrating the provision of local and regional water related services (*water supply, sewerage and stormwater management*) in order to maximise river health and regional socio-economic benefits; and,
- Providing greater clarity and direction in relation to estuary and entrance management.

In particular, the Final Report recommends that a state policy on estuarine dredging be prepared to guide decisions on estuarine dredging proposals. This is particularly relevant to the Manning River Estuary as there is considerable community and Council pressure to dredge the Manning Estuary (*and a number of others*), with those people believing that dredging is required to:

- mitigate flooding, improve flushing and therefore water quality;
- provide construction material or fill; or
- improve navigability, both within lower estuaries and over entrance bars.

Others believe that dredging may:

- cause ecological damage in terms of habitat destruction;
- increase beach erosion;

- make little difference to improved water quality;
- impact on disposal areas; and
- result in private benefit at public expense.

There are also calls for additional entrance training walls to be built for the Manning River estuary system, in the belief that a single northern training wall is insufficient to maintain adequate navigation access to the sea.

### Hunter and Central Coast Regional Environmental Management Strategy (*HCCREMS*)

HCCREMS is an innovative and highly successful regional initiative being implemented through the collaborative efforts of fourteen Councils in the Hunter, Central and Lower North Coast of NSW. The Strategy seeks to facilitate a regional approach to ecologically sustainable development by actively encouraging greater co-operation between member Councils, state and federal authorities, industry and community groups.

The original Lower Hunter and Central Coast project (*LHCCREMS*) was developed in 1995 through an extensive twelve-month regional community consultation process using the Agenda 21 model. Lake Macquarie, Maitland, Newcastle, Port Stephens, Cessnock, Gosford and Wyong Councils endorsed the LHCCREMS Strategy in early 1996. Implementation then commenced based on the prioritisation of a range of key regional issues identified in the consultation phase of its development. In 2002, the project was extended to include the Upper Hunter Councils of Singleton, Muswellbrook, Scone, Murrumbidgee, Merriwa, Dungog, Gloucester and Great Lakes, and in 2004, Greater Taree City Council was welcomed to the program (*HCCREMS website*).

HCCREMS has become widely regarded as a model approach to integrating local government planning and environmental management at the regional level. It:

- provides a framework for co-ordinated action in relation to environmental management issues impacting on the region;
- addresses those environmental and natural resource issues that are best managed at a regional scale (*e.g. biodiversity conservation and water quality management are key issues which require a broad management approach that transcends arbitrary institutional boundaries*); and,
- facilitates regional partnerships and resource sharing to address key environmental management issues in a co-ordinated, pro-active and efficient manner.

One important initiative of the Strategy is a professional Water Sensitive Urban Design (*WSUD*) capacity building program for Council staff and catchment managers. The final output of the project is the development of a WSUD Capacity Building CD and Toolkit for Councils that contains a range of reports, presentations, and video based training modules and tools. The Toolkit includes a selection of fact sheets concerning rainwater, porous pavers, infiltration and landscaping with a range of information and concepts for WSUD.

The WSUD Capacity Building Program has also spearheaded the development of regional planning and management tools. Model Planning Provisions and a National Design Guide



for Water Sensitive Urban Design are two important documents for Councils as well as Industry Practitioners (*HCCREMS website*).

### **Manning River Water Quality and River Flow Objectives (*DNR, 2006*)**

The Manning River Water Quality and River Flow Objectives have been established by the Department of Natural Resources (*DNR*) through review of available information and consultation with the Manning River community.

The entire set of standard NSW Water Quality Objectives apply to the Manning River catchment and cover the issues related to the five sub-sets of *town and water supply catchments, forested areas, waterways affected by urban development, uncontrolled streams and estuaries*.

These Water Quality Objectives include the following that relate specifically to the estuary (refer **Appendix D**):

- Aquatic ecosystems – maintaining or improving the ecological condition of waterbodies and their riparian zones over the long term;
- Visual amenity – aesthetic qualities of waters;
- Secondary contact recreation – maintaining or improving water quality for activities such as boating and wading, where there is a low probability of water being swallowed;
- Primary contact recreation – maintaining or improving water quality for activities such as swimming in which there is a high probability of water being swallowed;
- Aquatic foods (*cooked*) – refers to protecting water quality so that it is suitable for the production of aquatic foods for human consumption and aquaculture activities (*DNR, 2006*).

For each objective, DNR has established suitable indicators and their associated numerical criteria or trigger values to be applied for monitoring activities.

The entire set of standard NSW River Flow Objectives also apply to the Manning River catchment, including the following which are most applicable to estuary management:

- Maintain wetland and floodplain inundation – maintain or restore the natural inundation patterns and distribution of floodwaters supporting natural wetland and floodplain ecosystems;
- Maintain natural flow variability – maintain or mimic natural flow variability in all streams;
- Manage groundwater for ecosystems – maintain groundwater within natural levels and variability, critical to surface flows and ecosystems;
- Minimise the effect of weirs and other structures – minimise the impact of in-stream structures; and,
- Maintain or rehabilitate estuarine processes and habitats (*DNR, 2006*).

### Draft Assessment of Crown Land at Manning River Estuary (*Dept. of Lands, 2005*)

This report documents the physical and natural characteristics and current land use of five parcels of crown land along the foreshore of the Manning River and its tributaries.

The five areas of crown land identified in report are as follows (*refer mapping in Appendix E*):

- 6 hectares of foreshore land along Pelican Bay at Manning Point;
- 0.25 hectares at the south bank of Mangrove Island upstream from Harrington;
- 3.5 hectares at north bank of Manning River at Croki;
- 0.15 hectares at the east bank of Scotts Creek on Mitchells Island; and,
- 0.05 hectares at the north bank of South Channel on Oxley Island.

The report also includes recommendations as to suitable uses for the crown land areas, including the following:

- Environmental protection and nature conservation;
- Tourism and recreation; and,
- Agriculture (*aquaculture*) and industry.

### Greater Taree City Council On-site Sewage Management Strategy 2003

This Strategy covers the principles and operational requirements for the installation, performance and regulation of on-site sewage management facilities within the Greater Taree City Council area. This Strategy is complemented by DCP No.42 (*refer above*). The purpose of the Strategy is to provide a formal framework for the integrated management of on-site sewage management facilities in the Greater Taree LGA. The objectives of the strategy are to ensure that all on-site sewage management facilities are installed and operated in a manner which ensures the following environmental and health performance objectives are met:

- Prevention of public health risk;
- Protection of surface waters;
- Protection of groundwaters;
- Protection of lands;
- Protection of community amenity;
- Conservation and re-use of resources; and,
- Ecologically sustainable development.

The Strategy requires On-site Sewage Management Plans to be prepared for individual sites, subdivision release areas, sub-catchments and other areas where specific plans will help achieve the objectives. The Plans will identify environmentally sensitive areas in the study area or in the adjoining area or within the downstream catchment, i.e. drinking water catchments, wetlands and high water tables. The Strategy specifies the same recommended buffer distances for on-site effluent disposal areas as DCP No.42.

As part of the Strategy, Council has formulated a water quality monitoring program on the Manning River and major tributaries. The program commenced in April 2000 and included an initial 17 sampling sites selected to ensure that each of the four catchments were represented (*i.e. Manning River, Saltwater Recreation Area, Wallambah River and Johns River*). An additional 3 sampling sites have now been included, making a total of 20 sampling sites. Sampling is undertaken on a monthly basis.

#### **Manning River Bank Management Study (1997)**

The Manning River Bank Management Study was undertaken in order to identify existing areas of erosion and accretion along the river banks, determine the cause for bank movement and assess options for rehabilitating problem areas.

A major outcome of the study was the preparation of a draft bank management plan, which covered approximately 40 separate locations of bank erosion along the Manning River and its tributaries. The plan included details of the extent, mechanism and severity of bank erosion and also provided recommendations for rehabilitation with approximate costs.

It is unclear as to the exact extent of works that have been completed as part of the bank management plan since its development.

#### **Manning River Commercial Fishers Association Environmental Management System**

The Environmental Management System of the MRCFA was prepared so that the requirements of relevant Australian standards for commercial fishing operations are maintained within the Manning River fishery.

The EMS includes an environmental risk assessment that covers all aspects of commercial fishing on the Manning River. The risk assessment has been used to develop a range of actions to meet the following objectives that are considered to be related to protection of the estuarine environment:

- Protect and enhance the habitat of the Manning River and its catchment
- Harvest seafood in a manner that ensures stocks of fish and other species are maintained
- Minimise the level and impact of interactions with protected and threatened species, and species of particular community concern
- Minimise resource consumption, waste production and pollution associated with fishing operations
- Recognise and protect the cultural values associated with the Manning River and its catchment
- Contribute to scientific research and management innovation relevant to aquatic environments and commercial fishing (*MRCFA*)

#### **NSW Oyster Industry Sustainable Aquaculture Strategy (2006)**

This Strategy provides an overview of the current oyster industry along the NSW coast.

It also includes guidelines for the protection of water quality that estuary managers and planners should aim towards in order to preserve and improve the oyster industry.

The Strategy specifies a range of environmentally sustainable practices that oyster farmers should follow in order to preserve the environmental value of NSW estuaries. These guidelines have been used to identify areas of priority oyster aquaculture at each major estuary, including the Manning River.

The priority oyster aquaculture areas for the Manning River are shown in the map contained in **Appendix F**.

### **Regional Biodiversity Conservation Strategy (RBCS)**

The *Regional Biodiversity Conservation Strategy* is a unique and multi-faceted project of HCCREMS that has steadily been making important gains for biodiversity in the region since 1998. The aim of the RBCS is to develop a strategy and implementation plan to protect the natural, biological diversity of the Hunter, Central and Lower North Coasts in order to maintain existing ecological processes for future generations. The strategy and implementation plan will provide a framework for enhancing the integration of biodiversity information into current and future land use planning processes, thereby providing greater certainty to land managers (*HCCREMS website*).

As a starting point, the focus of the project over several years has been to collate a comprehensive regional dataset. This data collection program has been able to address coverage of private land which has been previously excluded from other government analysis processes. The Environment Division of Hunter Councils has been engaged by the Hunter Central Rivers CMA (*under NHT funding*) to undertake three vegetation mapping projects across three different areas of the catchment. This work will substantially and sequentially progress mapping across the region.

A 10 Year Plan was developed in late 2003 by Hunter Councils, Department of Environment & Conservation, Department of Infrastructure Planning & Natural Resources, and the Hunter Central Rivers CMA. It proposes a long-term regional approach to vegetation management and data requirements. It is envisaged that this will lead to establishment of a strategic management, planning and implementation process in collaboration with all relevant stakeholders in the catchment.

### **Greater Taree City Council Heritage Strategy May 2005**

The over-riding mission of the Heritage Strategy is to protect significant places from adverse impacts resulting from deterioration, inappropriate use and development. Through a range of proposed and continuation of existing programs, the strategy aims to:

- Improve the documentation of Greater Taree's heritage assets;
- Appropriately manage the historical records;
- Increase awareness and knowledge about heritage in the community;
- Provide better clarity on heritage issues and processes;
- Enable a more effective and efficient use of resources;

- Promote partnerships to share responsibility for heritage conservation; and,
- Achieve improved support for owners and managers of heritage places.

To support the strategy, develop community ownership and seek a level of transparency and independence, Greater Taree City Council established the Strategic Heritage Advisory Committee (*SHAC*) under the Local Government Act 1993.

### 5.8.2 Specific Management Plans

A range of management plans and Plans of Management (*PoMs*) have been prepared for specific areas within the Manning River catchment.

An estuary and catchment processes study has been completed for Browns Creek, which flows into the Manning River downstream from Taree. A draft Estuary Management Plan for Browns Creek has also been prepared.

Greater Taree City Council has prepared the following Plans in order to better manage and protect the foreshore areas and reserves along the estuary:

- Taree CBD Foreshore Management Plan;
- Plan of Management for Harrington Foreshore, including Pilot Hill (*June 2003*);
- Draft Plan of Management for Wingham Foreshore Recreational Reserve (*August 2006*);
- Plan of Management for Andrews Reserve & Lot 5 DP 251039 (*October 2003*); and,
- Coopersnook Foreshore Management Plan.

Coastal Management Plans have been previously developed for the eight areas of SEPP 26 littoral rainforest areas along the coast between Old Bar and Harrington. These areas include:

- Areas numbered 131 and 132, located north of Harrington (*refer Figure 4*);
- Areas numbered 134A and 135, located south of the Harrington inlet (*refer Figure 4*);
- Areas numbered 138 and 142, located on Mitchells Island (*refer Figure 3*); and,
- Areas numbered 144 and 145, located east of Old Bar (*refer Figure 3*).

These Coastal Management Plans were prepared some time ago and require review.

## 6 ESTUARY MANAGEMENT STRATEGIES

---

### 6.1 MANAGEMENT OBJECTIVES

The primary objective of the Manning River Estuary Management Plan is to develop a range of management options or strategies for maintaining and improving estuary condition and function. These options should include measures that will protect the essential features of the estuary (*e.g., the primary estuary processes*), resolve key issues and improve opportunities for estuary usage. However, prior to developing specific management measures aimed at achieving these goals, it is necessary to identify a set of specific management objectives.

Accordingly, a provisional list of management objectives was prepared based on a review of background documents, site inspections and feedback from the Estuary Management Committee during the first Committee workshop. The objectives were developed with the aim of addressing the key issues facing the future management of the estuary. They also considered the need to preserve or improve the condition of identified essential estuary features and to resolve conflicts between various estuary uses.

#### 6.1.1 Committee Response to Estuary Management Objectives

The provisional list of management objectives was forwarded to the Committee prior to Committee Workshop #2, held in June 2006 (*refer Section 2.1.2*). As with the key issues and essential features assessments, a proforma was prepared listing the provisional management objectives. Committee members were asked to review the proforma and to rank the relative importance of the listed management objectives.

At the second and third Committee Workshops, the management objectives were discussed and prioritised. From the Committee's perspective, the highest ranked objectives are:

- Optimise the economic, environmental and social value of the estuary;
- Ensure sustainable development throughout the estuary and catchment;
- Protect and restore estuarine and foreshore habitats;
- Optimise waterway usage potential; and,
- Improve water quality and protect water quality values.

These results are consistent with the outcomes of the key issues and estuary attributes assessments. They show that the most important overall objective, as determined through discussions with the Committee, is to improve the environmental health and sustainability of the estuary.

#### 6.1.2 Adopted Estuary Management Objectives

The outcomes from Workshop #2 and Workshop #3 were used to compile a complete set of adopted management objectives for the estuary (*refer Table 6*).



Also considered is the management of potential sea level rise and other issues associated with climate change, as highlighted through consultation with the Department of Environment and Climate Change (*DECC*).

**Table 6 MANAGEMENT OBJECTIVES FOR THE MANNING RIVER ESTUARY**

ADOPTED MANAGEMENT OBJECTIVES	ID NUMBER
⇒ ASSESS THE VIABILITY OF THE ENTRANCES	<b>1</b>
⇒ OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY	<b>2</b>
⇒ ENSURE SUSTAINABLE DEVELOPMENT THROUGHOUT THE ESTUARY AND CATCHMENT	<b>3</b>
⇒ PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS	<b>4</b>
⇒ OPTIMISE WATERWAY USAGE POTENTIAL	<b>5</b>
⇒ IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES	<b>6</b>
⇒ IMPROVE FISH PRODUCTIVITY	<b>7</b>
⇒ IMPROVE WATERWAY FACILITIES	<b>8</b>
⇒ IMPROVE ESTUARY NAVIGATION	<b>9</b>
⇒ IMPROVE EDUCATION ON ESTUARY ISSUES	<b>10</b>
⇒ REDUCE FLUVIAL SEDIMENTATION	<b>11</b>
⇒ INTEGRATE LAND USE AND NATURAL RESOURCE MANAGEMENT PLANS	<b>12</b>
⇒ PROTECT ABORIGINAL AND EUROPEAN HERITAGE SITES	<b>13</b>
⇒ CONSIDER AND MANAGE THE IMPACTS OF CLIMATE CHANGE AND SEA LEVEL RISE	<b>14</b>

## 6.2 POTENTIAL MANAGEMENT OPTIONS AND STRATEGIES

The adopted management objectives have been used to develop strategies and actions for the sustainable management of the estuary and adjoining catchment into the future. To confirm the relevance of each management objective, they have been linked to the adopted key issues that are identified in **Section 4.1.4**. The linkages between the identified issues, the key attributes and the adopted management objectives are represented in **Table 7**. The table is arranged in order of ranked key issues.

As to be expected and shown by comparison of **Table 6** with **Table 7**, the highest ranked objectives are generally aimed at addressing the highest ranked management issues. Examples include ‘*optimise the economic, environmental and social value of the estuary*’ and ‘*protect and restore estuarine and foreshore habitats*’. These two objectives are related to most of the top five ranked issues (refer **Table 7**).

Technical assessment of available information contained in the *Manning River Estuary Processes Study* (GTCC, 1997), background documents and existing Council and State planning instruments was also undertaken in the development of suitable management options.

A provisional list of potential management strategies was presented to the Estuary Management Committee at Committee Workshop #3, held in August 2006. The Committee was requested that they provide feedback regarding the provisional strategies so that a refined list of preferred measures and strategies could be developed. The list of strategies and their related ‘actions’ was discussed at length with the Committee during subsequent workshops.

Through consideration of the response from the Committee, a range of recommended measures and strategies were developed with the aim of initiating better management and improvements to the estuary.

The following section describes each recommended management strategy and the actions required to achieve each strategy.

**Table 7 LINKAGES BETWEEN KEY ISSUES, ESSENTIAL FEATURES AND MANAGEMENT OBJECTIVES**

**KEY ISSUES  
(ranked)**

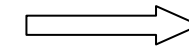
**ESSENTIAL FEATURES**

**ADOPTED MANAGEMENT OBJECTIVES**

**1. OCEAN ENTRANCE CONDITIONS**



- Two entrances
- Water quality
- Oyster / aquaculture industry
- Scenic amenity
- Tourism
- Recreational fishing
- Commercial fishing

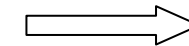


- ASSESS THE VIABILITY OF THE ENTRANCES
- OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY
- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES
- REDUCE FLUVIAL SEDIMENTATION
- IMPROVE ESTUARY NAVIGATION
- IMPROVE FISH PRODUCTIVITY
- OPTIMISE WATERWAY USAGE POTENTIAL

**2. RIVERBANK EROSION**



- Riparian vegetation / corridors
- Mangroves
- Picnicking and foreshore access
- Entrances
- Recreational fishing
- Scenic amenity
- Cultural heritage sites
- Water quality

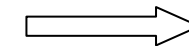


- PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS
- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES
- REDUCE FLUVIAL SEDIMENTATION
- PROTECT ABORIGINAL AND EUROPEAN HERITAGE SITES
- IMPROVE ESTUARY NAVIGATION
- CONSIDER AND MANAGE THE IMPACTS OF CLIMATE CHANGE ON ESTUARY PROCESSES

**3. NATURE CONSERVATION**



- Riparian vegetation / corridors
- Endangered water birds
- Seagrass beds
- Fish and crustaceans
- Mangroves
- SEPP 14 Wetlands
- National Parks and reserves
- Pockets of sub-tropical rainforest
- Saltmarsh, sedges and rushes
- Quiet rural lifestyle

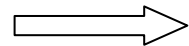


- OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY
- ENSURE SUSTAINABLE DEVELOPMENT THROUGHOUT THE ESTUARY AND CATCHMENT
- PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS
- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES
- IMPROVE FISH PRODUCTIVITY
- CONSIDER AND MANAGE THE IMPACTS OF CLIMATE CHANGE ON ESTUARY PROCESSES

**4. DEVELOPMENT CONTROLS**



- Riparian vegetation / corridors
- Mangroves
- SEPP 14 Wetlands
- National Parks and reserves
- Foreshore access
- Recreational fishing
- Industry
- Agriculture
- Quiet rural lifestyle



- OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY
- ENSURE SUSTAINABLE DEVELOPMENT THROUGHOUT THE ESTUARY AND CATCHMENT
- PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS
- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES
- INTEGRATE LAND USE AND NATURAL RESOURCE MANAGEMENT PLANS
- OPTIMISE WATERWAY USAGE POTENTIAL
- CONSIDER AND MANAGE THE IMPACTS OF CLIMATE CHANGE ON ESTUARY PROCESSES

**KEY ISSUES**  
*(ranked)*

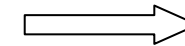
**ESSENTIAL FEATURES**

**ADOPTED MANAGEMENT OBJECTIVES**

**5. WATERWAY USAGE**



- Picnicking and foreshore access
- Swimming / snorkelling
- Recreational fishing
- Camping
- Recreational power-boating and waterskiing
- Boat launching ramps
- Wharves and jetties
- Tourism
- Quiet rural lifestyle

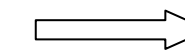


- OPTIMISE WATERWAY USAGE POTENTIAL
- IMPROVE ESTUARY NAVIGATION
- OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY
- IMPROVE WATERWAY FACILITIES
- ASSESS THE VIABILITY OF THE ENTRANCES
- IMPROVE EDUCATION ON ESTUARY ISSUES

**6. ACCESS TO THE WATERWAY**



- Picnicking and foreshore access
- Swimming / snorkelling
- Recreational fishing
- Camping
- Recreational power-boating and waterskiing
- Boat launching ramps
- Wharves and jetties
- Tourism
- Riparian vegetation / corridors
- SEPP 14 Wetlands
- Quiet rural lifestyle
- Cultural heritage sites
- Water quality

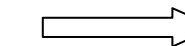


- OPTIMISE WATERWAY USAGE POTENTIAL
- IMPROVE ESTUARY NAVIGATION
- OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY
- PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS
- IMPROVE WATERWAY FACILITIES
- ASSESS THE VIABILITY OF THE ENTRANCES
- PROTECT ABORIGINAL AND EUROPEAN HERITAGE SITES
- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES

**7. SEDIMENTATION**



- Seagrass beds
- Saltmarshes
- Endangered water birds
- SEPP 14 Wetlands
- Water quality
- Recreational power-boating and waterskiing
- Two natural entrances
- Oyster / aquaculture industry



- REDUCE FLUVIAL SEDIMENTATION
- IMPROVE ESTUARY NAVIGATION
- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES
- ASSESS THE VIABILITY OF THE ENTRANCES
- PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS

**KEY ISSUES**  
*(ranked)*

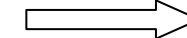
**ESSENTIAL FEATURES**

**ADOPTED MANAGEMENT OBJECTIVES**

**8. THE FISHERY**



- Recreational fishing
- Commercial fishing
- Fish and crustaceans
- Aquatic fauna
- Endangered water birds
- Seagrass beds
- Tourism
- Oyster / aquaculture industry
- Water quality

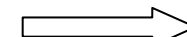


- IMPROVE FISH PRODUCTIVITY
- OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY
- IMPROVE WATERWAY FACILITIES
- IMPROVE ESTUARY NAVIGATION
- ASSESS THE VIABILITY OF THE ENTRANCES
- PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS
- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES

**9. WATER QUALITY**



- Water quality
- Oyster / aquaculture industry
- Swimming / snorkelling
- Aquatic fauna
- Seagrass beds
- Recreational fishing
- Commercial fishing
- Tourism

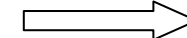


- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES
- OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY
- IMPROVE EDUCATION ON ESTUARY ISSUES
- ASSESS THE VIABILITY OF THE ENTRANCES
- OPTIMISE WATERWAY USAGE POTENTIAL
- IMPROVE WATERWAY FACILITIES
- PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS

**CLIMATE CHANGE**



- Water quality
- SEPP 14 Wetlands
- Saltmarshes
- Riparian vegetation / corridors
- Recreational fishing
- Seagrass beds
- Aquatic fauna
- Tourism
- Oyster / aquaculture industry



- CONSIDER AND MANAGE THE IMPACTS OF CLIMATE CHANGE ON ESTUARY PROCESSES
- OPTIMISE THE ECONOMIC, ENVIRONMENTAL AND SOCIAL VALUE OF THE ESTUARY
- PROTECT AND RESTORE ESTUARINE AND FORESHORE HABITATS
- OPTIMISE WATERWAY USAGE POTENTIAL
- ASSESS THE VIABILITY OF THE ENTRANCES
- IMPROVE WATER QUALITY AND PROTECT WATER QUALITY VALUES

### 6.3 DESCRIPTION OF RECOMMENDED MANAGEMENT STRATEGIES

A variety of strategies have been developed to address the management objectives for the estuary. These strategies encompass structural and non-structural measures aimed at protecting significant areas and improving aspects of the estuary to make it more suitable for existing and future waterway users. Many of these strategies were suggested by the Committee and key stakeholders during the consultation phases of the study.

Where possible, the strategies aim to harness the natural attributes of the catchment and are sympathetic to the interests of existing land-users. The recommended strategies are presented in the following sections under the following categories (*refer Figures 12 to 15*):

- Planning controls and policies;
- On-ground works;
- Investigation and research;
- Monitoring; and,
- Education and community involvement.

#### 6.3.1 Planning Controls and Policies

**1. FINALISATION OF A COMPREHENSIVE LAND USE PLAN (*THE GREATER TAREE CONSERVATION AND DEVELOPMENT STRATEGY*) TO IDENTIFY AREAS OF FUTURE URBAN DEVELOPMENT AND HIGH CONSERVATION VALUE**

Objectives Targeted (*refer Table 6*)

	2	3	4		6				10		12	13	14
--	---	---	---	--	---	--	--	--	----	--	----	----	----

**Actions required:**

1. Council staff to report to Manning River Estuary Management Committee the progress of finalising the Strategy
2. Incorporate outcomes of the Strategy into land use mapping for the Local Plan 2008

**2. ENSURE COUNCIL PLANNING STAFF ARE BRIEFED ON THE CONTENTS OF THE MANNING RIVER ESTUARY MANAGEMENT PLAN AND AWARE OF THE IMPACTS OF PLANNING DECISIONS ON ESTUARY WATER QUALITY AND RECENT CHANGES IN LEGISLATION AND POLICIES FOR URBAN DEVELOPMENT ALONG THE MANNING RIVER ESTUARY**

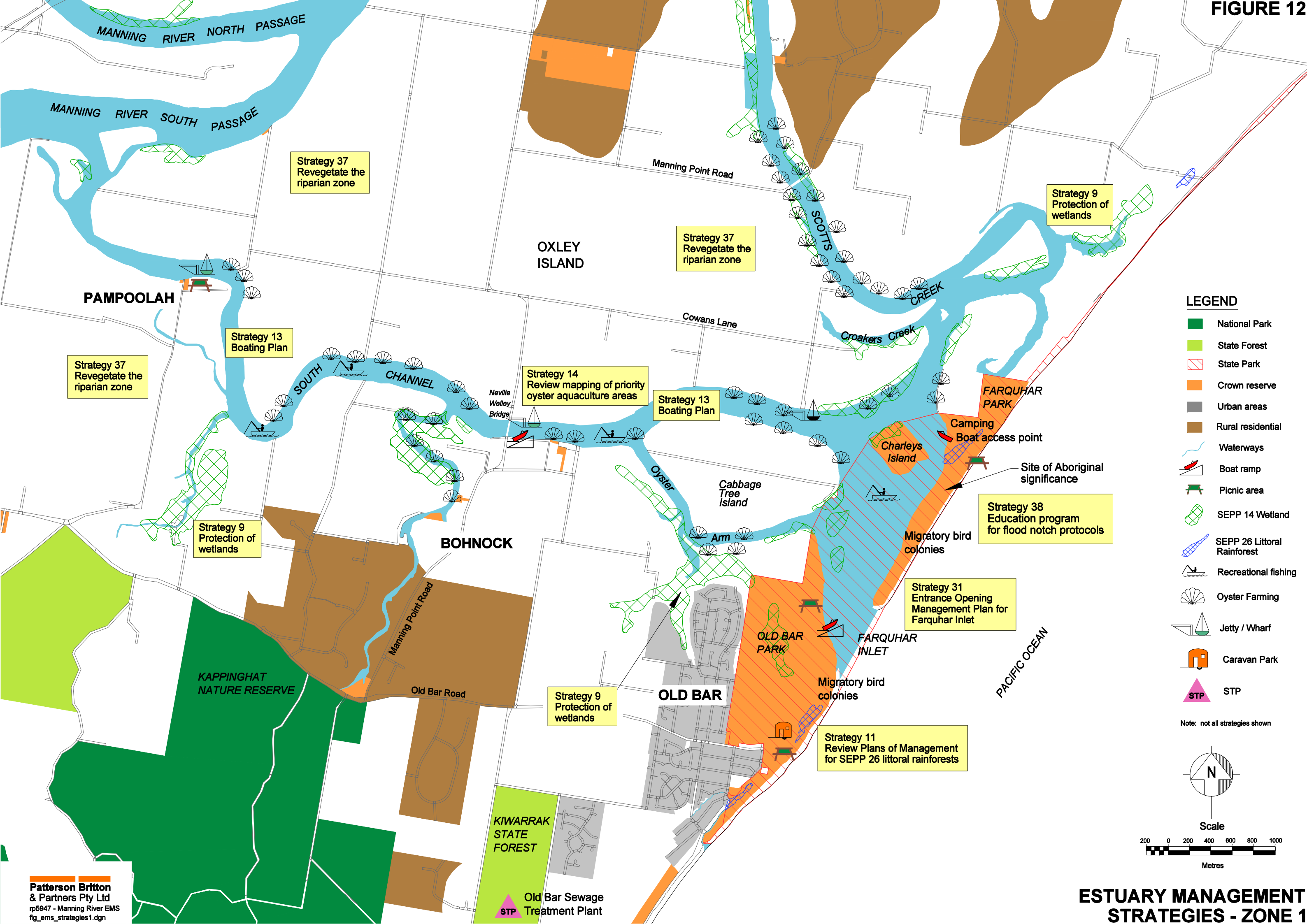
Objectives Targeted (*refer Table 6*)

	2	3			6						12		14
--	---	---	--	--	---	--	--	--	--	--	----	--	----

**Actions required:**

1. Implement a new strategy to inform new staff arriving at Council of the EMP and other relevant documents

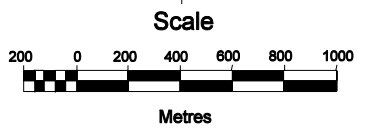
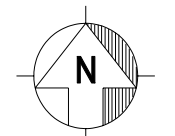


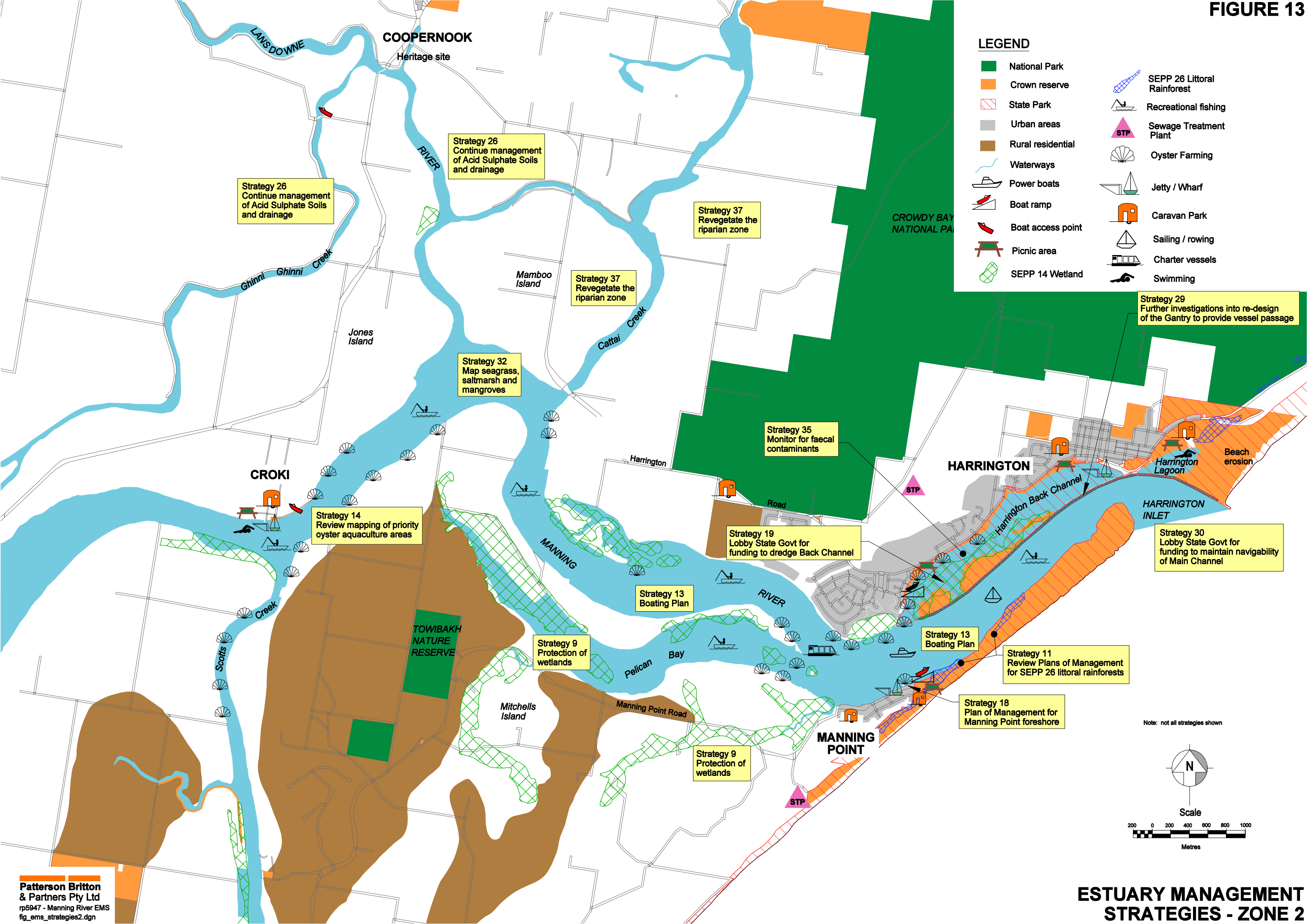


LEGEND

- National Park
- State Forest
- State Park
- Crown reserve
- Urban areas
- Rural residential
- Waterways
- Boat ramp
- Picnic area
- SEPP 14 Wetland
- SEPP 26 Littoral Rainforest
- Recreational fishing
- Oyster Farming
- Jetty / Wharf
- Caravan Park
- STP

Note: not all strategies shown





**LEGEND**

- National Park
- Crown reserve
- State Park
- Urban areas
- Rural residential
- Waterways
- Power boats
- Boat ramp
- Boat access point
- Picnic area
- SEPP 14 Wetland
- SEPP 26 Littoral Rainforest
- Recreational fishing
- Sewage Treatment Plant
- Oyster Farming
- Jetty / Wharf
- Caravan Park
- Sailing / rowing
- Charter vessels
- Swimming

Strategy 26  
Continue management  
of Acid Sulphate Soils  
and drainage

Strategy 26  
Continue management  
of Acid Sulphate Soils  
and drainage

Strategy 37  
Revegetate the  
riparian zone

Strategy 37  
Revegetate the  
riparian zone

Strategy 32  
Map seagrass,  
saltmarsh and  
mangroves

Strategy 35  
Monitor for faecal  
contaminants

Strategy 29  
Further investigations into re-design  
of the Gantry to provide vessel passage

Strategy 14  
Review mapping of priority  
oyster aquaculture areas

Strategy 19  
Lobby State Govt for  
funding to dredge Back Channel

Strategy 30  
Lobby State Govt for  
funding to maintain navigability  
of Main Channel

Strategy 13  
Boating Plan

Strategy 13  
Boating Plan

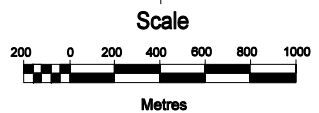
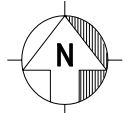
Strategy 9  
Protection of  
wetlands

Strategy 11  
Review Plans of Management  
for SEPP 26 littoral rainforests

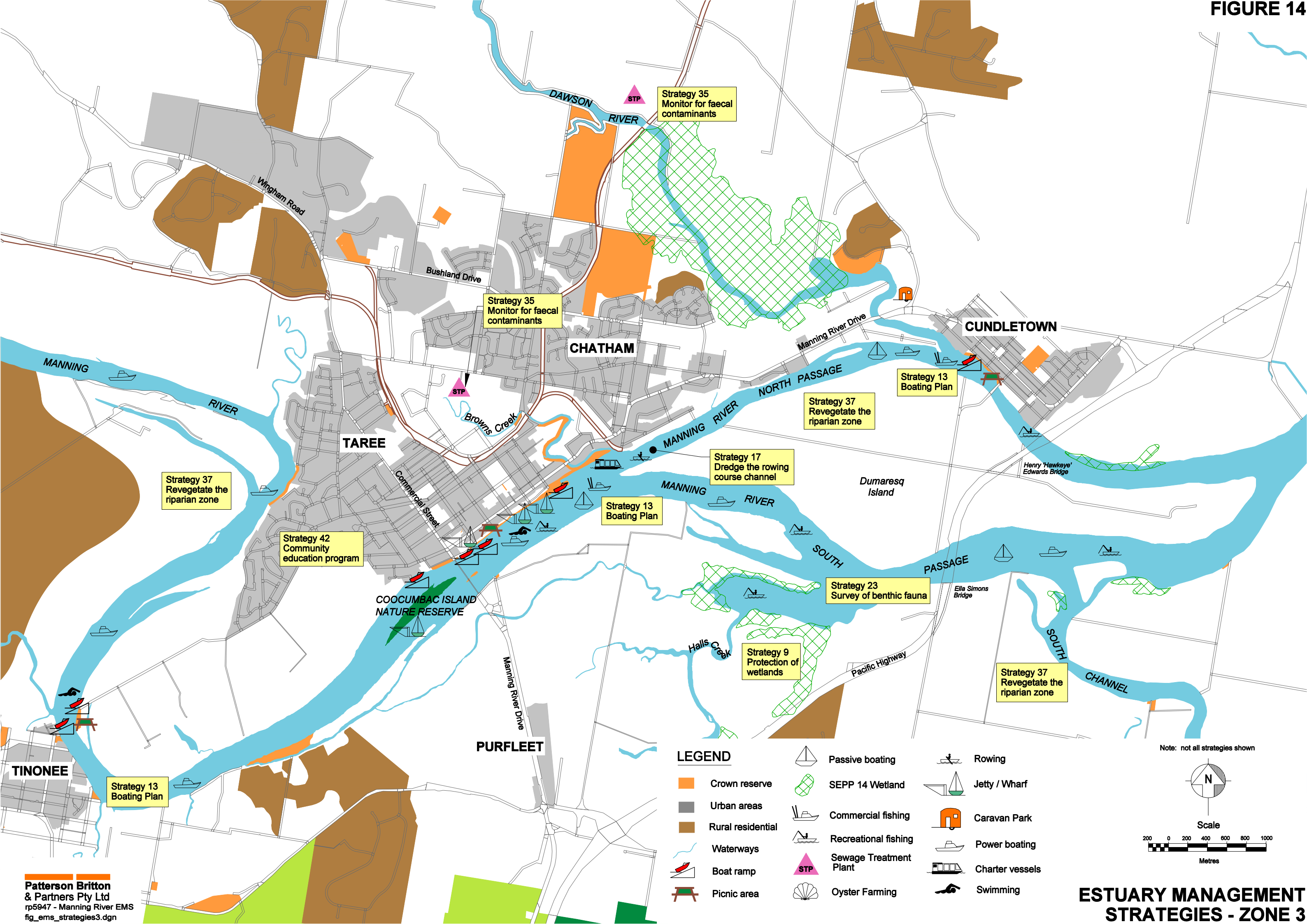
Strategy 18  
Plan of Management for  
Manning Point foreshore

Strategy 9  
Protection of  
wetlands

Note: not all strategies shown







Strategy 37  
Revegetate the riparian zone

Strategy 42  
Community education program

Strategy 35  
Monitor for faecal contaminants

Strategy 35  
Monitor for faecal contaminants

Strategy 13  
Boating Plan

Strategy 37  
Revegetate the riparian zone

Strategy 17  
Dredge the rowing course channel

Strategy 13  
Boating Plan

Strategy 23  
Survey of benthic fauna

Strategy 9  
Protection of wetlands

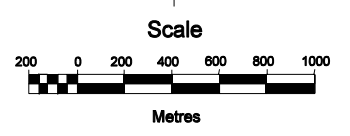
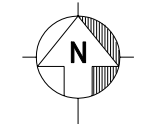
Strategy 37  
Revegetate the riparian zone

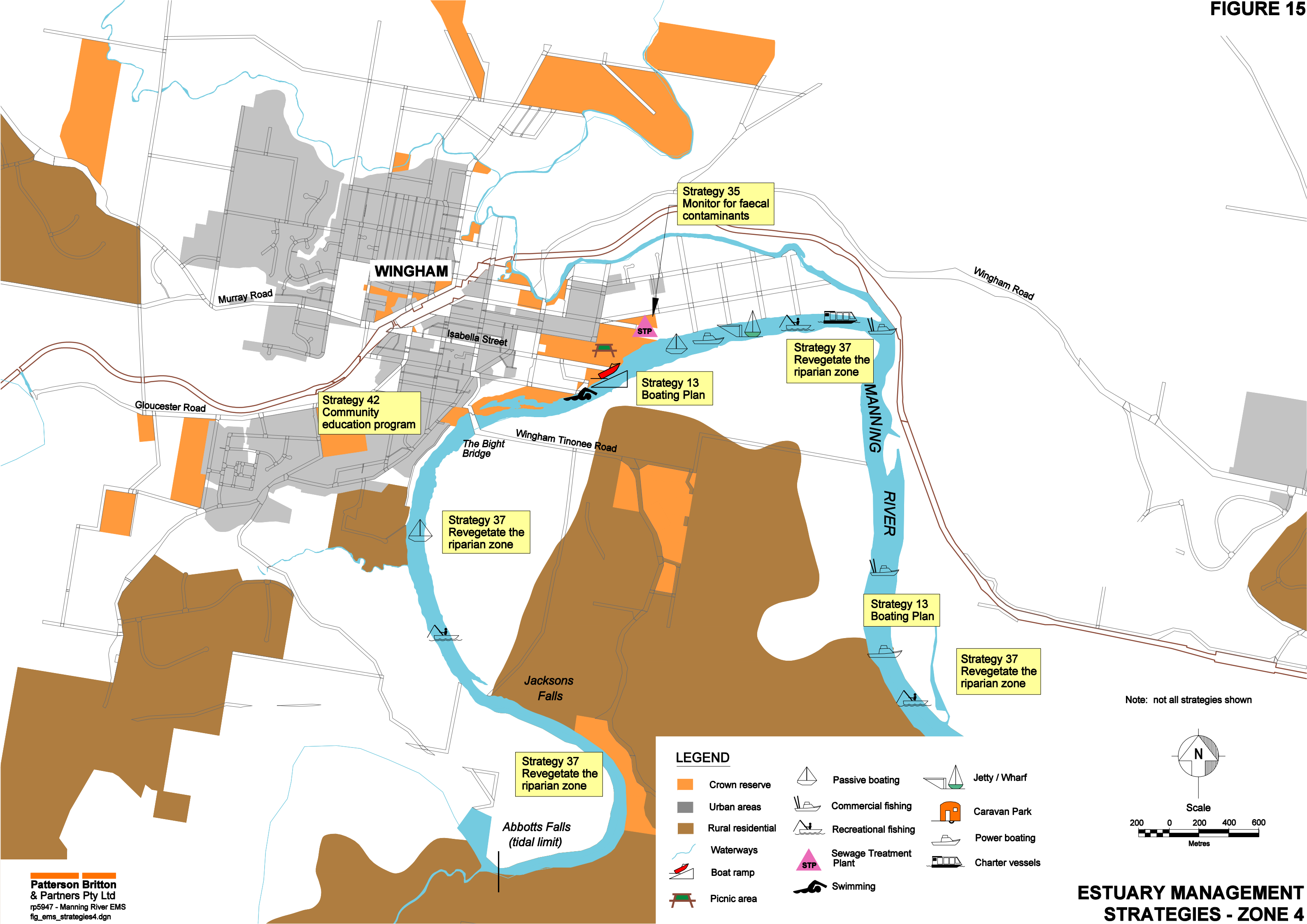
Strategy 13  
Boating Plan

**LEGEND**

- Crown reserve
- Urban areas
- Rural residential
- Waterways
- Boat ramp
- Picnic area
- SEPP 14 Wetland
- Commercial fishing
- Recreational fishing
- Sewage Treatment Plant
- Oyster Farming
- Passive boating
- Rowing
- Jetty / Wharf
- Caravan Park
- Power boating
- Charter vessels
- Swimming

Note: not all strategies shown





Strategy 42  
Community  
education program

Strategy 35  
Monitor for faecal  
contaminants

Strategy 37  
Revegetate the  
riparian zone

Strategy 13  
Boating Plan

Strategy 37  
Revegetate the  
riparian zone

Strategy 13  
Boating Plan

Strategy 37  
Revegetate the  
riparian zone

Strategy 37  
Revegetate the  
riparian zone

**LEGEND**

- |                   |                        |                 |
|-------------------|------------------------|-----------------|
| Crown reserve     | Passive boating        | Jetty / Wharf   |
| Urban areas       | Commercial fishing     | Caravan Park    |
| Rural residential | Recreational fishing   | Power boating   |
| Waterways         | Sewage Treatment Plant | Charter vessels |
| Boat ramp         | Swimming               |                 |
| Picnic area       |                        |                 |

Note: not all strategies shown

Scale  
200 0 200 400 600  
Metres

2. Undertake training activities every 6 months, including a one-day seminar/workshop and distribution of a brief training manual
3. Increase communication between departments

**3. PREPARE AN INTEGRATED WATER CYCLE MANAGEMENT PLAN BASED ON THE RECOMMENDATIONS OF THE INTEGRATED WATER CYCLE MANAGEMENT STRATEGY**

Objectives Targeted (refer Table 6)

	2	3			6					12		14
--	---	---	--	--	---	--	--	--	--	----	--	----

**Actions required:**

1. Review and identify actions from IWCMS that have been previously undertaken to determine outstanding tasks for inclusion in the Plan
2. Incorporate Water Sensitive Urban Design (WSUD) principles into the Plan
3. Undertake public exhibition of draft Plan document
4. Finalise and adopt IWCM Plan
5. Implement Integrated Water Cycle Management Plan

**4. INCORPORATE WATER SENSITIVE URBAN DESIGN (WSUD) PRINCIPLES AND REQUIREMENTS INTO THE NEW GREATER TAREE CITY LOCAL ENVIRONMENTAL PLAN ('LOCAL PLAN 2008') AND DEVELOPMENT CONTROL PLAN (DCP)**

Objectives Targeted (refer Table 6)

		3	4		6					11	12	
--	--	---	---	--	---	--	--	--	--	----	----	--

Water Sensitive Urban Design (WSUD) is a design approach that integrates stormwater management with the urban water cycle. Some WSUD techniques include the use of rainwater tanks, water efficient fixtures, grassed swales replacing kerb and gutter, bio-retention systems, and vegetated filter strips to remove pollutants from stormwater flows, riparian zone protection and re-vegetation.

The use of such techniques would greatly reduce the impacts on receiving waters within the Manning River estuary. The implementation of such a policy is in line with the NSW Government's Building Sustainability Index (BASIX) requirements.

**Actions required:**

1. Liaise with Council planners, building inspectors, local developers and the community to set criteria for new development
2. Undertake community consultation and public exhibition of draft LEP and DCP documents
3. Finalise and adopt new LEP and DCP

**5. USING THE MANNING RIVER WATER QUALITY OBJECTIVES ESTABLISH A SET OF CATCHMENT HEALTH INDICATORS BY WHICH THE CUMULATIVE IMPACT OF DEVELOPMENT CAN BE MEASURED AND MANAGED (THIS CAN BE DONE IN CONJUNCTION WITH STATE OF THE ENVIRONMENT REPORTING AND INCORPORATED INTO AN ESTUARY HEALTH REPORT CARD – REFER STRATEGY 45)**

Objectives Targeted (refer Table 6)

	2	3			6	7							
--	---	---	--	--	---	---	--	--	--	--	--	--	--

**Actions required:**

1. Establish set of catchment health indicators in conjunction with SoE reporting
2. Use indicators to monitor impact of development on a yearly basis in conjunction with monitoring activities associated with **Strategy 33**
3. Revise indicators every 3 years if required
4. Results of indicator monitoring to be consulted when determining future development and subdivision applications

**6. INCORPORATE PROVISIONS TO ADDRESS ACID SULPHATE SOILS (ASS) MANAGEMENT AND REHABILITATION INTO THE NEW 'LOCAL PLAN 2008' (LEP), CURRENTLY BEING PREPARED BY GREATER TAREE CITY COUNCIL**

Objectives Targeted (refer Table 6)

			4		6	7							
--	--	--	---	--	---	---	--	--	--	--	--	--	--

Incorporation of ASS requirements into the LEP will give statutory effect to the guidelines previously documented by Council.

**Actions required:**

1. Develop and include a policy of requiring development to avoid areas of ASS wherever possible and that if development is proposed in an area of ASS, mitigative measures should be incorporated as a condition of development consent
2. Incorporate existing draft Acid Sulphate Soils provisions into the proposed LEP and new DCP Maintenance Guidelines

**7. REQUEST THAT A REPRESENTATIVE FROM THE MANNING RIVER COMMERCIAL FISHERS ASSOCIATION REPORT TO THE ESTUARY MANAGEMENT COMMITTEE ON THE IMPLEMENTATION OF THE ASSOCIATION'S ENVIRONMENTAL MANAGEMENT SYSTEM FOR THE MANNING RIVER COMMERCIAL FISHERY**

Objectives Targeted (refer Table 6)

	2		4		6	7					12		
--	---	--	---	--	---	---	--	--	--	--	----	--	--

**Actions required:**

1. Regular reports on the implementation of the Environmental Management System every 12 months

**8. IN CONJUNCTION WITH THE RECOMMENDATIONS OF THE DEPARTMENT OF LANDS CROWN LANDS ASSESSMENT, IDENTIFY AND PROTECT SIGNIFICANT RESERVE SITES THROUGHOUT THE ESTUARY AND LINKAGES OF VEGETATION THROUGH CROWN LAND MANAGEMENT PLANS AND COUNCIL PLANNING LEGISLATION**

Objectives Targeted (refer Table 6)

	2	3	4	5	6		8				12		
--	---	---	---	---	---	--	---	--	--	--	----	--	--

**Actions required:**

1. Liaise with the Department of Lands to identify and protect significant Crown Reserves within the Manning River estuary that do not have a current Plan of Management.
2. Prepare draft Plans of Management for appropriate sites.
3. Undertake community consultation to obtain community feedback on draft Plans of Management.
4. Finalise reports.
5. If appropriate, incorporate reserves into land use mapping as part of Local Plan 2008

**9. REVIEW PROVISIONS FOR THE PROTECTION OF WETLANDS AND VEGETATION COMMUNITIES ON THE MANNING RIVER FLOODPLAIN**

Objectives Targeted (refer Table 6)

		3	4		6						12		14
--	--	---	---	--	---	--	--	--	--	--	----	--	----

**Actions required:**

1. Undertake site investigations to ground-truth the extent of SEPP 14 wetlands and potential Endangered Ecological Communities (EECs) and incorporate into GIS mapping
2. Incorporate revised mapping for wetlands and EECs into land use mapping for environmental protection within the Local Plan 2008
3. Incorporate standard statutory provisions in the Local Plan 2008 to protect mapped areas of wetlands and EECs



**10. INCORPORATE 40 METRE WIDE UN-DEVELOPED ‘ENVIRONMENTAL CONSERVATION’ ZONES ADJACENT TO WATERWAYS WITHIN THE REVISED GREATER TAREE CITY COUNCIL DCP (DEVELOPMENT CONTROL PLAN 2008) AND IN ACCORDANCE WITH THE GREATER TAREE DRAFT CONSERVATION AND DEVELOPMENT STRATEGY**

Objectives Targeted (refer Table 6)

		3	4		6						12		
--	--	---	---	--	---	--	--	--	--	--	----	--	--

**Actions required:**

1. Council planners to revise DCP such that provision for 40 metre wide riparian buffers are provided for any land within the Local Government Area, including that identified for future rezoning and/or subdivision.

**11. UNDERTAKE A REVIEW OF THE EXISTING PLANS OF MANAGEMENT FOR SEPP 26 LITTORAL RAINFORESTS ALONG THE MANNING RIVER**

Objectives Targeted (refer Table 6)

	2	3	4	5					10		12		
--	---	---	---	---	--	--	--	--	----	--	----	--	--

**Actions required:**

1. Review existing Plans of Management for SEPP 26 littoral rainforest areas along the Manning River Estuary to identify works successfully completed under the individual Plans
2. Identify and prioritise works and management activities from the individual PoMs that are yet to be implemented
3. Review availability and distribution of funding for management tasks
4. If required, seek additional funding
5. Implement outstanding management activities and tasks.

**12. TAKE AN ADAPTIVE APPROACH TOWARDS PLANNING AND DEVELOPMENT DESIGN TO CATER FOR SEA LEVEL RISE WITHIN THE REVISED GREATER TAREE CITY COUNCIL LEP (LOCAL PLAN 2008)**

Objectives Targeted (refer Table 6)

		3	4					9			12		14
--	--	---	---	--	--	--	--	---	--	--	----	--	----

As discussed above, climate change is expected to cause a range of impacts on estuary processes across most areas of the catchment. Most readily identifiable along the Manning River estuary is the potential impact from sea level rise, both on the natural environment and urban development.

**Actions required:**

1. Floodplain Management Committee for Manning River to report to Estuary Management Committee regarding the adoption of increased flood planning levels for coastal inundation
2. Review appropriate scientific research to validate incorporation of additional floor level requirements for new development into Local Plan 2008
3. Investigate the rezoning or strategic purchase of land to account for sea level rise and its impacts on existing and future development and riparian vegetation and ecosystems (*refer outcomes of Strategy 28*)
4. Undertake future revisions of the Local Plan 2008 in accord with observed sea level rises and future predictions

**13. NSW MARITIME TO PREPARE OR COMMISSION THE PREPARATION OF A BOATING PLAN FOR THE MANNING RIVER**

Objectives Targeted (*refer Table 6*)

	2			5	6		8	9					
--	---	--	--	---	---	--	---	---	--	--	--	--	--

**Actions required:**

1. Request that Manning River be included on the priority list for Boating Plans in the NSW Boating Plan of Management Strategy for 2008 and beyond
2. If Manning River is selected for a Boating Plan, review existing boating facilities and infrastructure (*last review completed in 1990*)
3. Investigate waterway usage and potential user conflicts, including the impact of boat usage on river bank erosion and navigational hazards created by wrecks of vessels
4. Incorporate additional boating facilities to encourage increased boating on the Manning River
5. Undertake community consultation during preparation of Boating Plan
6. Prepare generic Review of Environmental Factors for maintenance dredging to aid navigation

**14. NSW FISHERIES (DPI) TO REVIEW MAPPING OF PRIORITY OYSTER AQUACULTURE AREAS, AS CONTAINED IN THE SUSTAINABLE AQUACULTURE STRATEGY (2006), TO INCORPORATE THE LOCATION OF RECREATIONAL FACILITIES IN THE LOWER ESTUARY**

Objectives Targeted (*refer Table 6*)

	2			5			8	9			12		
--	---	--	--	---	--	--	---	---	--	--	----	--	--

Mapping produced for the Sustainable Aquaculture Strategy (*refer Appendix F*) shows that areas of priority oyster leases either overlap, or are located in the direct vicinity of, existing boat launching ramps and jetties within the lower estuary.

In order to reduce the potential for conflict between waterway users and improve waterway safety, it is recommended that the mapping be reviewed.

**Actions required:**

1. Review of mapping to be undertaken in consultation with Council officers and the Estuary Management Committee
2. Review of mapping to focus on areas upstream from Old Bar and Manning Point and at Croki

**6.3.2 On-Ground Works**

**15. CONSTRUCT FENCING ALONG CREEKS AND RIVERS IN THE ESTUARY WHERE LIVESTOCK ACCESS THE RIVER**

Objectives Targeted (refer Table 6)

			4	5	6		8			11			
--	--	--	---	---	---	--	---	--	--	----	--	--	--

**Actions required:**

1. Undertake independent audit of existing stock fencing along waterways and stock watering points
2. Using the results of the audit and current/proposed land use mapping, identify and prioritise areas for fence installation within the immediate estuarine catchment
3. Source funding from H-CR CMA to fence priority riparian zones
4. Liaise with private landholders during planning and implementation of fencing works
5. Prepare and distribute a brochure on Estuary Riverbank Stabilisation Procedures to educate public about private property.

**16. CREATE HABITAT TO ENCOURAGE MANGROVE GROWTH AT BANK EROSION SITES THROUGHOUT THE ESTUARY**

Objectives Targeted (refer Table 6)

			4		6				10	11			14
--	--	--	---	--	---	--	--	--	----	----	--	--	----

Work has previously been completed at the Manning River to create habitat for mangroves by way of providing protection from waves and disturbance behind small rock protection walls. The results have been encouraging, leading to natural seeding and proliferation of mangroves in these habitat areas.

**Actions required:**

1. Identify and prioritise sites where mangrove stands have declined with reference to results from **Strategy 21**
2. Undertake planning and design for habitation sites, including any minor bank stabilisation or rock protection works

3. Undertake works to establish mangrove habitat sites
4. Monitor growth of mangrove stands at habitat sites

**17. DREDGE THE NAVIGATION CHANNEL AT THE IDENTIFIED ROWING COURSE ADJACENT TO SHALLOW ISLAND AND LOCATE AND REMOVE WRECKS OF OLD VESSELS AND OTHER NAVIGATIONAL HAZARDS**

Objectives Targeted (*refer Table 6*)

	2			5			8	9					
--	---	--	--	---	--	--	---	---	--	--	--	--	--

Heavy sedimentation has occurred in the vicinity of the rowing course on the Manning River at Taree. It is proposed that the channel could be dredged to increase the amenity of the rowing course and general navigation along the Manning River.

**Actions required:**

1. Develop a concept design for dredging works based on latest available bathymetric survey
2. Undertake appropriate assessment of environmental impacts of proposed dredging works
3. Undertake community consultation to gather community response to proposed works
4. Subject to environmental and community approval, prepare detail designs for dredging
5. Undertake dredging works, including all measures to minimise environmental impact
6. Locate and remove known wrecks/ballast and other navigational hazards

It should be noted that the cost of dredging operations are largely dependent on the cost of mobilisation and demobilisation of the equipment used and therefore the following estimate is considered to be preliminary.

Based on a dredging volume of approximately 6,000 m<sup>3</sup>, it is estimated that dredging works would cost at least \$230,000. This amount is separate and additional to the cost of design for the works and the associated environmental investigations.

**18. PREPARE AND ACTION A PLAN OF MANAGEMENT FOR THE MANNING POINT FORESHORE**

Objectives Targeted (*refer Table 6*)

	2			5			8	9					
--	---	--	--	---	--	--	---	---	--	--	--	--	--

**Actions required:**

1. Undertake feasibility study for upgrading boating facilities (*refer to Boating Plan outcomes as part of Strategy 13*)
2. Conduct community consultation to determine potential reaction to replacement of existing jetties

3. Identify if jetties are to be removed and determine suitable location for replacement structures
4. Develop designs for replacement structure and undertake assessment of environmental impacts
5. Subject to community response and environmental assessment, remove existing jetties and construct new wharf
6. Incorporate appropriate sewage pump-out facilities at new wharf structure

**19. COUNCIL TO LOBBY STATE GOVERNMENT FOR FUNDING ASSISTANCE TO UNDERTAKE DREDGING OF THE HARRINGTON BACK CHANNEL**

Objectives Targeted (*refer Table 6*)

	2			5			8	9				
--	---	--	--	---	--	--	---	---	--	--	--	--

Several investigations have been completed to determine the scope of works and potential environmental impacts associated with dredging the Harrington Back Channel. The proposed dredging works can proceed with procurement of appropriate funding.

***Actions required:***

1. Use existing EIS documentation and approvals to lodge application for funding
2. Consider Master Plan for Harrington CBD and the open water foreshore
3. Detail design investigations and dredging to proceed upon procurement of funding
4. Undertake dredging works

Two dredging options have been considered for the purpose of preparing a cost estimate for the works:

- Option A - Dredging of a channel with width of 50 metres
- Option B - Dredging of a pilot channel only (*15 metres wide*).

As discussed, the cost of dredging operations are largely dependent on the cost of mobilisation and demobilisation of the equipment used. The exact extent and depth of dredging works would also influence the cost.

Based on nominal dimensions and an approximate mobilisation cost, it is estimated that dredging works associated with Option A would cost in the order of \$1.25M. The works associated with Option B are expected to cost at least \$450,000.

### 6.3.3 Investigation and Research

#### 20. IDENTIFY, PRESERVE AND PROTECT INDIGENOUS AND NON-INDIGENOUS HERITAGE SITES THROUGHOUT THE ESTUARY

Objectives Targeted (refer Table 6)

	2	3	4	5			8		10		12	13	
--	---	---	---	---	--	--	---	--	----	--	----	----	--

**Actions required:**

1. Liaise with the Local Aboriginal Land Council(s) and DECC to identify indigenous sites along the estuary
2. Prepare and review mapping for sites of significance
3. Liaise with the GTCC Strategic Heritage Advisory Committee (SHAC) to ensure that all heritage sites on Manning River estuary are included in the Heritage Strategic Plan for the Greater Taree area
4. Development Plans of Management for significant heritage sites

#### 21. UNDERTAKE A FIELD SURVEY TO GROUND TRUTH THE MAPPED EXTENTS WHERE FORESHORE VEGETATION HAS BEEN REMOVED ALONG THE ESTUARY AND ITS TRIBUTARIES

Objectives Targeted (refer Table 6)

		3	4		6						12		
--	--	---	---	--	---	--	--	--	--	--	----	--	--

**Actions required:**

1. Undertake inspection of creek foreshore vegetation in the upper catchment to ground truth the updated extant vegetation mapping produced by the Lower Hunter Central Coast Regional Environmental Management Strategy using aerial photographs from 2000 and 2001
2. Revise GIS layers if changes have occurred since previous airphotos were taken
3. Use ground-truthed GIS layers to identify and prioritise foreshore areas for revegetation works
4. Revegetation works to be undertaken in cooperation with H-CR CMA and Landcare groups

#### 22. REVIEW THE MANNING RIVER BANK MANAGEMENT STUDY (1997)

Objectives Targeted (refer Table 6)

			4	5	6		8		10				
--	--	--	---	---	---	--	---	--	----	--	--	--	--

More than 10 years has passed since development of the existing draft bank management plan and a review is required to determine and implement any outstanding or newly required works.

**Actions required:**

1. Identify bank management works that have not been completed since preparation of 1997 Bank Management Study report
2. Consider recent bank management techniques to the design of outstanding works
3. Develop revised schedule of works and determine associated costs for outstanding works
4. Undertake bank management works

Determining the extent of works that have not been completed may involve a basic visual survey of the estuary. During the same field inspections, any areas of recent bank erosion not previously documented should be identified.

Development of designs for outstanding rehabilitation works should include assessment of all types of common bank stabilisation options, including log work, ‘root balls’ and the strapping of other woody debris to the river bank.

For the purpose of this Study, the cost of the required bank rehabilitation works has been loosely estimated on the assumption that half of the works identified as being ‘high’ and ‘very high’ priority in the previous study are yet to be implemented.

Subject to the review of the Bank Management Study, it is estimated that the outstanding works could cost up to \$680,000.

**23. UNDERTAKE A SURVEY OF BENTHIC FAUNA IN THE MIDDLE ESTUARY**

Objectives Targeted (refer Table 6)

	2		4		6	7							
--	---	--	---	--	---	---	--	--	--	--	--	--	--

**Actions required:**

1. Advise interested Universities for post-graduate research projects to investigate benthic community
2. Work with university students to offer technical support and quality assurance
3. Review past research and available data from Midcoast Water, DPI Fisheries

**24. OBTAIN CATCH / EFFORT DATA FROM THE ANGLERS CATCH RESEARCH PROGRAM FOR AUSTRALIAN BASS RECORDED AT THE ANNUAL MANNING RIVER BASSCATCH EVENT TO DETERMINE CHANGES IN FISH STOCKS OVER THE LAST 5 YEARS.**

Objectives Targeted (refer Table 6)

	2			5		7							
--	---	--	--	---	--	---	--	--	--	--	--	--	--

**Actions required:**

1. Compile data recorded at Manning River Basscatch events



2. Assess changes in bass numbers during the past 5 years
3. If required, provide recommendations to mitigate decline of fish numbers

**25. UNDERTAKE A DETAILED SURVEY OF FISH POPULATIONS AND THE RECREATIONAL AND COMMERCIAL FISHING INDUSTRY THROUGHOUT THE MANNING RIVER ESTUARY**

Objectives Targeted (refer Table 6)

	2			5		7							
--	---	--	--	---	--	---	--	--	--	--	--	--	--

**Actions required:**

1. Undertake roving creel survey of recreational fish species in the Manning River
2. Collate information and report on fish abundance
3. Use gathered data to determine primary productivity of the estuary
4. Undertake survey of fish abundance in 3 to 5 years to determine any changes in species or distribution
5. Undertake management actions as necessary to control fishing, including investigation of alternative commercial harvesting methods

**26. CONTINUE INVESTIGATIONS INTO MANAGEMENT OF ACID SULPHATE SOILS (ASS) AND DRAINAGE FROM AREAS OF ASS**

Objectives Targeted (refer Table 6)

	2		4		6	7							
--	---	--	---	--	---	---	--	--	--	--	--	--	--

**Actions required:**

1. Use findings from existing study into floodgate impacts and blockages by H-CR CMA in conjunction with inventory of floodgates compiled by DPI Fisheries
2. Determine likely impact of floodgates and drains on fish passage and water quality processes, including mobilisation of acidic runoff
3. Investigate potential to modify or remove existing drains, including voluntary purchase of land and methods to reinstate natural systems, such as wetlands
4. Prepare Acid Sulphate Soils (ASS) remediation action plans for the priority areas identified in DLWC report: 'Acid Sulphate Soil Management Priority Areas in the Lower Manning Floodplain' (Tulau, 1999)
5. Assess rehabilitation measures in terms of feasibility and environmental impact
6. Seek funding to implement measures

**27. UNDERTAKE AN INDUSTRIAL ASSESSMENT OF ALL AGRICULTURAL PRACTICES ADJACENT TO WATERWAYS WITHIN THE CATCHMENT TO ENSURE BEST MANAGEMENT PRACTICES ARE BEING ADHERED TO, INCLUDING COUNCIL’S CATTLE FEEDLOTS CODE 1998**

Objectives Targeted (*refer Table 6*)

	2	3	4		6					11	12		
--	---	---	---	--	---	--	--	--	--	----	----	--	--

**Actions required:**

1. Compile list of agricultural practices for assessment
2. Determine framework with which to assess each practice
3. Undertake assessment of selected farms
4. Analyse results of assessments to identify practices that require improvement
5. Target identified sites as part of education program in **Strategy 43**
6. If required, enforce legal requirements for practices

**28. MODEL COASTAL INUNDATION IN RELATION TO A RANGE OF PREDICTIONS FOR SEA LEVEL RISE**

Objectives Targeted (*refer Table 6*)

	2	3											14
--	---	---	--	--	--	--	--	--	--	--	--	--	----

**Actions required:**

1. Use current sea level rise predictions to assess impact on estuary processes
2. Account for impacts of sea level rise when implementing estuary management strategies
3. Monitor work being undertaken by Intergovernmental Panel on Climate Change and CSIRO to predict sea level change
4. If predictions in sea level rise are confirmed and endorsed by Federal and State authorities, revise estuary management objectives and future strategies to account for predicted sea level change

**29. UNDERTAKE FURTHER ENVIRONMENTAL INVESTIGATIONS INTO THE PROPOSED RE-DESIGN OF THE GANTRY AT HARRINGTON BACK CHANNEL**

Objectives Targeted (refer Table 6)

	2			5			8	9					
--	---	--	--	---	--	--	---	---	--	--	--	--	--

As an alternative to dredging the back channel at Harrington, boating access could be provided to the Back Channel area through a basic re-design of the existing Gantry. If the bridge was raised, it could allow boating access to the village at Harrington and there is also the potential for a Coastal Patrol vessel to be based on the Back Channel area.

It should be noted that additional widening of the Gantry, if incorporated into the design, should consider the impacts of increased flow capacity and tidal exchange on estuarine flora and fauna of the Back Channel area (GTCC, 2001).

**Actions required:**

1. Undertake feasibility study of construction works, including works to raise the bridge to allow vessel access, to determine the cost and associated benefit
2. If option is feasible, prepare an Environmental Impact Statement for the works, considering flood impacts and ecological impacts
3. Subject to the outcomes of above actions, prepare concept and detail designs for works

**30. COUNCIL TO LOBBY STATE GOVERNMENT FOR FUNDING ASSISTANCE TO MAINTAIN NAVIGABILITY OF THE HARRINGTON MAIN CHANNEL THROUGH A SUB-COMMITTEE OF THE ESTUARY & COASTLINE MANAGEMENT COMMITTEE**

Objectives Targeted (refer Table 6)

1	2			5			8	9					
---	---	--	--	---	--	--	---	---	--	--	--	--	--

Investigations have been completed to determine the scope of works and potential environmental impacts associated with dredging the Harrington Main Channel to provide a navigable channel that links the Manning River to the ocean. It is understood that the proposed dredging works can proceed with procurement of appropriate funding.

It has also been suggested that a southern training wall at the Harrington could be constructed to assist in maintaining the navigability of a channel through the Manning River entrance.

**Actions required:**

1. Update economic scoping study and EIS documentation and approvals to lodge application for funding for proposed dredging works
2. Detail design investigations and dredging to proceed upon procurement of funding
3. Compile and review previous investigations and documentation regarding the potential southern training wall at Harrington

4. Undertake a detailed Environmental Impact Assessment for a southern training wall, considering flood impacts and ecological impacts (*in conjunction with Manning River Floodplain Management Committee*)
5. Prepare report containing investigation findings of southern training wall assessment
6. Incorporate program to educate the community regarding the outcomes of investigations

Based on nominal dimensions for the proposed dredging works and an approximate cost for mobilisation of equipment, it is estimated that the works would cost in the order of \$1.7M. This estimate is separate to the costs associated with the investigations detailed in the above actions.

### 31. PREPARE AN ENTRANCE OPENING MANAGEMENT PLAN FOR FARQUHAR INLET

Objectives Targeted (*refer Table 6*)

1	2			5	6	7	8	9	10				
---	---	--	--	---	---	---	---	---	----	--	--	--	--

As discussed above, there has been growing concern from the community regarding the closed state of the Farquhar Inlet and the detrimental impacts on water quality in the lower south of the estuary.

#### **Actions required:**

1. Compile and review all previous documentation regarding the Farquhar Inlet and the existing sedimentary processes
2. If required, undertake additional data collection
3. Prepare and assess protocols for maintaining an open entrance at the inlet, including consideration of environmental impacts and estimated cost of maintenance works
4. Take into consideration the effects of potential erosion and scour on significant features such as Farquhar park camping ground and the nesting sites of migratory birds
5. Prepare management plan to document the findings of investigations and recommendations for protocols for maintaining an open entrance.

### 32. MAP SEAGRASS, SALTMARSH AND MANGROVES THROUGHOUT THE ESTUARY

Objectives Targeted (*refer Table 6*)

	2		4		6	7				11			14
--	---	--	---	--	---	---	--	--	--	----	--	--	----

The extent and density of mangroves, saltmarsh and particularly seagrass beds gives an indication of the extent of habitat that is suitable for benthic fauna. The proliferation of aquatic fauna is important for maintaining and boosting fish stocks in the Manning River.

Habitat connectivity for aquatic species is important for the primary productivity of the estuary, and is expected to become more significant in the event of climate change and the associated impacts on catchment hydrology and flow regimes.

**Actions required:**

1. Undertake survey to ground truth current seagrass extent (*approach Universities for assistance for research projects*)
2. Compare GIS layer of current seagrass extent with GIS data held by Council corresponding to extent of seagrass last surveyed in 1984, and previous aerial photographs taken between the 1940s and the present
3. Investigate impact of previous dredging works on seagrass extent in the lower Manning River
4. Investigate mitigative measures if seagrass extent found to be significantly decreased due to anthropogenic influences

**6.3.4 Monitoring**

**33. DEVELOP A WATER QUALITY MONITORING PROGRAM FOR MANNING RIVER TRIBUTARIES IN THE LOWER ESTUARY TO COMPLEMENT EXISTING MONITORING ACTIVITIES BY COUNCIL, MIDCOAST WATER AND WATERWATCH GROUPS**

Objectives Targeted (*refer Table 6*)

	2	3		5	6	7							
--	---	---	--	---	---	---	--	--	--	--	--	--	--

As discussed in **Section 4.3**, water quality monitoring within the Manning River and its tributaries has previously been undertaken by several separate groups.

A Water Quality Partnership has recently been established. The partnership includes representatives from Council, MidCoast Water, Hunter-Central Rivers CMA, Gloucester Council, Great Lakes Council and the DECC. The current objective of the partnership is to compile a water quality database of all previous water quality monitoring results.

The recently established Water Quality Partnership aims to compile all available water quality data for the Manning River and implement additional monitoring in the lower estuary to determine the impact of future development and agriculture on nutrient levels.

**Actions required:**

1. Monitoring program to determine the impact of catchment activities on nutrient levels in the lower Manning River estuary
2. Compile existing water quality data from Council monitoring activities for Gross Pollutant Traps and for the lagoons at Manning Point and Farquhar Park
3. Compile existing water quality data from 15 sites monitored by MidCoast Water (*spanning 18 years*)
4. Compile existing water quality data from the Waterwatch database, subject to reliability of the data
5. Extract relevant water quality data from database compiled by the Water Quality Partnership (*refer Strategy 34*)

6. Combine existing data into GIS mapping base that shows the location of all previous sampling sites
7. Use the available water quality data to develop a base level water quality data set
8. Additional water quality monitoring to be undertaken at the following 6 sites:
  - Lansdowne River near Lansdowne and at the confluence with Manning River
  - Dawson Creek at the confluence with Manning River and 8 km upstream from the confluence
  - at the tidal limit of Manning River and 10 km upstream from the tidal limit
9. Monitoring to focus on parameters that demonstrate the presence of nutrients and faecal contamination
10. Sampling to be undertaken monthly and following rainfall events
11. Incorporate newly collected water quality data into GIS mapping
12. Use total water quality data set to assess the impact of agricultural activities and urban runoff on nutrient levels in the Manning River

**34. REPRESENTATIVE FROM THE WATER QUALITY PARTNERSHIP (H-CR CMA, MIDCOAST WATER, GTCC AND GLOUCESTER COUNCIL) TO REPORT TO ESTUARY MANAGEMENT COMMITTEE WHEN CURRENT WORK TO COMPILE THE WATER QUALITY DATABASE HAS BEEN COMPLETED**

Objectives Targeted (refer Table 6)

	2	3		5	6	7			10		12		
--	---	---	--	---	---	---	--	--	----	--	----	--	--

**Actions required:**

1. Interrogate compiled database to determine available background data for water quality and identify ongoing regular monitoring activities
2. Results from database analysis to be used in development of water quality monitoring program for the lower estuary (refer **Strategy 33**)
3. Present results to the community

**35. UNDERTAKE MONITORING FOR THE BIOLOGICAL INDICATOR SPECIES, E.COLI AND MACROINVERTEBRATE SPECIES THROUGHOUT THE ESTUARY, TO MONITOR FOR THE PRESENCE OF PATHOGENIC ORGANISMS THAT MAY PRESENT A PUBLIC HEALTH RISK AND TO ASSESS THE HEALTH OF THE ESTUARY**

Objectives Targeted (refer Table 6)

	2	3			6								
--	---	---	--	--	---	--	--	--	--	--	--	--	--

**Actions required:**

1. Monitoring to include sites in the vicinity of outfalls from sewage treatment plants at:
  - Taree

- Wingham
- Manning Point
- Harrington
- Lansdowne
- Cooperbrook
- Gloucester
- Dawson

**36. APPOINT A COORDINATOR FOR THE MANNING RIVER ESTUARY MANAGEMENT PLAN**

Objectives Targeted (*refer Table 6*)

1	2	3	4	5	6	7	8	9	10	11	12	13	14
---	---	---	---	---	---	---	---	---	----	----	----	----	----

**Actions required:**

1. Advertise coordinator position for part-time hours within Council and H-CR CMA
2. Coordinator to spend nominal time and resources to manage activities included in the Estuary Management Plan
3. Coordinator to report to Estuary & Coastline Management Committee and attend all Committee meetings

**6.3.5 Education and Community Involvement**

**37. WORK WITH LANDHOLDERS TO REVEGETATE THE RIPARIAN ZONE ON PRIVATE LAND ALONG WATERWAYS WITHIN THE MANNING RIVER ESTUARY**

Objectives Targeted (*refer Table 6*)

	2	3	4		6				10	11			
--	---	---	---	--	---	--	--	--	----	----	--	--	--

**Actions required:**

1. Identify priority areas for revegetation within the immediate estuarine catchment (*refer to outcomes of review of Manning River Bank Management Strategy - Strategy 22*)
2. Supply tube sock to revegetate priority riparian areas
3. Liaise with landholders and local Landcare and Coastcare groups to assist in the revegetation of priority areas
4. Encourage landholders to conserve existing native remnant vegetation and to enter into Voluntary Conservation Agreements, Biodiversity Management Agreements or Property Vegetation Plans
5. Continue work as part of Council's Community Nursery program
6. Assist in the development of community networks



**38. PREPARE AN EDUCATION PROGRAM TO INFORM COMMUNITY OF CURRENT FLOOD NOTCH PROTOCOLS**

Objectives Targeted (refer Table 6)

1	2			5					10				
---	---	--	--	---	--	--	--	--	----	--	--	--	--

There is potential for the excessive shoaling and resultant beach berm at Farquhar Inlet to exacerbate the impact of flooding in the lower estuary due to the ‘building-up’ of floodwaters behind the berm.

There are existing protocols for the management of the flood notch at Farquhar Inlet. These protocols include details of the works required to open the flood notch during times of flooding so that damage to properties and infrastructure in the lower estuary is reduced.

There is concern from Council that the general community is not informed of the existing flood notch protocols and are therefore worried about the impact that the beach berm will have on flooding. Accordingly, an education program should be developed and implemented and later updated, subject to the findings of additional investigations into providing an open entrance.

**Actions required:**

1. Education program to target Old Bar community and oyster growers
2. Create education brochures explaining the procedures for maintenance of the flood notch and its purpose. Include details of environmental benefits
3. Review strategy following preparation of Entrance Opening Management Plan for Farquhar Inlet

**39. ENCOURAGE LANDHOLDERS TO ENTER INTO PROPERTY VEGETATION PLANS WITH THE HUNTER-CENTRAL RIVERS CATCHMENT MANAGEMENT AUTHORITY**

Objectives Targeted (refer Table 6)

	2	3	4		6				10	11			
--	---	---	---	--	---	--	--	--	----	----	--	--	--

A property vegetation plan (PVP) is a voluntary but legally binding agreement between the landholder and the Hunter-Central Rivers Catchment Management Authority. The Plan will clarify what can be done with native vegetation on a property and give certainty that the agreement will continue for the period of the plan. The clearing provisions of a property vegetation plan last for up to 15 years. There are no fees associated with preparing the Plan.

**Actions required:**

1. H-CR CMA to establish trial of three sites for development of Property Vegetation Plans
2. H-CR CMA officer to undertake site inspections and advise landholders

3. Prepare draft Plans using “PVP Developer”. Incorporate appropriate riparian buffer zones where applicable. H-CR CMA to provide financial incentives.
4. H-CR CMA to review and assess Plans
5. Approval of Property Vegetation Plans by H-CR CMA
6. Advertise and exhibit trial sites to encourage additional landholders to develop PVPs
7. H-CR CMA to report and update progress of PVP development to Estuary Management Committee
8. Assess suitability of H-CR CMA incentives program for works to maintain riparian buffer zones (*up to 50 metres, including Core Riparian Zone and Vegetated Buffer*)

A PVP has the following benefits:

- provides long term security so that native vegetation on a property can be better managed for both financial and environmental outcomes;
- provides clearing provisions that last up to 15 years, reducing the need for repeated development applications;
- provides the basis for providing financial support to farmers to improve the condition of native vegetation on their property;
- provides consistency between agreed management actions on a property and priorities in the Catchment Action Plan; and
- provides clarification for existing use.

Although a PVP is voluntary, a PVP:

- is required when applying for natural resource incentive funding;
- is an alternative to a development application to clear any remnant native vegetation or protected re-growth that is not exempt under the *Native Vegetation Act 2003*; and,
- is required when seeking to secure offsets associated with clearing proposals.

**40. CONDUCT FIELD DAYS FOR RIPARIAN LANDHOLDERS AT DEMONSTRATION SITES TO RAISE AWARENESS OF THE IMPORTANCE OF RIPARIAN VEGETATION**

Objectives Targeted (*refer Table 6*)

	2	3	4		6				10	11			
--	---	---	---	--	---	--	--	--	----	----	--	--	--

Riparian vegetation plays a key role maintaining and improving water quality in estuarine waterways. Riparian vegetation is important because it:

- stabilises riverbanks;
- reduces overland flows; and,
- reduces sediment, nutrient and pathogen loads to the estuary by filtering runoff before it reaches the waterways.

**Actions required:**

1. Publish media article advising of completion of works at demonstration sites and advise of field days
2. Send invitations to all riparian property owners to field days at demonstration sites
3. Undertake field days, taking the opportunity to distribute educational brochures by hand

**41. INTRODUCE A COMMUNITY RECOGNITION AND LOCAL AWARDS SCHEME FOR EFFORTS TOWARDS BIODIVERSITY CONSERVATION**

Objectives Targeted (refer Table 6)

	2		4		6	7			10				
--	---	--	---	--	---	---	--	--	----	--	--	--	--

For many residents, recognition of their efforts towards biodiversity conservation or stormwater management is sufficient to motivate further participation and action. Community recognition of individuals who undertake environmentally responsible practices on their property could include a local award scheme or an awards ceremony facilitated by the Council.

Such public recognition, acknowledgement and encouragement could be assisted by sponsorship from local businesses and industry. Participating landowners could also receive a sign to display on their property gate to show that they are part of a specific project or that they have taken the initiative to start their own local project (DEC, 2004).

**Actions required:**

1. Publish media article advising rural land owners, community groups and schools of awards scheme and request nominations
2. Identify suitable nominees for recognition by undertaking site inspections of nominated properties
3. Invite all participants to presentation via a media article and direct mail
4. Present awards
5. Encourage further nominations by fellow landholders and community groups

**42. DEVELOP A COMMUNITY EDUCATION PROGRAM THAT OUTLINES THE IMPORTANCE OF ESTUARY PROCESSES AND THE POTENTIALLY ADVERSE IMPACTS OF HUMAN ACTIVITIES**

Objectives Targeted (refer Table 6)

	2	3	4		6	7			10	11		13	14
--	---	---	---	--	---	---	--	--	----	----	--	----	----

Education of the community will lead to conscious decisions to make an effort to preserve the state of the estuary and therefore provide the community with a sense of ownership of the estuary.

**Actions required:**

1. Develop a community education program that outlines the importance of estuary processes and the potentially adverse impacts of human activities (*ie: untreated and uncontrolled stormwater runoff, clearing of vegetation, 4WD access*)
2. Develop and distribute a global brochure aimed at the whole community describing issues facing the estuary.
3. Develop and distribute targeted brochures to selected community groups and estuary users (e.g. residents, tourists, recreational fishers) outlining potentially adverse impacts.
4. Provide educational brochures on Council's Website in PDF format. Include print-friendly versions of all brochures.
5. Organise media coverage of on-the-ground works as they are carried out and achievements in the implementation of this Plan.

**43. PREPARE AND UNDERTAKE A TARGETED COMMUNITY EDUCATION PROGRAM FOR RURAL PROPERTY OWNERS TO MAKE THEM AWARE OF BEST MANAGEMENT LAND-USE PRACTICES.**

Objectives Targeted (*refer Table 6*)

	2	3	4		6				10	11			
--	---	---	---	--	---	--	--	--	----	----	--	--	--

These practices include:

- Minimisation of slope erosion;
- Minimisation of gravel loss and bank erosion at river crossings;
- Controlling cattle access to waterways;
- Minimisation of vegetation clearing;
- Replanting of native catchment and riparian vegetation;
- Appropriate application (*timing and locations*) of fertilisers; and,
- Installation of sediment traps.

**Actions required:**

1. Post “expression of interest” brochures / letters to all rural property owners to identify interested parties, availability and topics for discussion
2. Make follow-up phone calls to potential participants
3. Publish a media article inviting all rural property owners to workshops
4. Undertake workshops for rural property owners at local community hall
5. Distribute industry-specific education brochures to all landholders
6. Encourage rural landowners to develop Property Vegetation Plans

**44. CONSTRUCT INTERPRETATIVE SIGNS AT KEY LOCATIONS THROUGHOUT THE ESTUARY TO PROVIDE EDUCATION ON THE POTENTIALLY ADVERSE IMPACTS OF HUMAN ACTIVITIES ON THE ENVIRONMENTAL HEALTH OF THE ESTUARY, PARTICULARLY STORMWATER POLLUTANTS AND DISTURBANCE OF THE RIPARIAN ZONE**

Objectives Targeted (*refer Table 6*)

			4		6		8		10			13	
--	--	--	---	--	---	--	---	--	----	--	--	----	--

**Actions required:**

1. Undertake audit of signs previously installed prior to the erection of additional signs
2. Design and erect signs at key locations of estuary usage and where the estuary may be impacted by human activities:
  - Foreshore reserves
  - Boat ramps
  - Wetland areas
3. Mark existing stormwater inlet pits with message, "This pit drains to Manning River" (*or applicable equivalent*) in 100 mm high bold yellow lettering using standard road line marking paint.
4. Involve community groups and local schools in the development of designs for signs.

**45. DEVELOP A 4 YEARLY "STATE OF THE MANNING" ENVIRONMENTAL REPORT CARD ON ALL ESTUARY MONITORING ACTIVITIES AND THE HEALTH OF THE ESTUARY (TO TIE IN WITH SOE REPORTING)**

Objectives Targeted (*refer Table 6*)

	2	3							10				
--	---	---	--	--	--	--	--	--	----	--	--	--	--

**Actions required:**

1. Develop report card layout / structure
2. On a 4 yearly basis, compile all estuary water quality data from existing/future water quality monitoring programs and Marine Parks Authority monitoring
3. Assess water quality monitoring data against target values
4. Prepare report card detailing all water quality monitoring activities, including comparisons against target values
5. Prepare report card detailing all monitoring activities relating to ecological processes
6. Publish report card in local media and make available on Council's Website

# 7 RECOMMENDATIONS

---

## 7.1 PRIORITISED STRATEGIES

A prioritised list of estuary management strategies is required for inclusion in the Manning River Estuary Management Plan. Due to the importance of strategies that aim to address the most urgent management issues, it is recommended that these strategies be implemented sooner than other strategies.

Prioritisation of strategies was undertaken through consideration of feedback from the Estuary Management Committee and the relative importance of the issues and management objectives that each strategy aims to address.

Each strategy has been assigned a priority ranking. The priority rankings are defined as follows:

- **Priority 1** – Implementation should proceed immediately and is required to address major issues considered to require urgent attention. Physical implementation of works or changes to policy should be achieved within the next three (3) years.
- **Priority 2** – Implementation should proceed at some time during the next five (5) years and is required to address issues that have proved to be a consistent problem, but which can be “lived with” over the short term in the interests of achieving the right result rather than risking a quick “fix-it” solution that hasn’t been thought out.
- **Priority 3** – Implementation should proceed at some time 5 - 10 years from now and is required for the long term benefit of the estuary, strategy is less urgent and can be built into other investigations or activities within the region.

It is recommended that the estuary management strategies for Manning River estuary be assigned a priority rank as specified below. The prioritised strategies have again been grouped into the following categories:

- Planning controls and policies;
- On-ground works;
- Investigation and research;
- Monitoring; and,
- Education and community involvement.

### 7.1.1 Planning Controls and Policies

#### Priority One Strategies

- Finalisation of a comprehensive land use plan (*the Greater Taree Conservation and Development Strategy*) to identify areas of future urban development and high conservation value
- Ensure Council planning staff are briefed on the contents of the Manning River Estuary Management Plan and aware of the impacts of planning decisions on estuary water quality and recent changes in legislation and policies for urban development along the Manning River Estuary
- Incorporate provisions to address Acid Sulphate Soils (ASS) management and rehabilitation into the new 'Local Plan 2008' (LEP), currently being prepared by Greater Taree City Council
- Request that a representative from the Manning River Commercial Fishers Association report to the Estuary Management Committee on the implementation of the Association's Environmental Management System for the Manning River Commercial Fishery
- Incorporate 40 metre wide un-developed 'Environmental Conservation' Zones adjacent to waterways within the revised Greater Taree City Council LEP (*Local Plan 2008*) and in accordance with the Greater Taree Draft Conservation and Development Strategy
- Take an adaptive approach towards planning and development design to cater for sea level rise within the revised Greater Taree City Council LEP (*Local Plan 2008*)

#### Priority Two Strategies

- Prepare an Integrated Water Cycle Management Plan based on the recommendations of the Integrated Water Cycle Management Strategy
- Incorporate Water Sensitive Urban Design (WSUD) principles and requirements into the new Greater Taree City Local Environmental Plan (*Local Plan 2008*) and Development Control Plan (DCP)
- Using the Manning River Water Quality Objectives establish a set of catchment health indicators by which the cumulative impact of development can be measured and managed (*this can be done in conjunction with State of the Environment reporting and incorporated into an estuary health report card – refer strategy 48*)
- In conjunction with the recommendations of the Department of Lands Crown Lands Assessment, identify and protect significant reserve sites throughout the estuary and linkages of vegetation through Crown Land management plans and Council planning legislation
- Review provisions for the protection of wetlands and vegetation communities on the Manning River floodplain
- Undertake a review of the 8 existing Plans of Management for SEPP 26 littoral rainforests along the Manning River



- NSW Maritime to prepare or commission the preparation of a Boating Plan for the Manning river
- NSW Fisheries (*DPI*) to review mapping of priority oyster aquaculture areas, as contained in the Sustainable Aquaculture Strategy (2006), to incorporate the location of recreational facilities in the lower estuary, such as boat launching ramps and jetties

### 7.1.2 On-Ground Works

#### Priority One Strategies

- Prepare and action a Plan of Management for the Manning Point foreshore
- Council to lobby State Government for funding assistance to undertake dredging of the Harrington Back Channel:
  - ⇒ Option A - Dredging of channel 50 metres wide
  - ⇒ Option B - Dredging of pilot channel only (*15m wide*)

#### Priority Two Strategies

- Construct fencing along creeks and rivers in the estuary where livestock access the river
- Create habitat to encourage mangrove growth at bank erosion sites throughout the estuary
- Dredge the navigation channel at identified rowing course adjacent to Shallow Island and locate and remove wrecks of old vessels and other navigational hazards

### 7.1.3 Investigation and Research

#### Priority One Strategies

- Undertake a field survey to ground truth the mapped extents where foreshore vegetation has been removed along the estuary and its tributaries
- Review the Manning River Bank Management Study (1997)
- Obtain catch / effort data from the Anglers Catch Research Program for Australian Bass recorded at the annual Manning River Basscatch event to determine changes in fish stocks over the last 5 years
- Council to lobby State Government for funding assistance to maintain navigability of the Harrington Main Channel
- Council in partnership with State Government to prepare an Entrance Opening Management Plan for Farquhar Inlet
- Map seagrass, saltmarsh and mangroves throughout the estuary

### Priority Two Strategies

- Identify, preserve and protect Indigenous and non-indigenous heritage sites throughout the estuary
- Undertake a detailed survey of fish populations and the recreational and commercial fishing industry throughout the Manning River Estuary
- Continue investigations into management of Acid Sulphate Soils (ASS) and drainage from areas of ASS
- Undertake an Industrial Assessment of all agricultural practices adjacent to waterways within the catchment to ensure best management practices are being adhered to, including Council's Cattle Feedlots Code 1998
- Model coastal inundation in relation to a range of predictions for sea level rise
- Undertake further environmental investigations into the proposed re-design of the Gantry at Harrington Back Channel

### Priority Three Strategies

- Undertake a survey of benthic fauna in the middle estuary

## 7.1.4 Monitoring

### Priority One Strategies

- Develop a water quality monitoring program for Manning River tributaries in the lower estuary to complement existing monitoring activities by Council, MidCoast Water and Waterwatch groups
- Representative from the Water Quality Partnership (*H-CR CMA, MidCoast Water, GTCC and Gloucester Council*) to report to Estuary Management Committee when current work to compile the water quality database has been completed
- Appoint a coordinator for the Manning River Estuary Management Plan

### Priority Two Strategies

- Undertake monitoring for the biological indicator species, E.Coli and macroinvertebrate species throughout the estuary, to monitor for the presence of pathogenic organisms that may present a public health risk and to assess the health of the estuary

## 7.1.5 Education and Community Involvement

### Priority One Strategies

- Prepare an education program to inform community of current flood notch protocols

- Encourage landholders to enter into Property Vegetation Plans with the Hunter-Central Rivers Catchment Management Authority
- Conduct field days for riparian landholders at demonstration sites to raise awareness of the importance of riparian vegetation
- Develop a community education program that outlines the importance of estuary processes and the potentially adverse impacts of human activities
- Prepare and undertake a targeted community education program for rural property owners to make them aware of best management land-use practices, such as:
  - ⇒ Minimisation of slope erosion;
  - ⇒ Minimisation of gravel loss and bank erosion at river crossings;
  - ⇒ Controlling cattle access to waterways
  - ⇒ Minimisation of vegetation clearing
  - ⇒ Replanting of native catchment and riparian vegetation;
  - ⇒ Appropriate application (*timing and locations*) of fertilisers; and
  - ⇒ Installation of sediment traps.

#### Priority Two Strategies

- Work with landholders to revegetate the riparian zone on private land along waterways within the Manning River Estuary
- Construct interpretative signs at key locations throughout the estuary to provide education on the potentially adverse impacts of human activities on the environmental health of the estuary, particularly stormwater pollutants and disturbance of the riparian zone
- Develop a 4 yearly “State of the Manning ” environmental report card on all estuary monitoring activities and the health of the estuary (*to tie in with SoE reporting*)

#### Priority Three Strategies

- Introduce a community recognition and local awards scheme for efforts towards biodiversity conservation

## 8 REFERENCES

---

- (1) Adam, P (1985) *Coastal Wetlands of New South Wales: A Survey and Report prepared for the Coastal Council of New South Wales*
- (2) Atkinson, G., Tulau, M.J. and Currie, B.A. (2003) *Cattai Creek Acid Sulfate Soils Hot Spot Remediation Concept Plan* NSW Department of Infrastructure, Planning and Natural Resources.
- (3) Australian and New Zealand Environment & Conservation Council (ANZECC) (1999) *Threatened Fauna List*
- (4) Australian and New Zealand Environment & Conservation Council (ANZECC) (1992) *Australian Water Quality Guidelines for Fresh and Marine Waters*; ISBN 0 642 18297 3
- (5) Bateson, P. (2001) *Incentives for Sustainable Land Management: Community cost-sharing to conserve biodiversity on private lands* A guide for local government. Revised edition. Environment Australia, Canberra and Environs Australia, Melbourne.
- (6) Birse, B., Hemmingway, T. and Cocchini, C. (2005) *Draft Assessment of Crown Land at Manning River Estuary*. Department of Lands. June 2005.
- (7) Breen, D.A., Avery, R.P. and Otway, N.M. (2004) *Broadscale Biodiversity Assessment of the Manning Shelf Marine Bioregion*. NSW Marine Parks Authority.
- (8) Bucher, D. (2002) *Recreational Fishing Effort in the Manning River Estuary: Final Report prepared for Greater Taree City Council*. Centre for Coastal Management, Southern Cross University, PO Box 157 Lismore NSW 2480. 26 November 2002.
- (9) Department of Infrastructure, Planning and Natural Resources (2004) *Standard Provisions for Local Environmental Plans in NSW*. Discussion paper, September 2004
- (10) Department of Infrastructure, Planning and Natural Resources (Undated) *Proposed Dredging for the Harrington Waters Estate – Manning River: Report on the Assessment of a Development Application (DA 122-5-2002) Pursuant to Section 79C of the Environmental Planning and Assessment Act 1979*
- (11) Department of Lands (2005) *Crown Lands Policy for Marinas and Waterfront Commercial Tenures*.
- (12) Department of Lands (2005) *Draft Assessment of Crown Land at Manning River Estuary*.
- (13) Domain Environmental and Engineering (1996) *Blackhead Lagoon Estuary Processes Study*
- (14) Ellis Karm and Associates Pty Ltd (2001) *Old Bar Sewerage Scheme: Sewerage Servicing Strategy May 2001*. Report prepared on behalf of Mid Coast Water.
- (15) Ellis Karm and Associates Pty Ltd (2001) *Harrington Sewerage Scheme: Sewerage Servicing Strategy July 2001*. Report prepared on behalf of Mid Coast Water.

- (16) Ellis Karm and Associates Pty Ltd (2003) 'Taree Sewerage Scheme: Sewerage Servicing Strategy October 2003'. Report prepared on behalf of Mid Coast Water.
- (17) Ellis Karm and Associates Pty Ltd (2005) 'Manning Point Sewerage Scheme: Sewerage Servicing Strategy April 2005'. Report prepared on behalf of Mid Coast Water.
- (18) Greater Taree City Council (1982) 'City of Greater Taree Development Control Plan No.6 Policy Regulating the Keeping of Pigs'
- (19) Greater Taree City Council (1987) 'Interim Flood Management Policy 1987'
- (20) Greater Taree City Council (1987) 'Manning River Entrance Study – Background and Issues of Concern'
- (21) Greater Taree City Council (1990) 'Manning River Recreational Waters Development Strategy'
- (22) Greater Taree City Council (1994) 'Water Quality in the Manning River Report'
- (23) Greater Taree City Council (1995) 'Greater Taree Local Environmental Plan 1995'
- (24) Greater Taree City Council (1995) 'Greater Taree Development Control Plan 1995'. Amended by Council – 10 April 2002.
- (25) Greater Taree City Council (1996) 'Greater Taree Development Control Plan No.38 Maintenance of Open Drains'
- (26) Greater Taree City Council (1997) 'Manning River Estuary Processes Study', prepared by Webb, McKeown & Associates Pty Ltd.
- (27) Greater Taree City Council (1998) 'Black Head Lagoon Estuary Management Plan'
- (28) Greater Taree City Council (1998) 'Greater Taree City Council Harrington Development Strategy'
- (29) Greater Taree City Council (1999) 'Greater Taree City Council Development Control Plan No.43 Erosion and Sediment Control Policy and Code of Practice'
- (30) Greater Taree City Council (2001) 'Greater Taree City Council Development Control Plan No.47 – Bungay Estate'
- (31) Greater Taree City Council (2001) 'Manning River Estuary Management Study – Numerical Modelling', prepared by WBM Oceanics Australia.
- (32) Greater Taree City Council (2002) 'Recreational Fishing in the Manning River'
- (33) Greater Taree City Council (2002) 'Greater Taree City Council Rural Residential Strategy and Release Program'. Amended September 2002.
- (34) Greater Taree City Council (2003) 'Greater Taree City Council Development Control Plan No. 42 On-Site Effluent Disposal Policy'
- (35) Greater Taree City Council (2003) 'Greater Taree City Council Old Bar / Wallabi Point Development Strategy'. Reviewed and amended by Council January 2003.
- (36) Greater Taree City Council (2003) 'On-Site Sewage Management Strategy Amendment 1'
- (37) Greater Taree City Council (Undated) 'On-Site Sewage Management Water Quality Sampling Program'. Enhancement Project Grant Greater Taree E23. Department of Local Government.

- (38) Greater Taree City Council (2005) 'Greater Taree City Council Heritage Strategy May 2005'
- (39) Greater Taree City Council (2005) 'Browns Creek Estuary and Catchment Management Plan Draft September 2005'
- (40) Healthy Rivers Commission (2003) 'Final Report – Independent Inquiry Into the North Coast Rivers'
- (41) Hunter Central Rivers Catchment Management Authority (2005) 'Catchment Action Plan and Incentives Programs Guidelines'
- (42) James, R. (2002) 'Mangrove Regeneration and Estuarine River Bank Stability: The Easy Way'\_Coast to Coast 2002. NSW Department of Land and Water Conservation.
- (43) Johnston, S., Kroon, F., Slavich, P., Cibilic, A. and Bruce, A. (2003) 'Restoring the Balance: Guidelines for Managing Floodgates and Drainage Systems on Coastal Floodplains'. NSW Agriculture, Wollongbar, Australia.
- (44) Manning Catchment Management Committee (1996) 'Manning Valley Draft Strategic Plan'
- (45) Manning DELTA Landholders Protection Committee (2003) 'Interim Drain Maintenance Guidelines'
- (46) Manning River Commercial Fishers Association (200?), 'Environmental Management System', prepared with the assistance of Ocean Watch Ltd and the Fisheries Research and Development Corporation.
- (47) Mid Coast Water (2005) 'Wingham Sewerage Scheme: Sewerage Servicing Strategy January 2005'
- (48) NSW Department of Land and Water Conservation (1996) 'The NSW Wetlands Management Policy'
- (49) NSW Department of Natural Resources (2006) 'NSW Water Quality and River Flow Objectives; Manning River Catchment', DNR website.
- (50) NSW Department of Primary Industries (2006) 'Oyster Industry Sustainable Aquaculture Strategy'.
- (51) NSW Department of Public Works and Services (1987) 'Water Quality Report for the Manning River (Northern Rivers Study No. 7)'
- (52) NSW Department of Public Works and Services (1990) 'Manning River Data Compilation Study', prepared by the Coast and Rivers Branch.
- (53) NSW Fisheries (1999) 'Policy and Guidelines; Aquatic Habitat Management and Fish Conservation', updated in 2005.
- (54) NSW Fisheries (2003) 'Fishery Management Strategy for the Estuary General', prepared in February 2003.
- (55) NSW Government (1992), 'Estuary Management Manual'
- (56) NSW National Parks and Wildlife Service (1987) 'Crowdy Bay National Park Plan of Management'. NSW National Parks and Wildlife Service December 1987.
- (57) NSW National Parks and Wildlife Service (2003a) 'Coocumbac Island Nature Reserve Plan of Management'. NSW National Parks and Wildlife Service September 2003.

- (58) NSW National Parks and Wildlife Service (2003b) 'Wingham Brush Nature Reserve Plan of Management'. NSW National Parks and Wildlife Service November 2003.
- (59) NSW National Parks and Wildlife Service (2005) 'Brimbin Nature Reserve Plan of Management'. NSW National Parks and Wildlife Service May 2005.
- (60) Public Works Engineering Division (1987) 'Manning River Entrance Study – Background and Issues of Concern' May 1987.
- (61) Roylat Services Pty Ltd (2003) 'Manning River Entrance Improvement Project – Economic Scoping Study'
- (62) State Pollution Control Commission (1986) 'Water Quality in the Manning River' State Pollution Control Commission Northern Rivers Study No.7.
- (63) Stone, Graeme (1997) 'The Manning River Unplugged'
- (64) Tulau, M.J. (1999) 'Acid Sulphate Soil Management Priority Areas in the Lower Manning Floodplain'. Report. Department of Land and Water Conservation, Sydney.
- (65) WBM Oceanics Australia (2001) 'Estuary Management Study – Numerical Modelling Report';
- (66) Webb, Mckeown & Associates Pty Ltd, Consulting Engineers (2000) 'Taree CBD Foreshore Management Plan'
- (67) Webb, Mckeown & Associates Pty Ltd, Consulting Engineers (1997) 'Manning River Bank Management Study';
- (68) Wetland Care Australia (2005) 'Cattai Wetland Project – Background' Information Bulletin #1 24 January 2005.

---

# **APPENDIX A**

## **GLOSSARY**

---



## GLOSSARY OF TECHNICAL TERMS

<b>Algae</b>	Non-rooted aquatic plants, specifically non-vascular photosynthetic organisms with unicellular reproductive organs, including phytoplankton and seaweeds.
<b>Aerobic Bacteria</b>	Bacteria that obtain metabolic energy by aerobic (oxygen requiring) respiration.
<b>Algal Bloom</b>	The excessive growth of phytoplankton, generally caused by high nutrient levels. Can result in deoxygenation of the water mass, leading to the death of aquatic flora and fauna.
<b>Amenity</b>	Those features of an estuary that foster its use for various purposes; e.g., clear waters and sandy beaches make beach-side recreation attractive.
<b>Amphibian</b>	"Any frog or other member of the class amphibia that is native to Australia, including the eggs and the young thereof".
<b>Anaerobic Bacteria</b>	Bacteria that obtain metabolic energy by a variety of non aerobic (not oxygen dependent) pathways, including the reduction of nitrates ('denitrification') and/or sulphates.
<b>Animal</b>	Any animal, whether vertebrate or invertebrate, and at whatever stage of development, but does not include fish within the meaning of the Fisheries and Oyster Farms Act, 1935, other than amphibians or aquatic or amphibious mammals or aquatic or amphibious reptiles'.
<b>Annual Exceedance Probability</b>	The chance or likelihood that an event of a nominated size or greater (e.g. flood discharge) will occur in any year.
<b>Balanced Development</b>	The weighing of ecological, social and economic consequences in determining the nature, location and degree of estuarine development.
<b>Baseline Monitoring</b>	A monitoring program aimed at determining long-term and possibly pre-disturbance levels and variation in some parameter of interest, e.g. dissolved oxygen.
<b>Benthos, Benthic Organisms</b>	Organisms living in or on the bed of a waterbody.
<b>Biological Oxygen Demand</b>	Oxygen required by aerobic bacteria in metabolising detritus.
<b>Biota</b>	Living organisms.
<b>Bird</b>	"Any bird that is native to, or is of a species that periodically or occasionally migrates to, Australia, and includes the eggs and the young thereof and the skin, feathers or any other part thereof".
<b>Degradation</b>	A reduction in the area of estuarine habitat; or in the well-being, health and viability of estuarine ecosystems; or in estuarine amenity.
<b>Denitrification</b>	See anaerobic bacteria.
<b>Detritus</b>	All non-living organic material, including animal waste products and the remains of animals, plants and micro-organisms/ together with the associated microbial community {bacteria and fungi}.
<b>Diffuse Source Pollution</b>	Pollution originating from a widespread area, e.g. urban stormwater runoff, agricultural runoff.
<b>Discharge</b>	Volumetric flow rate of water, typically measured in terms of cubic metres per second (m <sup>3</sup> /s).
<b>Dissolved Oxygen</b>	Atmospheric oxygen that dissolves in water. The solubility of oxygen in water depends upon temperature and salinity.
<b>Ebb Tide</b>	The outgoing tidal movement of water within an estuary.

<b>Ecologically Sustainable Development</b>	Development that does not interfere with the short and long term well-being, health and viability of estuarine ecosystems.
<b>Ecosystem</b>	A community of living organisms, together with the environment in which they live and with which they interact.
<b>Endangered Fauna</b>	"Protected Fauna of a species named in Schedule 12" of the National Parks and Wildlife Act 1974.
<b>Entrance Bar</b>	A deposit of sand or silt across the entrance to an estuary. The material may be either fluvial or marine in origin.
<b>Environmental Impact Statement</b>	"An assessment of the impact of a proposed development".
<b>Estuarine Processes</b>	Those processes that affect the physical, chemical and biological behaviour of an estuary, e.g. predation, water movement, sediment movement, water quality, etc.
<b>Estuarine Resources</b>	The totality of the animal, vegetable and mineral matter associated with an estuary and its environs' including estuarine waters, together with the amenity of the estuary.
<b>Estuary</b>	An enclosed or semi-enclosed body of water having an open or intermittently open connection to coastal waters in which water levels vary in a periodic fashion in response to ocean tides.
<b>Estuary Management Process</b>	A sequence of activities starting with the formation of an Estuary Management Committee and culminating in the implementation of an Estuary Management Plan that will foster the balanced and sustainable use of estuaries.
<b>Fauna</b>	"Any mammal, bird, reptile or protected amphibian".
<b>Fish (In the context of the Fisheries &amp; Oyster Farms Act, 1935)</b>	"All or any of the varieties of marine, estuarine or freshwater fishes "whether indigenous or not" and their young, fry and spawn, and unless the contrary intention be expressly stated or the context otherwise requires, includes crustacea and oysters and all marine, estuarine and freshwater animal life, and any part of a fish as hereinbefore defined, but does not include any species of whales".
<b>Flood Mitigation Works</b>	Structures that are designed to manage floodwaters (e.g. levees, retarding basins).
<b>Flood Tide</b>	The incoming tidal movement of water within an estuary.
<b>Fluvial</b>	Pertaining to non-tidal flows.
<b>Fluvial Processes</b>	The erosive and transport processes that deliver terrestrial sediment to creeks, rivers, estuaries and coastal waters.
<b>Fluvial Sediments</b>	Land-based sediments carried to estuarine waters by rivers.
<b>Foreshore</b>	The area of shore between low and high tide marks and land adjacent thereto.
<b>Geomorphology</b>	The study of the origin, characteristics and development of land forms.
<b>Habitat</b>	The places in which an organism lives and grows. Many estuarine organisms require different habitats at different stages of their life cycles.

<b>Heavy Metals</b>	Generally, those metals that occur in Groups IS to VIII B of the Periodic Table with atomic numbers between 21 and 84, but excluding Rare Earth elements. Heavy metals generally have a specific gravity of 5.0 or more and include chromium, iron, nickel, copper, zinc, silver, cadmium, platinum, gold, mercury and lead. Although essential in trace concentrations, some heavy metals are toxic to aquatic organisms at higher concentrations, e.g. mercury, lead, copper and zinc. Even when present in sub-lethal concentrations, heavy metals may adversely affect the health of aquatic organisms.
<b>Hydraulic Regime</b>	The variation of estuarine discharges in response to seasonal freshwater inflows and diurnal tides.
<b>Intertidal</b>	Pertaining to those areas of land covered by water at high tide, but exposed at low tide, e.g. intertidal habitat.
<b>Invertebrate</b>	Animal without a backbone, e.g. jellyfish.
<b>Large-Scale Boundary Effects</b>	The promotion of mixing in estuarine waters caused by the presence of large boundary features, such as headlands, bays and channels, that disturb flood and ebb tide flow patterns and provide storage for waters on the flood tide and release of these waters on the ebb, and so facilitate mixing across the estuary.
<b>Levee</b>	A man-made embankment or wall built to exclude floodwaters, or a natural embankment adjacent to a waterway built by the deposition of silt from floodwaters..
<b>Littoral Zone</b>	An area of the coastline in which sediment movement by wave, current and wind action is prevalent.
<b>Macrophytes (aquatic)</b>	Rooted aquatic plants, e.g. Eelgrass.
<b>Mangroves</b>	An intertidal plant community dominated by trees.
<b>Marine Sediments</b>	Sediments in coastal waters moved along the coast by littoral processes.
<b>Neap Tides</b>	Tides with the smallest range in a monthly cycle. Neap tides occur when the sun and moon lie at right angles relative to the earth (the gravitational effects of the moon and sun act in opposition on the ocean).
<b>Numerical Model</b>	A mathematical representation of a physical, chemical or biological process of interest. Computers are often required to solve the underlying equations.
<b>Physical Model</b>	The representation of physical processes of interest, e.g. water movement or sediment movement, by a scale model of the estuary and the process.
<b>Phytoplankton</b>	Microscopic free-floating aquatic plants (algae).
<b>Point-Source Pollution</b>	Specific localised source of pollution, e.g. sewage effluent discharge, industrial discharge.
<b>Poorly-Mixed Estuary</b>	An estuary characterised by poor vertical mixing, pronounced vertical salinity gradients and a discrete body of saltwater (a salt wedge) underlying freshwater.
<b>Protected Fauna</b>	Fauna of a species not named in Schedule 11 of the National Parks and Wildlife Act 1974.
<b>Protected Native Plant</b>	A native plant of a species named in Schedule 13n of the National Parks and Wildlife Act 1974.
<b>Receiving Waters</b>	Waters into which effluent or waste streams are discharged or discharge.
<b>Reptile</b>	"A snake, lizard, crocodile, tortoise, turtle or other member of the class reptilia (whether native, introduced or imported), and includes the eggs and the young thereof and the skin or any other part thereof".

<b>Revetments</b>	Walls built parallel to the shoreline to limit shoreline recession.
<b>Riparian Vegetation</b>	Vegetation growing along banks of rivers, including the brackish upstream reaches of an estuary.
<b>Runoff</b>	That proportion of rainfall that drains off the land's surface.
<b>Salinity</b>	The total mass of dissolved salts per unit mass of water. Seawater has a salinity of about 35 g/kg or 35 parts per thousand.
<b>Salinity Limit</b>	The landward limit of salinity intrusion along an estuary. The location of the salinity limit changes with freshwater discharge, high freshwater inflows moving the limit downstream, whilst low flows allow salt and the salinity limit to migrate upstream.
<b>Saltmarsh</b>	A coastal wetland subject to tidal flooding and vegetated by grasses, herbs and low shrubs that are tolerant of high salinity.
<b>Salt Wedge</b>	The wedge-shaped body of saltwater that underlies freshwater in poorly-mixed estuaries.
<b>Sediment Load</b>	The quantity of sediment moved past a particular cross-section in a specified time.
<b>Semi-diurnal</b>	A twice-daily variation, e.g. two high waters per day.
<b>Shear Strength</b>	The ability of the bed to accommodate flowing water without the movement of bed sediments. The shear strength of the bed depends upon bed material, degree of compaction and armouring,
<b>Shoals</b>	Shallow areas in an estuary created by the deposition and build up of sediments.
<b>Spring Tides</b>	Tides with the greatest range in a monthly cycle, which occur when the sun, moon and earth are in alignment (the gravitational effects of the moon and sun act in concert on the ocean).
<b>Storm Surge</b>	The increase in coastal water levels caused by the barometric and wind setup effects of storms. Barometric setup refers to the increase in coastal water levels associated with the lower atmospheric pressures characteristic of storms. Wind setup refers to the increase in coastal water levels caused by an onshore wind driving water shorewards and piling it up against the coast.
<b>Surface Pollutants</b>	Floating pollutants that do not mix effectively with water, e.g. Oil.
<b>Suspended Sediment Load</b>	That portion of the total sediment load held in suspension by turbulent velocity fluctuations and transported by flowing water.
<b>Swale</b>	A topographic depression in a dune system that may retain water.
<b>Tidal Amplification</b>	The increase in the tidal range at upstream locations caused by the tidal resonance of the estuarine waterbody, or by a narrowing of the estuary channel.
<b>Tidal Exchange</b>	The proportion of the tidal prism that is flushed away and replaced with 'fresh' coastal water each tide cycle.
<b>Tidal Limit</b>	The most upstream location where a tidal rise and fall of water levels is discernible. The location of the tidal limit changes with freshwater inflows and tidal range.
<b>Tidal Prism</b>	The total volume of water moving past a fixed point on an estuary during each flood tide or ebb tide.
<b>Tidal Propagation</b>	The movement of the tidal wave into and out of an estuary.
<b>Tidal Range</b>	The difference between successive high water and low water levels. Tidal range is maximum during Spring Tides and minimum during Neap Tides.

<b>Tides</b>	The regular rise and fall in sea level in response to the gravitational attraction of the sun, moon and planets.
<b>Total Catchment Management</b>	"The coordinated and sustainable use of land, water, vegetation and other natural resources on a water catchment basis so as to balance resource utilisation and conservation".
<b>Training Walls</b>	Walls constructed at the entrances of estuaries to improve navigability.
<b>Turbidity</b>	A measure of the ability of water to absorb light.
<b>Vertebrate</b>	Animal with a backbone, e.g. fish, birds.
<b>Water Quality</b>	The suitability of the water for various purposes, as measured by the concentration or level of a wide variety of contaminants.
<b>Well-Mixed Estuary</b>	Estuary characterised by strong vertical mixing and weak or non-existent vertical salinity gradients.

---

**APPENDIX B**  
MEMBERS OF THE MANNING RIVER  
ESTUARY MANAGEMENT COMMITTEE

---

**Table B MEMBERS OF THE ESTUARY AND COASTLINE MANAGEMENT COMMITTEE 2004 – 2008**

NAME	ORGANISATION
Councillor Richard Wilson ( <i>Chair</i> )	Greater Taree City Council
Councillor John Byrne	Greater Taree City Council
Councillor Helen Hannah	Greater Taree City Council
Ric Slatter	Department of Environment and Climate Change Natural Resources
Brian Semple	Department of Lands
Kevin Carter	Department of Environment and Climate Change Parks and Wildlife
Bret Ryan	NSW Maritime Authority
Martin Angle	NSW DPI Fisheries – Wallis Lakes Fisheries Office
Jim Love	Commercial / interest – Waterways
Simon Skelton	Manning Coastcare
Beryl Neilsen (alternative George Townsend)	Manning Valley Channel Committee
John Sorby	Old Bar resident
Brian Hughes	H-CR CMA – Regional Coastcare Facilitator
Trevor Burns	Manning River Sustainable Recreational Fishing and Tourism Committee
Chris Watson (alternative Sherree Sheather)	Taree Fisherman's Co-operative Society Limited
Mark Polson	Oyster Growers Association
Ian Crisp	Manning River Oyster Farmers Association
Peter Longworth	Manning Delta Landowners Protection Committee

---

## **APPENDIX C**

### **STATE LEGISLATION**

---



## Consolidated Acts

### Native Vegetation Act 2003

The *Native Vegetation Act (NV Act) 2003* replaces the *NVC Act 1997*. The *NV Act* sets the legislative framework for protecting the health of land, rivers and wildlife while delivering investment security and increased flexibility for landholders. The new system is based on voluntary agreements between landholders and Catchment Management Authorities called Property Management Plans (*PMPs*) or Property Vegetation Plans (*PVPs*). The new Act sets a framework for:

- ending broadscale clearing unless it improves or maintains environmental outcomes;
- encouraging revegetation and rehabilitation of land with native vegetation; and
- rewarding farmers for good land management.

Key improvements include:

- flexibility for landholders;
- no consent required for routine agricultural management activities;
- the introduction of financial incentives for landholders;
- an end to broadscale clearing by limiting the circumstances under which clearing may be approved;
- improving and streamlining the application process for the clearing of native vegetation;
- property vegetation plans that will provide certainty and flexibility for landholders allowing clearing for up to 15 years;
- clear definitions for different classes of native vegetation;
- involvement of local people in decision making; and,
- certainty for private native forestry.

### National Parks and Wildlife Act 1974

The *National Parks and Wildlife Act (NPW Act) 1974* is the principal legislation for protecting both Aboriginal and Non-Aboriginal cultural sites in the Manning River Estuary. Under the Act, the Director-General of DECC is responsible for the care, control and management of all national parks, historic sites, nature reserves, reserves, Aboriginal areas and state game reserves. State conservation areas, karst conservation reserves and regional parks are also administered under the Act. The *National Parks and Wildlife Regulation 2002* governs various activities under the *NPW Act*, including:

- the regulation of the use of national parks and other areas administered by the DEC (*Part 2*);
- the preservation of public health in Kosciuszko National Park (*Part 3*);
- licenses and certificates (*Part 4*);
- the protection of fauna (*Part 5*);
- the exemption of Aboriginal people from the restrictions imposed by various sections of the Act on the hunting of certain animals and the gathering of certain plants (*Part 6*);

- boards of management and plans of management in relation to Aboriginal land (*Part 7*); and,
- advisory committees constituted under section 24 of the NPW Act (*Part 8*).

### Threatened Species Conservation Act, 1995

The *Threatened Species Conservation Act 1995 (TSC Act)* came into effect on 1 January, 1996.

The *TSC Act* aims to:

- conserve threatened species, populations, ecological communities and their habitats;
- promote their recovery; and,
- manage the processes that threaten or endanger them.

The *TSC Act* replaces the *Endangered Fauna (Interim Protection) Act 1991*. The *TSC Act* covers plants as well as animals and includes categories for ‘endangered’, ‘vulnerable’, and ‘presumed to be extinct’. This Act is relevant to the Manning River Estuary, in that it must be taken into account where a development application (*DA*) is lodged with the consent authority under Part 4 of the *EP&A Act*, and where a proposed activity under Part 5 of the *EP&A Act* is likely to significantly affect the environment of threatened species, populations, ecological communities or their habitats.

This means that an appropriate study must be carried out to determine if any listings under the *TSC Act 1995* will be impacted by a proposed development or activity as defined in the Act.

In relation to agriculture, the *TSC Act* exempts ‘routine agricultural activities’ from Section 91 licensing but provides for certain routine agricultural activities to be prescribed by regulation as requiring a licence or a property management plan.

Four activities which may occur on agricultural land have initially been proposed for prescription and are:

- Pesticide / herbicide application;
- Dead timber collection or removal for sale including standing timber and fallen debris which may have an impact on threatened species;
- Collection or removal of bushrock for sale which may have an impact on threatened species; and,
- Activities affecting the distribution of water within a naturally occurring wetland which may have an impact on threatened species (*NPWS, 1997*).

Under Schedule 3 of the *TSC Act*, the following threatening processes were deemed relevant to the Manning River Estuary catchment:

- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands;
- Entanglement in or ingestion of anthropogenic debris in marine and estuarine environments;
- Clearing of native vegetation; and,

- Removal of dead wood and dead trees.

### **Environmental Planning and Assessment Act 1979**

The *Environmental Planning and Assessment Act (EP&A Act) 1979* is the key piece of environmental planning legislation in NSW. The EP&A Act establishes the three types of environmental planning instruments (*EPIs*):

- local environmental plans;
- regional environmental plans, and
- state environmental planning policies.

The Act provides for local government to develop regional and local environmental plans which provide the planning framework tailored to local landscapes, objectives and issues.

The Act divides development into three broad categories:

- development that may be carried out without development consent;
- development that may be carried out only with development consent; and
- development that is prohibited.

The *EP&A Act* requires that activities deemed likely to have a potential significant impact on the environment require the preparation of an Environmental Impact Statement or an Environmental Assessment for major projects under the new Part 3A of the *EP&A Act*.

### **Coastal Protection Act 1979**

The objectives of the *Coastal Protection Act 1979* are to provide for the protection of the coastal environment of the State for the benefit of both present and future generations. Under the Act, a public authority can not, without the concurrence of the Minister:

- Carry out any development in the coastal zone, or
- Grant any right or consent to a person
  - to use or occupy any part of the coastal zone or
  - to carry out any development in the coastal zone.

The Act provides for the preparation of Coastal Zone Management Plans for a council whose area, or part of whose area, is included within the coastal zone may, and must do so if directed by the Minister, prepare a Coastal Zone Management Plan in accordance with the Act. The Act also specifies those matters that must to be dealt with in the Plan, such as:

- Protecting and preserving beach environments;
- Provisions for emergency actions; and,
- Continued and undiminishing public access to beaches, headlands and waterways, particularly where public access is threatened or affected by accretion.

### NSW Fisheries Management Act, 1994

Government regulation of fishing in NSW began with the passing of the *Fisheries Act 1865*. A variety of acts and amendments were passed over the next 130 years to improve fisheries management in NSW.

The most recent legislation, the *Fisheries Management Act 1994* and *Fisheries Management Amendment Act 1997* were developed to conserve, develop and share the fisheries resources of the state for the benefits of present and future generations (*Fisheries NSW, 1998*).

The objectives of the Act are to:

- conserve fish stocks and protect key habitat;
- conserve threatened species, populations and ecological communities of fish and marine vegetation;
- promote ecologically sustainable development, including the conservation of biological diversity;
- promote viable commercial fishing and aquaculture industries;
- promote quality recreational fishing opportunities; and
- appropriately share fisheries resources between users of the resources.

The Department of Primary Industry (*DPI*) (*formerly named NSW Fisheries*) conserves fish habitats under Part 7 of the *Fisheries Management Act 1994* (*NSW Fisheries, 1998*). The main habitat related provisions in this part of the Act are:

- Habitat protection plans – allow for the preparation and gazettal of management plans for the protection of specific aquatic habitats.
- Aquatic reserves – allow for the creation and management of aquatic reserves.
- Dredging and reclamation – allow for the control and regulation of dredging and reclamation activities which may be harmful to fish and fish habitats. It establishes requirements to obtain a permit from, or to consult with, *DPI* (*Fisheries*).
- Protection of mangroves and certain other marine vegetation – allows for the regulation of damage to, or removal of, certain marine vegetation. At this stage, mangroves and seagrasses are the only forms of marine vegetation protected in this way. A permit is required to remove or damage marine vegetation.
- Protection of spawning of salmon, trout and certain other fish – allows for the protection of fish spawning areas.
- Noxious fish – allows for the declaration of undesirable fish as noxious fish. Once declared noxious these fish may be liable to be seized and destroyed.
- Release and importation of fish – allows for the control of the release, import, sale or possession of fish not originating from NSW waters. The purpose is to prevent the spread of disease and the introduction of undesirable species.
- Miscellaneous – provides for the free passage of fish past barriers such as dams and weirs. This facilitates the installation of fishways, and/or implementation of appropriate operation procedures for weirs.

### Protection of the Environment Operations Act, 1997

The *Protection of the Environment Operations Act 1997 (POEO Act)* came into effect on the 1st July 1999. It is administered by the NSW DEC.

The *POEO Act, 1997*, replaces the following Acts, which have subsequently been repealed:

- *Clean Waters Act, 1970*;
- *Pollution Control Act, 1970*;
- *Environmental Offences and Penalties Act, 1989*;
- *Clean Air Act, 1961*; and,
- *Noise Control Act, 1975*.

The *POEO Act* enables the Government to set out explicit protection of the environment policies (*PEPs*) and adopt more innovative approaches to reducing pollution. The *POEO Act* is designed to replace approvals required under these Acts, with an integrated licensing system. The most relevant provisions and requirements extracted from these Acts are discussed in the following sections.

DECC is the appropriate regulatory authority for the activities specified in Schedule 1 of the *POEO Act (scheduled activities)*. In most cases, local councils are the regulatory authorities for non-scheduled activities, except activities undertaken by a public authority which DECC will regulate or where a public authority has been declared the appropriate regulatory authority. DECC licenses scheduled activities.

In general, Greater Taree City Council can regulate non-scheduled activities through notice and enforcement powers in their local government area. However, DECC can issue a licence to regulate water pollution from a non-scheduled activity. If it does, DECC becomes the regulator for all environmental impacts from the activity under the *POEO Act* instead of Greater Taree City Council.

Clean-up notices, prevention notices and prohibition notices are the environment protection notices which are provided for under the legislation. The classification of offences as Tier 1, 2 or 3 continues under the *POEO Act*. The offences are similar to the previous offence regime. However, there is a duty to notify the appropriate regulatory authority (*broadly, DECC or the local council*) of pollution incidents where material harm to the environment is caused or threatened.

Under the *POEO Act*, a load based licensing approach is required for point source discharges to any stream. The objective of this approach is to foster the protection of aquatic ecosystems in waterways where point source discharges occur. Under load based licensing, the focus has shifted from controlling the concentration of pollutants discharged, to controlling the total load of pollutants discharged. Notwithstanding, concentration limits will still be specified where the concentration of a pollutant is likely to cause harm to human health or the environment. The aim of the license is to establish long term environmental improvement for receiving waters.

The *POEO Act* also provides that mandatory audits may be required as a condition of a licence if DECC reasonably suspects that the holder of the licence has on one or more occasions contravened the *POEO Act*, the regulations or the conditions of the licence, and the contravention has caused or is likely to cause harm to the environment.

### Water Act 1912

Section 21A of the *Water Act 1912* makes it an offence to discharge substances such as refuse, sludge, noxious matter and liquid proceeding from factories, manufacturing processes or businesses, into a river or lake. The Act is used primarily to regulate discharges in rural situations. Under the provisions of the Act, the installation of structures within streams for the impoundment of water must be licensed.

### Water Management Act 2000

The *Water Management Act 2000* provides for the sustainable and integrated management of water sources for the benefit of both present and future generations. The Act considers the following water management issues that relate to the Manning River Estuary:

- the protection of geographical and other features of indigenous significance;
- maximisation of social and economic benefits to the community;
- responsive monitoring and improvements in understanding of ecological water requirements;
- drainage management to avoid or minimise land degradation including soil erosion, contamination, decline of native vegetation; and,
- the minimisation of impacts of drainage activities on other water users.

The *Water Management Act 2000 No. 92 - Proclamation (NSW Government Gazette No. 168, December 2000)* commenced most of the provisions of the Act on 1 January 2001, except those provisions relating to aspects of harvestable rights, access licenses, approvals and the Water Investment Trust. For the time being, matters relating to licenses and approvals will continue to be dealt with by the *Rivers and Foreshores Improvement Act 1948* and the *Water Act 1912*.

The *Water Management Act* provides for the preparation of water management plans, which contain much of the detail necessary for the operation of the Act. Water management plans address matters such as water sharing, water use, drainage and floodplain management and water source protection. Water management plans are created by the water management committee for a water management area or by the Minister for Water. Water management committees are appointed by the Minister, and each committee must develop a water management plan in accordance with terms of reference set by the Minister.

### Crown Lands Act 1989

The term 'Crown land' refers only to land administered and managed under the provisions of the *Crown Lands Act 1989* and associated legislation. This includes the *Crown Land (Continued Tenures) Act 1989*, *Commons Management Act 1989*, *Western Lands Act 1901*, *Wentworth Irrigation Act 1890*, *Hay Irrigation Act 1902* and other Acts covering specific locations and Crown Land functions.

The *Crown Lands Act 1989* provides for the equitable sharing of Crown land resources in accordance with the principles of environmental protection, conservation and ecological sustainability, public use and enjoyment, as well as encouragement of multiple uses.

The Act contains the following principles for managing Crown land:

- environmental protection principles are observed in the management and administration of Crown land;
- natural resources of Crown land (*including water, soil, flora, fauna and scenic quality*) are conserved, wherever possible;
- public use and enjoyment of appropriate Crown land is to be encouraged;
- multiple use of Crown land is to be encouraged, where appropriate;
- Crown land should be used and managed so its resources are sustained in perpetuity, where appropriate; and
- Crown land is to be occupied, used, sold, leased, licensed or dealt with in the best interests of the State, consistent with the above principles.

As the bed and banks to the mean high water mark of the Manning River Estuary, islands and much of its public foreshore land are Crown Land, this piece of legislation is very relevant to the management of the estuary.

---

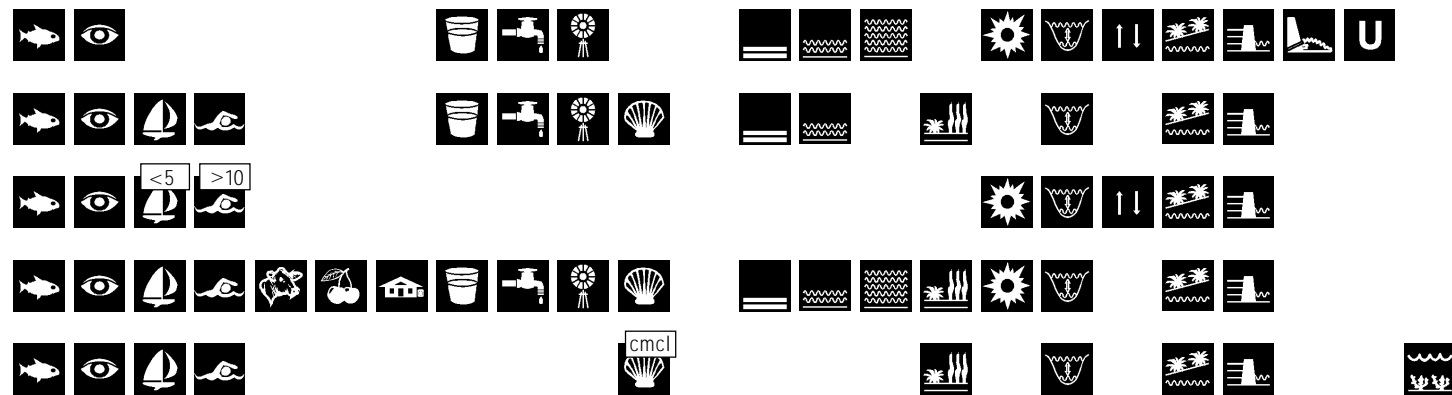
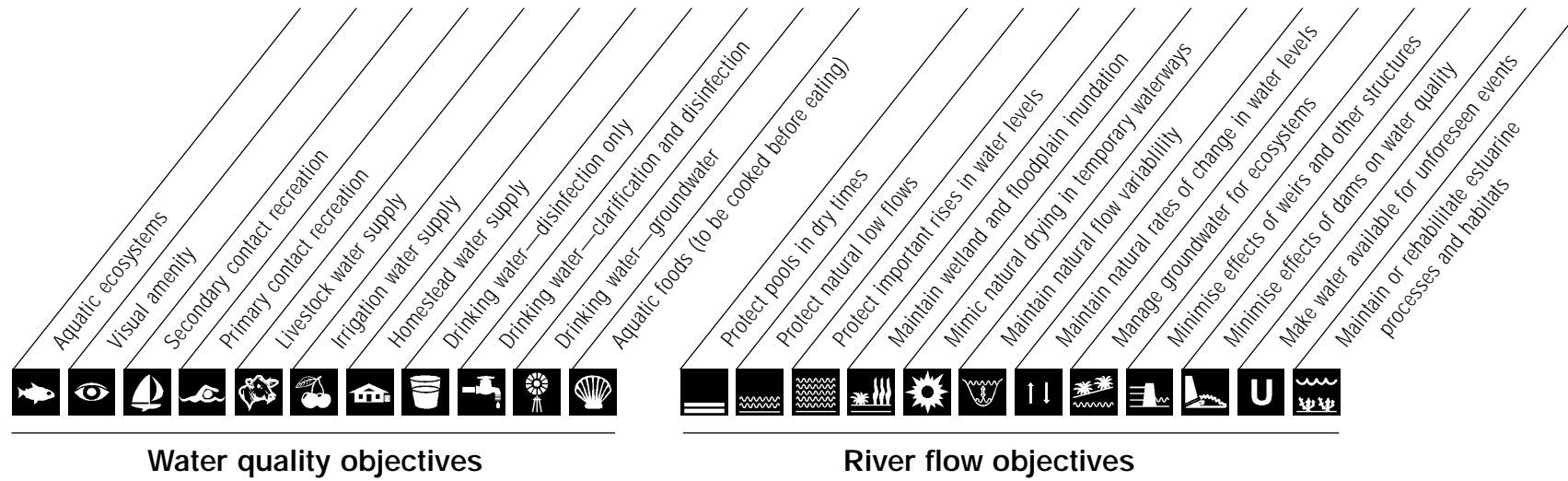
**APPENDIX D**  
MANNING RIVER WATER QUALITY AND RIVER FLOW OBJECTIVES

---



# Catchment at a glance

## Manning River Catchment



<5 For achievement within 5 years  
5-10 For achievement in 5 to 10 years  
>10 For achievement in 10 years or more

cmcl Includes commercial shellfish production  
wtld Includes wetlands

---

**APPENDIX E**  
CROWN LANDS ASSESSMENT MAP

---



---

**APPENDIX F**  
OYSTER INDUSTRY SUSTAINABLE AQUACULTURE STRATEGY (2006)  
MANNING RIVER OYSTER AQUACULTURE MAP

---

# Oyster Industry Sustainable Aquaculture Strategy

## Manning River Oyster Aquaculture



### Legend

- |  |   |  |   |
|--|---|--|---|
| <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #90EE90; border: 1px solid black; margin-right: 5px;"></span> Priority oyster aquaculture areas</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #FFD700; border: 1px solid black; margin-right: 5px;"></span> Current oyster aquaculture leases to be phased out</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: #ADD8E6; border: 1px solid black; margin-right: 5px;"></span> Current leased area in National Park Estate</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px dashed black; margin-right: 5px;"></span> Leases within Marine Park Boundaries</li> </ul> | <p><b>Minimum Lease Marker post intervals</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; border-bottom: 1px solid black; margin-right: 5px;"></span> 10 metre intervals</li> <li><span style="display: inline-block; width: 15px; border-bottom: 3px double black; margin-right: 5px;"></span> 25 metre intervals</li> <li><span style="display: inline-block; width: 15px; border-bottom: 1px dashed black; margin-right: 5px;"></span> 50 metre intervals</li> <li><span style="display: inline-block; width: 15px; border-bottom: 2px dashed black; margin-right: 5px;"></span> Special navigation and marking condition</li> </ul> <p>All other boundaries 100 metre intervals</p> | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px dotted black; margin-right: 5px;"></span> Former leases</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Current leases</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Cadastral boundaries (shorelines are indicative only)</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Roads</li> </ul> | <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 10px; height: 10px; background-color: red; margin-right: 5px;"></span> Launching ramp</li> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Marina or boatshed</li> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Public wharf</li> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Port marker</li> <li><span style="display: inline-block; width: 10px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Starboard marker</li> </ul> |
|--|---|--|---|

