



Coffs Harbour City Council

31 October 2012

ORDINARY MEETING

The above meeting will be held in the Council Chamber, Administration Building, corner Coff and Castle Streets, Coffs Harbour, on:

THURSDAY, 8 NOVEMBER 2012

The meeting commences at **5.00pm** and your attendance is requested.

AGENDA

1. Opening of Ordinary Meeting
2. Acknowledgment of Country
3. Disclosure of Interest
4. Apologies
5. Public Addresses / Public Forum
6. Mayoral Minute
7. Mayoral Actions under Delegated Authority
8. Confirmation of Minutes of Ordinary Meeting – 25 October 2012
9. Notices of Motion
10. General Manager's Reports
11. Consideration of Officers' Reports
12. Requests for Leave of Absence
13. Matters of an Urgent Nature
14. Questions On Notice
15. Consideration of Confidential Items (if any)
16. Close of Ordinary Meeting.

Steve McGrath
General Manager



COFFS HARBOUR CITY COUNCIL

ORDINARY MEETING

**COUNCIL CHAMBERS
COUNCIL ADMINISTRATION BUILDING
COFF AND CASTLE STREETS, COFFS HARBOUR**

8 NOVEMBER 2012

NOTICES OF MOTION

- NOM12/8 RE-USE FACILITY AT THE WASTE TRANSFER STATION
- NOM12/9 SUSPENSION OF BULKY GOODS AND HARD RUBBISH COLLECTION
- NOM12/10 "ARTSIDE THE BOX" PROJECT

CORPORATE BUSINESS DEPARTMENT REPORTS

- CB12/97 CBD SPECIAL RATE VARIATION APPLICATION
- CB12/98 PROPERTY ACQUISITION - RMS LAND AFFECTED BY BENNETTS ROAD AND SPAGNOLOS ROAD DETENTION BASINS
- CB12/99 LEASE - SAWTELL MEALS ON WHEELS AT 25 ELIZABETH STREET BEING LOT 34 IN SECTION 4 DP 21528 - EXECUTION OF LEASE DOCUMENTS UNDER COMMON SEAL OF COUNCIL
- CB12/100 LEASE RENEWALS AT COFFS HARBOUR COMMUNITY VILLAGE

CITY SERVICES DEPARTMENT REPORTS

- CS12/39 PRIORITY PROJECTS FOR REGIONAL DEVELOPMENT AUSTRALIA FUND APPLICATIONS
- CS12/40 BRELSFORD PARK - REGIONAL SKATE PLAZA / YOUTH SPACE
- CS12/41 DRAFT WOOLGOOLGA LAKE ESTUARY, WILLIS CREEK ESTUARY & DARKUM CREEK ESTUARY COASTAL ZONE MANAGEMENT PLANS
- CS12/42 CITY WIDE FLOOD MITIGATION, STORMWATER & DRAINAGE WORKS PROGRAM - OCTOBER 2012
- CS12/43 COFFS COAST CYCLE CHALLENGE MARKETING AND PROMOTION - VISIT TO LAKE TAUPO NZ BIKEFEST
- CS12/44 APPOINTMENT OF COUNCILLOR TO NORTH COAST WEEDS ADVISORY COMMITTEE



COFFS HARBOUR CITY COUNCIL
ORDINARY MEETING
COUNCIL CHAMBERS
COUNCIL ADMINISTRATION BUILDING
COFF AND CASTLE STREETS, COFFS HARBOUR
25 OCTOBER 2012

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COFFS HARBOUR CITY COUNCIL

ORDINARY MEETING

25 OCTOBER 2012

Present: Councillors D Knight (Mayor), J Arkan, N Cowling, R Degens, G Innes, B Palmer, K Rhoades, M Sultana and S Townley.

Staff: General Manager, Director Corporate Business, Director of City Services, Director Land Use, Health & Development and Executive Assistant.

We respectfully acknowledge the Gumbayngirr Country and the Gumbayngirr Aboriginal peoples who are traditional custodians of the land on which we meet and their Elders both past and present.

The Mayor reminded the Chamber that the meeting was to be recorded, and that no other recordings of the meeting would be permitted.

The meeting commenced at 5.00pm with the Mayor, Cr D Knight in the chair.

DISCLOSURE OF INTEREST

No disclosures of interest.

PUBLIC ADDRESS

No public addresses.

CONFIRMATION OF MINUTES

- 259 RESOLVED** (Arkan/Degens) that the minutes of the Ordinary meeting held on 11 October 2012 be confirmed as a true and correct record of proceedings.
- 260 RESOLVED** (Cowling/Innes) that in relation to item GM12/26 - Election of Deputy Mayor, the last paragraph should read "...declared that Cr J Arkan is elected Deputy Mayor for the ensuing 12 months".

GENERAL MANAGER'S REPORT

GM12/30 2012 DISCLOSURE OF INTEREST BY COUNCILLORS AND DESIGNATED PERSONS

To table the Register of Returns received in accordance with s450A Local Government Act 1993

- 261 RESOLVED** (Arkan/Palmer) that the Register of Disclosures by Councillors and designated persons for the period July 2011 – June 2012, as tabled, be noted.

GM12/31 WORKS IN KIND POLICY

For Council to adopt the Works in Kind Policy.

- 262 RESOLVED** (Arkan/Degens) that Council adopts the attached Works in Kind Policy.

GM12/32 ADMINISTRATION OF THE DEVELOPER CONTRIBUTIONS SYSTEM POLICY

For Council to adopt the Administration of the Developer Contributions System Policy.

- 263 RESOLVED** (Degens/Arkan) that Council adopts the attached Administration of the Developer Contributions System Policy.

GM12/33 SOCIAL MEDIA POLICY

To seek adoption of a new policy for Council, the Social Media Policy.

- 264 RESOLVED** (Arkan/Sultana) that Council adopts the attached Social Media Policy.

GM12/34 COMMUNITY STRATEGIC PLAN (CSP) REVIEW - COMMUNITY ENGAGEMENT STRATEGY

To seek Council adoption of the Coffs Harbour 2030 Review - Community Engagement Strategy.

- 265 RESOLVED** (Innes/Arkan) that Council adopts the Community Engagement Strategy for the Review of Coffs Harbour 2030 as attached to this report.

CORPORATE BUSINESS DEPARTMENT REPORTS

CB12/88 ENVIRONMENTAL LEVY PROJECTS REPORT 30 JUNE 2012

To provide Council with a status report on the projects funded under the Environmental Levy (EL) Program and make recommendations regarding revotes for each project.

- 266 RESOLVED** (Arkan/Sultana):
1. That Council notes the status of Environmental Levy Projects as at 30 June 2012 as outlined in the attachment.
 2. That the following projects' over-expenditures be allocated from existing Environmental Levy projects / funds as follows:

<u>Project</u>	<u>Deficit Funds</u>
Environmental Weed Control – Camphor Laurel Removal	\$ 151.10
Environmental Weed Control – Glory Lily	\$ 361.91
Environmental Weed Control – Vine Weeds	\$ (513.01)
Sustainable Management of Biodiversity in LGA	\$ 4,950.73
Environmental Levy Interest	\$ (4,951)

CB12/88 - Environmental Levy Projects Report 30 June 2012 (Cont'd)

3. That the following projects' surplus funds and completed projects with less than \$10 be returned to the funding reserve for allocation to future projects.

<u>Project</u>	<u>Surplus Funds</u>
Flying-fox Plan Implementation	\$ 609.15
The Implementation of the CH Vertebrate Pest Management Strategy	\$1,345.05
CH LGA Biodiversity Monitoring Program: Stage 2	\$ 223.38
Boambee Beach	\$ 94.22
Dunecare / Landcare Groups	\$4,174.33
Bush Regeneration	\$1,684.16
Darrunda Wajaarr Repair to Country High Priority Sites	\$ 821.69
Environmental Weed Control - Bitou Bush	\$ 265.82
Environmental Weed Control - Privet	\$ 238.33
Environmental Weed Control - Pine/Celtis/Pepper Tree	\$ 328.52
Environmental Weed Control – Vine Weeds	\$ 62.43
Various projects balances under \$10	<u>\$ 4.09</u>
 Total	 <u>\$9,851.17</u>

4. That it be noted the Financial Result for Year Ended 30 June 2012 incorporates the Environmental Levy Revotes as recommended in this Report summarised as follows:

<u>Project</u>	<u>Revote Funds</u>
Koala Plan of Management 2009 - Implementation 2010/11	\$46,321.33
Biodiversity Action Strategy Implementation 2009/2010	\$12,918.43
Green School Sustainability Fund	\$11,748.21
The Woolgoolga Flying-Fox Camp Strategy Including St 1 Imp	\$12,500.00
Coffs Ambassadors Interpretive Tours	\$ 8,574.25
Matching Grant Funding Pool	\$30,000.00
Coastal Headland Env. Protection - Woolgoolga Headland	\$39,720.55
Coastal Headland Env. Protection – Route Markers	\$40,000.00
West Coffs to CBD Cycleway (Stage 1)	\$82,304.04
Pipe Clay Lake Stormwater Community Education Project	\$10,500.00
Protection of the Sensitive Environs of Boambee Creek	\$ 3,472.93
 Total	 \$298,059.74

5. That it be noted the Financial Result for Year Ended 30 June 2012 incorporates Contribution Revotes as follows:

Hogbin Drive Koala Fencing	\$1,063.18
CH Class 5 Vegetation Map Validation 2012/13 received in advance	<u>\$ 6,000.00</u>
 Total	 <u>\$ 7,063.18</u>

CB12/88 - Environmental Levy Projects Report 30 June 2012 (Cont'd)

6. Beacon Hill Regeneration / Assessment Project

It is recommended the funds held for this project in the EL Reserve of \$9,490.00 remain in the EL Reserve pending allocation to Marine Rescue CCTV.

7. That Council continues to monitor the Environmental Levy Program to ensure the earliest completion of projects.

CB12/89 COUNCIL MEETING DATES 2013

To seek Councillors' confirmation to set Council's meeting dates for the period January 2013 to December 2013.

267 RESOLVED (Arkan/Degens):

1. That no Council meetings be scheduled for January 2013.
2. That the first meeting in 2013 be scheduled for 14 February 2013.
3. That meetings from February to November 2013 are scheduled on the second and fourth Thursday of each month with the exception of March and April where the second meeting of these months will be held on Wednesday 27 March and Wednesday 24 April 2013.
4. That the last Council meeting for 2013 be held on 12 December.

CB12/90 STATUS OF THE JETTY4SHORES PHASE 1 PROJECT

To inform Council of the status of the Jetty4Shores Phase 1 Project.

268 RESOLVED (Degens/Innes) that Council note the attached Project Plan and endorse the overall direction currently being undertaken.

CB12/91 AMENDMENT OF 2012 - 2013 WATER BACKFLOW FEES AND CHARGES

Following a period of public exhibition, approval is sought to change Council's 2012-2013 Fees and Charges Schedule related to a new schedule of fees for water backflow prevention to be implemented on 1 November 2012.

- 269 RESOLVED** (Innes/Sultanta) that the new schedule of fees for Water Backflow Prevention be adopted, effective from 1 November 2012.

CB12/92 DONATIONS PROGRAM 2012 / 2013

Determination of the Donations Program for 2012/2013.

- 270 RESOLVED** (Arkan/Degens):

1. The Donations and Rate Subsidy Programs for 2012/2013 as set out in the report, totaling \$117,782 be adopted.
2. That Council review the current Donations Policy and undertake a comprehensive assessment of the aims, goals and objectives of the Donations Program with a report to be brought back to Council for determination, prior to preparation of the budget for 2013/2014.

CB12/93 ANNUAL FINANCIAL STATEMENTS 2011/2012

Statements to be signed to meet legislative requirements in relation to the completion of the Annual Financial Statements for 2011/2012.

- 271 RESOLVED** (Arkan/Degens) that the "General Purpose Financial Statements – Statement by Councillors and Management" and "Special Purpose Financial Statements – Statement by Councillors and Management" forms for 2011/2012 be approved for completion by the designated signatories.

CB12/94 BANK BALANCES AND INVESTMENTS FOR JUNE 2012

To list Council's Bank Balances and Investments as at 30 June 2012.

272 RESOLVED (Arkan/Degens):

1. That the bank balances and investments totaling (from loans, Section 94 and other avenues that form the restricted accounts and are committed for future works) one hundred and seventy three million, fifty thousand, four hundred and eighty six dollars (\$173,050,486) as at 30 June 2012 be noted.
2. That the general fund unrestricted cash and investments totaling three million, three hundred and eighty thousand, five hundred and forty one dollars (\$3,380,541) as at 30 June 2012 be noted.

CB12/95 HOLIDAY PARKS TOURIST ACCOMMODATION TARIFFS 2013/14

To recommend the tourist accommodation tariffs to be charged during the 2013/2014 period for Park Beach Holiday Park, Sawtell Beach Holiday Park, Woolgoolga Beach Caravan Park and Woolgoolga Lakeside Caravan Park.

273 RESOLVED (Degens/Palmer) that Council, as Corporate Manager of the Coffs Coast State Park Trust and Woolgoolga Beach Reserve Trust, approve the Tariffs within the report for:

1. Park Beach Holiday Park
2. Sawtell Beach Holiday Park
3. Woolgoolga Beach Caravan Park
4. Lakeside Caravan Park

to be adopted effective 2 March 2013.

CB12/96 DRAFT PLAN OF MANAGEMENT FOR NORTHERN SECTION OF WOOLGOOLGA BEACH RESERVE (WOOLGOOLGA LAKESIDE)

To submit to Council, as Corporate Manager of the Woolgoolga Beach Reserve Trust, the Draft Plan of Management for Part Reserve 63076 for Public Recreation and Resting Place and Reserve 72664 for Public Recreation (Northern section of Woolgoolga Beach Reserve) and recommend that the Draft Plan be referred to the Department of Primary Industries, Crown Lands requesting approval to place the Draft Plan of Management on Public Exhibition.

- 274 RESOLVED** (Arkan/Degens) that Council, as Corporate Manager of the Woolgoolga Beach Reserve Trust, adopt the Draft Plan of Management for Part Reserve 63076 for Public Recreation and Resting Place and Reserve 72664 for Public Recreation (Northern section of Woolgoolga Beach Reserve) and grant approval for the Draft Plan to be referred to the Department of Primary Industries, Crown Lands requesting approval to place the Draft Plan on Public Exhibition.

CITY SERVICES DEPARTMENT REPORTS

CS12/34 NSW WATER SUPPLY & SEWERAGE PERFORMANCE REPORT 2010/11

To inform Council about the results of the 2010/11 NSW Water Supply and Sewerage Performance Report in relation to Coffs Harbour's system.

- 275 RESOLVED** (Arkan/Sultana) that
- That Council note the Performance Monitoring Report and the 2010-11 NSW Water Supply and Sewerage document in relation to Coffs Harbour's systems.

CS12/35 LIBRARY STRATEGIC PLAN

To recommend that Council adopt the *Coffs Harbour City Library Strategic Plan 2012-16*.

- 276 RESOLVED** (Arkan/Townley):
1. That Council adopt the *Coffs Harbour City Library Strategic Plan 2012-16* as appended.
 2. That funding sources and partnerships for a new library be identified as soon as practicable.

CS12/36 2012-2013 ROADS MAINTENANCE STRATEGY & BUDGET

To discuss the need for alternative road maintenance strategies to address challenges arising from the condition of Council's road network, and to seek Council's approval for the reallocation of funds within these programs in accordance with these strategies.

- 277** **RECOMMENDED** (Arkan/Townley) that Council approve the following reallocation of roads maintenance budgets within the 2012 / 2013 Local Roads Program.

Description	Budget	Reallocation	Revised Budget
Sealed Roads Reseals	\$931,000	+ \$350,000	\$1,281,000
Road Resurfacing	Nil	+ \$200,000	\$200,000
Gravel Patching	Nil	+ \$200,000	\$200,000
Urban Roads Maintenance	\$1,148,900	+ \$244,800	\$1,393,700
Traffic Facilities (lines and signs)	\$152,900	+\$20,000	\$172,900
Dust Seals	\$164,800	- \$164,800	Nil
Gravel Resheeting	\$207,000	- \$100,000	\$107,000
Sealed Roads Rehabilitation	\$1,646,265	- \$750,000	\$896,265
TOTAL:	\$4,250,865		\$4,250,865

CS12/37 SUBMISSION TO THE DRAFT NSW LONG TERM TRANSPORT MASTER PLAN

To consider Coffs Harbour City Council's response to the draft NSW Long Term Transport Master Plan.

- 278** **RESOLVED** (Palmer/Arkan) that Council approve a submission be made to Transport for NSW on the Draft NSW Long Term Transport Master Plan based on the comments in the following table.

CS12/38 BRIDGE REPAIRS - KIRTONS ROAD, BROOKLANA

To recommend that Council undertake bridge maintenance on Kirtons Road, Brooklana.

279 RESOLVED (Arkan/Townley) that Council:

1. Undertake the necessary repairs to the bridge on Kirtons Road, Brooklana, to be funded from Council's Bridge Program.
2. Approve the placement of a two tonne load limit on this bridge until the repairs can be carried out.

CON12/7 UNMAINTAINED ROADS

To recommend that Council revise its current policy and resolutions on "unmaintained roads", having regard to changes in common law and legislation that have occurred over recent years and develop a new policy reflecting Council's duty of care to users of all roads vested in (i.e. the property of) Council.

280 RESOLVED (Cowling/Innes):

1. That all property vested in Coffs Harbour City Council as a public road be inspected and placed on Council's asset register.
2. That Council inspect the roads that are proposed to be added to Council's asset register with a view to identifying the necessary remedial works to mitigate Council's risk exposure having regard to Council's limited resources.
3. That the notation on S149 Certificates for properties accessing these roads be amended appropriately.

CON12/8 ACQUISITION OF LAND - HOYS ROAD, MOONEE - UPDATE

To seek approval to classify Lot 9 DP 1140702 Hoys Road, Moonee prior to acquisition.

281 RESOLVED (Arkan/Palmer):

1. That upon its acquisition Lot 9 DP 1140702 Hoys Road, Moonee be classified as Operational Land under the Local Government Act 1993 (as amended).
2. That the confidential attachment be noted.

CON12/9 TECHNOLOGY GROUP BUSINESS PLAN

To provide information to Council in relation to the establishment of the Technology Group.

- 282 RESOLVED** (Arkan/Townley) that Council note the information provided in this report in relation to the development of the Technology Group Business Plan.

REQUESTS FOR LEAVE OF ABSENCE

- 283 RESOLVED** (Arkan/Innes)) that Cr Sultana be granted leave of absence from Council from 8 November 2012.

MATTERS OF AN URGENT NATURE

MUN12/17 Woolgoolga Beach Drowning

Councillor Arkan spoke about the recent tragic drowning at Woolgoolga Beach and asked if signs saying "No Swimming", with appropriate pictures, could be placed in front of the boat ramp area or near the rocks where the rips are.

Cr Arkan also asked whether there could be some award given to the young people at Woolgoolga who had put their lives at risk.

The General Manager advised that a report would be brought back to Council on the matter.

QUESTIONS ON NOTICE

No questions on notice.

This concluded the business and the meeting closed at 5.57 pm.

Confirmed: 8 November 2012.

.....
Denise Knight
Mayor

RE-USE FACILITY AT THE WASTE TRANSFER STATION

Purpose:

Councillor Sally Townley has given her notice to move the following motion:

That the council calls for expressions of interest to develop a suitable lease arrangement for a materials recovery facility at the waste transfer station.

Rationale:

Since 2 October 2011, the re-use facility at the waste transfer station has not been operating. As a result, residents have not been able to use the facility to drop off unwanted but useable goods. Nor have they had the ability to source materials for re-use. There is an urgent need to restore this facility. Increased recovery of 'waste' items means less material going directly to landfill. At present, material which could be recovered is going directly to landfill and the life expectancy of the waste transfer station is being shortened.

Council should work with waste recovery professionals and community employment agencies to create a high standard waste recovery facility. This will create social, economic and environmental benefits to the community.

Staff Comment:

- Based on previous investigations, there is no suitable location on the landfill for this proposal. The site of the previous business is now utilised for landfill operations/maintenance.
- The previous location was unsuitable, and a constant complaint of the operator.
- There are significant financial and operational issues associated with any proposed siting of this facility at the Englands Road site.

SUSPENSION OF BULKY GOODS AND HARD RUBBISH COLLECTION

Purpose:

Councillor Sally Townley has given her intention to move the following motion:

That Council suspend its bulky goods and hard rubbish collection temporarily until a suitable materials recovery facility is re-established.

Rationale:

Further, the collection of bulky goods or 'hard rubbish' is currently going directly to landfill in the absence of a material recovery facility. Many residents are unaware of this and put out unwanted items in the belief that they may be recycled or re-used. This is shortening the life of the landfill facility.

Staff Comment:

- 1,146.16 tonnes of waste were collected by the bulky goods collection last financial year, which is 0.93% of the total volume of waste dealt with across the whole of the operations at the Recovery Park, or 6.3% of the total waste taken directly to the landfill.
- The collection is part of the Domestic Kerbside Collection Contract, and therefore contracted payment would need to continue. Negotiations could take place for a Contract Variation, but plant and employees are in place.
- Collection dates out until at least the end of 2014 have been provided to the public.
- There is considerable risk of an increase in illegal dumping of these goods, rather than them being taken to a waste facility for disposal, due to the tipping fees.
- There are significant financial and operational issues associated with suspending the existing bulky goods and hard rubbish collection.

"ARTSIDE THE BOX" PROJECT

Purpose:

Councillor Nan Cowling has given her intention to move the following motion:

Recommendation

The following action be taken to promote the beautification of the Coffs Harbour City Local Government Area.

1. Obtain approval from Council for the "Artside the Box" project;
2. Request authority from RMS and Essential Energy to apply designs to their equipment;
3. Allow website development on the C.H.C.C. site to promote the project;
4. Obtain approval to utilise Council resources related to the project.

Rationale:

This project will:

- Beautify the whole area by reducing graffiti on both the Traffic Signal boxes and the Sub Station Electrical boxes with art works.
- Encourage local artists to participate by creating their own art works and also maintain them.
- Be a tourist attraction and improve the aesthetic outlook.
- Encourage the community to take pride in their surroundings and this should alleviate the disinterest in our surroundings.
- Lead to a much bigger programme of beautification as ideas flow from the community.
- Promote a walking tour with an ambassador guide as a major tourist attraction.

Staff comment:

Whilst the request for authority to paint traffic signal and substation electrical boxes involves staff simply drafting letters to the relevant authorities, the extent of Council resources required to deliver the remainder of the project is not clear.

Resource requirements from Council will be influenced by the number of sites, requirements for public safety / workplace health and safety, insurances, administration of the project, funding for materials / services and the need for ongoing maintenance of the artistic works.

For Council to make an informed decision about the allocation of Council resources to the "Artside the Box" project, it would seem appropriate to clarify these issues and how the project might work, as well as understanding the alternative methods by which such programs are delivered in other communities, which Council staff are currently researching.

CBD SPECIAL RATE VARIATION APPLICATION

Purpose:

To seek Council's endorsement to notify the Independent Pricing and Regulatory Tribunal NSW (IPART) of its intention to submit a Special Rate Variation application for an extension of the existing CBD Special Rate.

Description of Item:

Early this year IPART approved a one year extension to the CBD Special Rate. This was in response to Council's application for a ten year extension. The one year extension has allowed Council to appoint Roberts Day Pty Limited as the CBD Master Plan consultant to develop the CBD Master Plan from which a ten year Program of Works would be developed. This ten year Program of Works will form the basis of the CBD Special Rate Variation application that will be submitted to IPART in February 2013.

Consultation has commenced and will continue with the CBD property owners, businesses and general community in relation to the development and finalisation of the CBD Master Plan. It is planned to have the final CBD Master Plan and Program of Works to Council in February 2013 for final adoption prior to the submission of the Special Rate Variation application.

Sustainability Assessment:

- **Environment**

There were no environmental impacts as a result of this report.

- **Social**

Community consultation has commenced and will continue throughout the development of the CBD Master Plan.

- **Civic Leadership**

Council has been working closely with representatives of the community through the appointment of a CBD Master Plan Committee and through the consultation process. Council, by working with the CBD Master Plan Committee, is providing the necessary leadership for the ongoing development of the CBD.

- **Economic**

Broader Economic Implications

There are no direct financial implications resulting from this report. If Council chooses to submit, and if approval is given for the Special Rate Variation, there will be financial implications that would be dealt with in subsequent reports.

Delivery Program/Operational Plan Implications

There are no Delivery Program / Operational Plan implications as a result of the recommendations in this report.

Consultation:

As outlined above, consultation is continuing to occur through the CBD Master Plan Committee, the appointed consultants, property and business owners within the CBD and the broader community. This will continue through to early February 2013.

Strategic Alignment

The proposal aligns with Council's 2030 in relation to the provision of a vibrant CBD and also in relation to Council undertaking consultation with the community.

Related Policy and / or Precedents:

Council has previously sought and been granted a Special Rate Variation for the CBD.

Statutory Requirements:

Council would need to make a Special Rate Variation application under Section 508 of the Local Government Act.

Issues:

There are no major issues resulting from this report. The proposed notification and, if approved, subsequent submission of the Special Rate Variation application is in line with the overall directions being taken for the past two years in relation to securing ongoing funding for the development of the CBD.

Implementation Date / Priority:

Consultation will continue to take place. IPART will be notified of Council's intention in line with their requirements prior to 23 December 2012 and a report will be submitted to Council in early February 2013 for further consideration.

Recommendation:

1. **That Council writes to notify IPART of its intention to make an application for an extension to the current CBD Special Rate.**
2. **That ongoing consultation takes place with the relevant rate payers to develop and finalise the CBD Master Plan and the related ten year Works Program.**

PROPERTY ACQUISITION – RMS LAND AFFECTED BY BENNETTS ROAD AND SPAGNOLOS ROAD DETENTION BASINS

Purpose:

To seek Council approval to acquire an easement for inundation over part Lot 221 DP 1049858 and acquire the freehold of part of Lot 112 DP 816131.

Description of Item:

During recent years Council has acquired land and constructed a detention basin at William Sharp Drive at West Coffs Harbour. More recently, Council has commenced construction of the Bennetts Road Detention Basin and the Spagnolos Road Detention Basin. These projects both impact on land that is owned by the RMS (Roads and Maritime Services).

At the Bennetts Road project, Council will require an easement at the rear of a property owned by the RMS known as 20 Bennetts Road. The easement required is for inundation purposes and will be created over the rear portion of this property as shown by red cross hatching as Attachment 1 to this report. The property is described as Lot 221 DP 1049858 and comprises a rural holding of 7,873 square metres. The property had a dwelling constructed on site, however this was demolished to make way for construction of the detention basin wall. This wall in future will act as the base for Bennetts Road which once completed will provide access to an interchange with the proposed future highway by-pass of Coffs Harbour. The easement will affect the lower rear flood affected section of the property.

At the Spagnolos Road project, Council will require the acquisition of a 7.52 hectare section of land to be excised from Lot 112 DP 816131 which is currently owned by the RMS. The land required is shown in Attachment 2 to this report. The Balance of the land retained by the RMS is to be used for the future construction of the Coffs Harbour by-pass.

This land is vacant and predominantly zoned rural 1A with a small section zoned 7A Environmental Protection to the north. Most of the site is low lying apart from a small elevated section to the south. The whole of Lot 112 (10.62 hectares) was recently acquired by the RMS for an amount of \$680,000.

Council is about to enter into a licence agreement with the RMS which will require that Council proceed with the acquisition of the above interests, both in relation to the easement and the freehold purchase. The compensation is to be assessed by the Valuer General in accordance with the Land Acquisition (Just Terms Compensation) Act 1991.

Sustainability Assessment:

- **Environment**

There are no environmental impacts in acquiring the interests.

The acquisitions will assist with the ongoing drainage management in the West Coffs Release Area.

- **Social**

The acquisition of the Spagnolos Road property will add to the open space holdings of Council which provide visual and amenity attributes in the local area.

- **Civic Leadership**

In line with the Coffs Harbour 2030 Plan, Council needs to take a leadership role addressing flooding and drainage issues for the betterment of the city.

- **Economic**

Broader Economic Implications

There will be minimal implications as a result of these acquisitions by Council.

Delivery Program/Operational Plan Implications

Funds are available for the land purchase in the flood mitigation program.

Grant funding may also be available and will be sought in the next round of offers in State and Federal grants.

Consultation:

Discussion has occurred with relevant staff in relation to the potential purchases.

Council's Planners advise that Lot 112 DP 816131 does not have a building entitlement.

Related Policy and / or Precedents:

Council has in the past acquired property in this locality for similar purposes.

Council legally needs to control the land upon which it builds infrastructure and also needs to compensate lands that are impacted by its works.

Statutory Requirements:

Council has the power to acquire property or property rights for the required purpose under the Local Government Act.

Issues:

There are no major issues related to this matter.

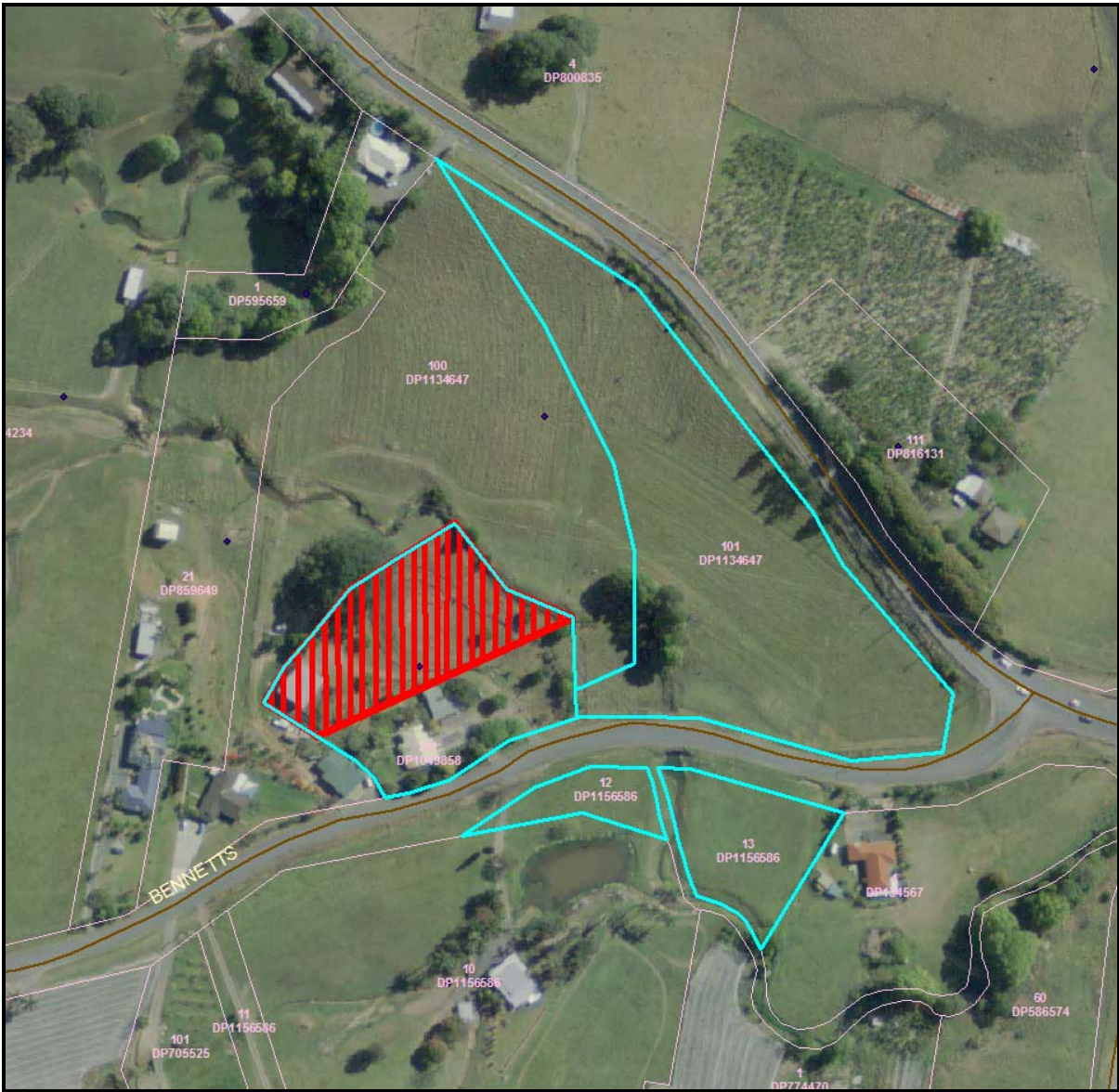
Implementation Date / Priority:

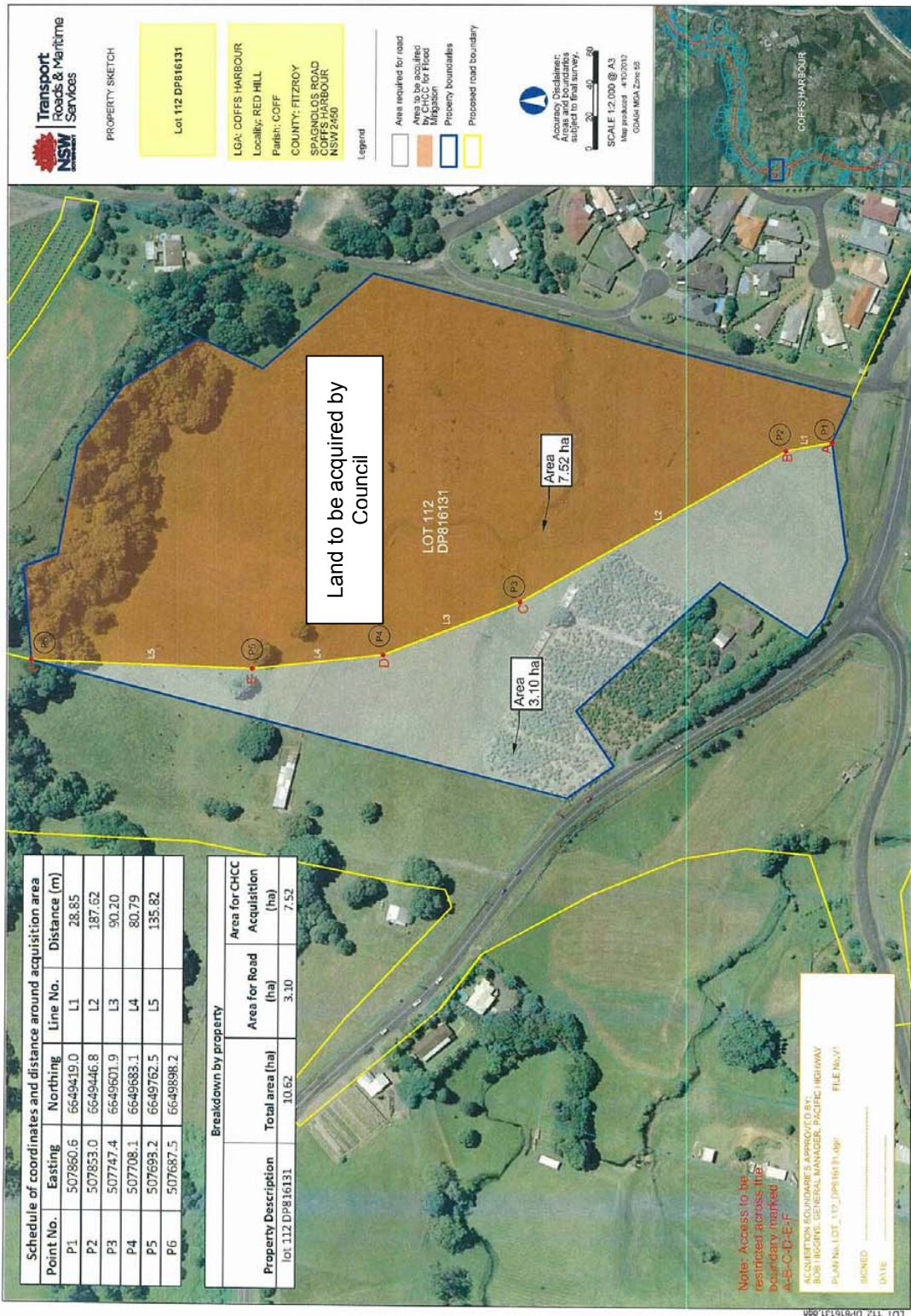
The matter will be acted upon in due course and in line with the terms of the licence which stipulates the acquisitions be completed prior to the RMS land being dedicated as road in conjunction with the future by-pass project.

Recommendation:

1. That Council acquire an easement for inundation over that part of Lot 221 DP 1049858 as shown on the plan attached to this report as Attachment 1, on the terms contained within this report.
2. That Council acquire that part of Lot 112 DP 816131 as shown on the plan attached to this report as Attachment 2 on the terms contained within this report.
3. That the part of Lot 112 DP 816131 once acquired be classified as operational land under the Local Government Act, 1993 (as amended).
4. That any necessary documents for the acquisitions be executed under the common seal of Council.

Attachment 1





LEASE - SAWTELL MEALS ON WHEELS AT 25 ELIZABETH STREET BEING LOT 34 IN SECTION 4 DP 21528 - EXECUTION OF LEASE DOCUMENTS UNDER COMMON SEAL OF COUNCIL

Purpose:

Seeking authority for the execution of a lease between Coffs Harbour City Council as the registered proprietor of the land known as 25 Elizabeth Street being Lot 34 in section 4 DP 21528 to Sawtell Meals on Wheels Incorporated under the Common Seal of Council

Description of Item:

Council is the registered proprietor of Lot 34 in section 4 DP 21528.

The land is classified as operational land and has been previously leased to Sawtell Meals on Wheels (SMOW) under two lease agreements since 1993 and 1998 respectively.

The first lease pertains to the kitchen extension to the premises and expires in January 2013.

The second lease which pertains to the main hall has expired and continues on a month to month basis with the tenant remaining in occupation.

SMOW seeks to refurbish the property to:

- Consolidate its services to the community.
- Expand the functionality of the premises
- Improve energy efficiency in their operation.

SMOW has successfully applied for funding through the Community Building Partnership Program for 2012 to contribute to the overall cost of the project. The approved grant is for \$47,000.

SMOW seeks more secure tenure to be able to realise their refurbishment efforts.

The land is zoned 5A community purposes and as such is reserved for the express purposes of providing for the cultural, social and utility service needs of the community.

It is recommended that council grant a lease for the land for a term of 5 years with an option for a further 5 years.

Sustainability Assessment:

- **Environment**

The recommendation does not give rise to any environmental issues.

- **Social**

The Coffs Harbour 2010-2014 delivery program objective (LC1.2.2) is for Council to "facilitate the provision of a full range quality health care services for all". Further Council, as facilitator and advocate, encourages and supports development of structures and programs that address health care issues

The proposed lease is an efficient and effective way to deliver on the plans objectives.

- **Civic Leadership**

A lease to SMOW facilitates the development of activities and programs that address community health care issues (LCI.2.2030)

- **Economic**

The land is currently zoned 5(a) Community Purposes. Accordingly the opportunity for a commercial rent return is limited.

Broader Economic Implications

The recommendation does not give rise to any adverse economic outcomes, noting that whilst the tenure is granted at a subsidised rate the responsibility for the ongoing general maintenance and repair of the property rests with the lessee.

Delivery Program/Operational Plan Implications

Support of local community service groups is in keeping with the 2030 Vision and delivery program for 2011 -2015 to provide each village with the services and facilities needed to maintain a sense of local community.

The lease will work towards these operational goals.

Consultation:

Executive Manager Business Units, Corporate Business and Sawtell Meals on Wheels Inc.

Related Policy and / or Precedents:

The recommendations are in line with general leasing practices.

Statutory Requirements:

The subject property is classified as Operational Land in accordance with provisions of the Local Government Act 1993. Therefore, there are no impediments to pursuing this lease arrangement in accordance with normal leasing procedures and practices under the NSW Real Property Act 1900 and the Conveyancing Act 1919.

Regulation 400(2) Local Government (General) regulation 2005 applies with respect to execution of the lease documentation under Council seal.

Issues:

Most Meals on Wheels and Food Service organizations in NSW are run by local management committees, made up of volunteers from the community. The committees receive and control funding to employ one or more people to manage and coordinate the daily operations of the service. Sawtell Meals on Wheels has provided essential community services to the local community from the Elizabeth Street address for the last 22 years.

While age and disability may reduce some people's capacity to get out and about, Sawtell Meals on Wheels helps make it possible for those people to stay in their homes, where most are happiest, and maintain some independence. Delivery of nutritious meals, social interaction and regular visits ensure a clients' wellbeing and can help people live the lives they choose (<http://www.mealsonwheels.org.au/About-Us>).

Unquestionably the service is highly valued by clients, supporting families and the broader local community.

A current SMOW project is to provide a meeting place for seniors within the community who are still active. To this end SMOW seeks to enhance the premises to entice existing and new clients to come together for social activities in a café type environment. The proposed enhancement will also enable the premises to be used for bigger social functions thereby making more use of the commercial kitchen. Council, as the land owner, has consented to the lodgment of a Development Application for the refurbishment of the hall and office space and the construction of a indoor/outdoor deck to accommodate up to 30 -40 people.

Under the existing lease arrangement council charges a subsidised rent of \$1,538.00 per annum (as 1 July 2012).

It is submitted that a more appropriate rental which would allow council to recover administration costs and establish a moderate budget for ongoing asset management of the property would be \$7,200 per annum. Discussion with SMOW however indicates that this rent level is beyond their current funding and would invariably detract from the services they are providing. This is validated in the annual financial reports submitted to council by SMOW.

Council does not currently have a policy to determine the level of rent subsidy for council owned community buildings. The formulation of such a policy is in tow and will necessarily address such issues as the objectives in the Coffs Harbour 2030 Plan as well as the imperative to ensure that adequate funds are budgeted to properly maintain and repair buildings to ensure the maximum and most cost effective life span for such facilities.

This focus changes Council's ability to offer traditional "peppercorn rentals". It is submitted that the "new peppercorn" rental is in fact a rate which can potentially achieve a semblance of cost recovery, noting that cost recovery alone still represents an operating subsidy provided by Council to the occupants and users of the facility.

Having regard to the:

- community service provided by SMOW
- voluntary basis of the provision of this service,
- relatively restricted alternative use of the premises due to the zoning, and
- current SMOW project to improve the facility to enable greater community use;

it is recommended to Council that the following rental structure apply to the proposed lease:

Years 1 - 3	Current rent plus CPI adjustments
Year 4	\$1,332 plus a sinking fund contribution of \$1,500 pa towards ongoing maintenance and repair of the building
Year 5	\$2,000 plus a sinking fund contribution of \$1,500 pa towards ongoing maintenance and repair of the building.

A further review of rent upon the exercise of option.

Consideration of alternative tenants for the property would not be equitable given the long history SMOW has at this location unless Council is able to furnish SMOW with alternative and equal premises or sufficient time to attain such.

The negotiated proposal includes the following terms:

Premises	25 Elizabeth Street, Sawtell, NSW
Lessee:	Sawtell Meals on wheels Incorporated
ABN:	93068998456
Lessee Address:	25 Elizabeth Street, Sawtell
Guarantor	
Lease Term:	5 years with an option for a further 5 years
Commencement	On or before 1 January 2013
Use:	Meals on wheels Kitchen and ancillary community service activities
Rental:	<p>Years 1 - 3 Current rent plus CPI adjustments</p> <p>Year 4 \$1,332 plus a sinking fund contribution of \$1,500 pa towards ongoing maintenance and repair of the building</p> <p>Year 5 \$2,000 plus a sinking fund contribution of \$1,500 pa towards ongoing maintenance and repair of the building.</p>
GST:	Licensee is responsible for the payment of GST.
Outgoings:	Lessee is to be responsible for payment of all rates, taxes, charges and utilities including electricity and all other costs associated with its use and occupation of the premises.
Insurances:	<p>Lessee to hold public liability insurance in a minimum amount of twenty million dollars (or such other amount as may be advised by Council from time to time) with such policy to nominate Council as being an interested party</p> <p>Licensee is to hold Workers Compensation insurance cover in respect of any employees working at the premises.</p> <p>Council as Lessor will, at Councils expense, insure the buildings and improvements under council general insurance policy</p>
Lease Costs:	Lessee is to be responsible for costs associated with leasing the premises, including Council's solicitors' reasonable costs.
Maintenance and Repairs	Lessee's responsibility However it is noted that Council has assisted Sawtell Meals on Wheels in the past and SMOW is welcome to approach Council to seek assistance at any time and Council will, subject to budget restrictions, endeavor to provide assistance.
Other:	<p>Lessee to keep on foot all licenses and permits required for the carrying on of the business/activity conducted by the Lessee</p> <p>Other general terms and conditions to be in line with the existing Lease agreement. Any other terms and conditions as may be advised or required by Council's solicitors.</p>

Implementation Date / Priority:

The lease document will be executed under seal following completion of drafting by council solicitor and subject to authority being granted by council.

Recommendation:

1. **The Council as registered proprietor of 25 Elizabeth Street, Sawtell being Lot 34 in section 4 DP21528 (the demised premises) authorize the lease of the demised premises to Sawtell Meals on Wheels Incorporated for a period of 5 years with an option for a further period of 5 years and subject to the terms and conditions contained in this report.**
2. **That any necessary documents required to give effect to the lease of 25 Elizabeth Street, Sawtell being Lot 34 in section 4 DP21528 to Sawtell Meals on Wheels Incorporated be executed under the common seal of Council.**

LEASE RENEWALS AT COFFS HARBOUR COMMUNITY VILLAGE

Purpose:

Seeking authority for the execution of leases between Coffs Harbour City Council in its capacity as the corporate manager of the Coffs Harbour (R140058) Community Village Reserve Trust and various not for profit community service organisations of office premises within the land known as the Coffs Harbour Community Village being Crown Reserve (R140058) for Community Purposes under the Common Seal of Council.

Description of Item:

The Coffs Harbour Community Village is located on Crown Reserve 140058 (being lot 521 DP 728228) Earl Street Coffs Harbour. Coffs Harbour City Council has care control and management of the Reserve in accordance with the provisions of the Crown Lands Act 1989.

In its capacity as the Reserve Trust manager Council has been leasing sections of the Village to various community groups.

The overarching objective of the Village has been and remains:

“...to provide a facility for residents and visitors that allows total access and integration of all members of the community into its use, and to provide organisations and individuals in Coffs Harbour with a multi purpose facility for social, cultural and community purposes.”

Incorporated into this objective are the terms of the funding agreement with the NSW Department of Local Government which inter alia provided for Home and Community Care programs (HACC) being given priority when allocating lease space. The funding agreement provided the source of approximately 1/2 of the funds required to construct the Village over 20 years ago. It is submitted that any rights and obligations of the funding agreement have now lapsed by virtue of the elapse of time.

Notwithstanding Council's contribution to construction costs, the original intention of Council's involvement in the operation of the facility was that it would be a cost neutral activity. That is to say, the net operating costs of the Village were to be met entirely by tenants of the Village.

Since inception Council has incrementally increased its financial support of the operation of the Village to the current annual rate of \$87,000.

By way of example, Council received \$149,219 in the 2011/2012 Financial Year from tenancies. A further \$77,409 was raised from room hire and Community Village services. Total expenditure at the Community Village for 2011/2012 was \$314,210.86.

There is no apparent contractual or policy basis for the current subsidy and it is recommended that Council consider and determine its future financial support of the Village. A review of operations will be the subject of a separate report to Council.

Leases are currently granted to “not for profit” community service providers on a three year basis with rent set at a nominal rate on the proviso tenants pay a predetermined contribution to the net operating costs of the Village. The table below sets out the current leasing arrangements at the Community Village.

Coffs Harbour Community Village:		Office	Lease Expiry
1	Volunteering Coffs Harbour Inc	Office 1 Block A	31/12/2012
2	CH Meals On Wheels	Office 3, 4 (Kitchen) & 5 Block A	31/12/2012
3	Respite & Recreation Inc	Block B	03/10/2011
4	Ch Meals On Wheels Inc	Office 1 Block C	31/12/2012
5	Home Modification and Maintenance	Offices 2 & 4 Block C	VACANT
6	Volunteering Coffs Harbour Inc	Office 3 Block C	31/12/2012
7	Volunteering Coffs Harbour Inc	Office 5 Block C	31/12/2012
8	Waratah Respite Centre (MNC)	Office 1 & 1A Block D	30/06/2016
9	Waratah Respite Centre (MNC)	Office 2 Block D - Maureen Guthrie Cottage	30/06/2016
10	CH Aboriginal Family Community Care Centre	Office 1 & 2 Block E	15/04/2013
11	Volunteering Coffs Harbour Inc	Offices 1 & 2 Block F	30/06/2015
12	CH Aboriginal Family Community Care Centre	Offices 1 & 3 Block G	31/07/2015
13	Jetty Bunker Youth Service	Office 2 Block G	14/08/2013
14	Coffs Harbour Arts Council Inc	Block H	01/09/2011
15	Dads in Distress Inc.	Block I	09/01/2014
16	New Horizons Enterprises Ltd	Block J	14/11/2013

Tenants whose leases have, or are due to expire generally seek renewal of their tenure to ensure ongoing funding for the services (from both State and Federal sources).

Should Council require tenants to meet all operating costs there will be a significant increase in current contributions which will potentially impact on the capacity of tenants to continue providing their respective services.

Under the current cost model it would be inequitable to introduce a higher contribution rate as and when leases fall due. Accordingly it is recommended that the existing outgoing apportionment rates remain until such time as Council has reviewed the overall operation of the Village and determined the level of subsidy (if any) to be provided by Council. Further it is recommended that future tenure at the Village be granted only up to July 2015 where after a revised rent structure can be applied across all tenancies (noting that special provisions will need to be made for Waratah Respite) given the lease termination date is not until June 2016.

Sustainability Assessment:

- **Environment**

The recommendations do not give rise to any adverse environmental impacts at the Reserve noting that the complex is largely fully developed and all services are established.

- **Social**

The Local Government Act at section 8 – The Council's Charter; provides that council must (inter alia):

provide directly or on behalf of other levels of government, after due consultation, adequate, equitable and appropriate services and facilities for the community and to ensure that those services and facilities are managed efficiently and effectively

Support and management of the Community Village is consistent with this Charter obligation.

- **Civic Leadership**

CHCC is a facilitator and advocate in delivering on the strategy to “*seek to provide a full range of quality health services for all*”. The long standing history of support and development of the Community Village underscores Council's attention to this objective.

Similarly the 2030 Vision requires Council to be a provider, facilitator and advocate for the provision of services by all levels of Government. Council's ongoing engagement with both state and federal bodies for the delivery of services at the Village works to achieve better service outcomes for Coffs Harbour.

- **Economic**

Broader Economic Implications

Council does not currently have a policy to guide the leasing and licensing of Council owned and controlled land. Property is working with Community Services to finalise a draft policy for Council's consideration in February 2013.

It is anticipated however that such a policy will, amongst other things, determine the method and level of future subsidies and support for community service organisations. In the meantime the recommendations serve to ensure that services can continue in the mid term.

Delivery Program/Operational Plan Implications

Council currently funds the operation of the Village in the amount of the net annual operating deficit. As previously discussed the original intention of Council's involvement in the Village was to contribute to the construction of the Village and to provide management services to the Reserve Trust. The net operating costs of the Village were to be met by tenants. Notwithstanding the original intention, Council has incrementally increased its level of support to the current rate of \$87,000 per annum. It is submitted that this rate exceeds Council's charter obligations and that in so doing Council is subsidising State and Federally funded community and health services.

Whilst the current recommendations seek to retain the status quo it is recommended that Council revisit its objectives for the Community Village to enable Council's continued support of the Community Village to be effected in a cost effective and affordable manner.

Consultation:

Department of Lands Grafton
Executive Manager - Business units
Community Development Manager

It is intended to include Community Village stakeholders in the review of Community Village operations.

Related Policy and / or Precedents:

The recommendations are in line with general leasing practices

Statutory Requirements:

Regulations 400(2) Local Government (General) regulation 2005 applies with respect to execution of the lease documentation under Council seal.

Crown Lands Act 1989 as to consent from the Minister.

Issues:

The purpose of this report is to obtain consent to execute leases under seal up until 31 July 2015 as and when they fall due and in line with current financial arrangements

It is recommended that Council review the operation of the Community Village generally to establish the future objectives of Council's involvement in the Village and to establish, inter alia, an acceptable level of subsidy (if any) and a further report will come to Council in this regard.

Implementation Date / Priority:

The lease documents will be executed under seal following completion of drafting and subject to authority being granted by Council as the Reserve Trust Manager and the Department of lands.

Recommendation:

1. The Council as the Corporate Manager of the Coffs Harbour Community Village Reserve trust R140058 authorise the leasing of the premises detailed in the table below as and when they become vacant to not for profit community service organisations for a term not post dating 31 July 2015.

Office space at Coffs Harbour Community Village R140058	
1	Office 1 Block A
2	Office 3, 4 (Kitchen) & 5 Block A
3	Block B
4	Office 1 Block C
5	Offices 2 & 4 Block C
6	Office 3 Block C
7	Office 5 Block C
8	Caretakers residence (to be converted to office space)
9	Office 1 & 1A Block D
10	Office 2 Block D - Maureen Guthrie Cottage
11	Office 1 & 2 Block E
12	Offices 1 & 2 Block F
13	Offices 1 & 3 Block G
14	Office 2 Block G
15	Block H
16	Block I
17	Block J

2. That the current outgoing apportionment relative to each premises be retained subject to annual CPI adjustments and further direction from Council following a review of the general operation of the Coffs Harbour Community Village.
3. That any necessary documents required giving effect to the leases for premises within Coffs Harbour (R140058) Community Village Reserve executed under the common seal of Council.
4. That a further report be brought to Council following a review of the operation of the Community Village

PRIORITY PROJECTS FOR REGIONAL DEVELOPMENT AUSTRALIA FUND APPLICATIONS

Purpose:

To provide an update on the status of possible projects to be considered for the Regional Development Australia Fund (RDAF) program, and to seek Council's direction regarding the submission of an Expression of Interest for round 4 of the program.

Description of Item:

Council has submitted applications in both rounds 1 and 2 of the RDAF.

For round 1, Council considered a report (attached) to its meeting of 14 April 2011 which examined in detail the status of a number of projects and provided:

- A brief outline of the proposed project.
- Information currently available to complete a quality application.
- Estimated costs
- Timing
- Likelihood of being 'shovel ready' within the timeframe.

A matrix summarises this information in the report.

Council resolved that:

Council complete applications for funding for the following projects which are listed in priority order:

1. *E-demo and Innovation Centre*
2. *Jetty Foreshores*
3. *BCU Stadium Upgrade*
4. *Regional Skate Park*
5. *Bruxner Park Eco Tourism Project*
6. *Cycleway next to newly constructed Pacific Highway*
7. *Solitary Islands Coastal Walk*

Council's applications were unsuccessful.

In round 2, guidelines were changed (only one application was permitted and requirements for matching funding were increased). Following consideration of a report (attached) at its meeting of 24th November 2011, Council resolved to submit an application for a "community space" at Brelsford Park. The proposal included a library (co-located with a facility for the community of learning and business – COLAB, previously known as the E-demo and Innovation Centre – to promote the Digital Economy in particular), pedestrian plaza, café, youth space, seniors playground and other active and passive recreation areas as well as a carpark.

Council's application was rejected as ineligible on the basis of less than 50% of the partner funding being in cash. Council staff queried this (correspondence attached – it appears that Council offered, in effect, *too much* in-kind funding, despite a substantial cash component of \$7.6M) but has not had a reply acknowledging that the decision was in conflict with the stated objective of maximizing leverage for the program. It is noted that the guidelines for rounds 3 and 4 have been amended, effectively removing this requirement.

Round 3 and 4 of the RDAF program has now been announced by the Department of Regional Australia, Local Government, Arts and Sport.

The third and fourth rounds of the RDAF, which funds capital infrastructure projects in regional Australia, were announced on 23 October. Expressions Of Interest (EOI) nominating a project must be submitted by 6 December, 2012 with a full application (subject to the success of the EOI) to be submitted by 11 April 2013.

Round 3 is for grants between \$50,000 and \$500,000 for towns with a population under 30,000 and round 4 is for grants of between \$500,000 and \$15 million. One submission can be submitted for each round.

While it appears that Council may be eligible to submit an EOI for round 3, this must be for a different project than round 4. Staff are currently preparing possible projects for consideration by Council.

This report reviews, and updates where relevant, the previous projects for Council's consideration in determining a project to progress for round 4 of the RDAF.

Sustainability Assessment:

- **Environment**

There are no environment impacts of the matters raised in this report. Should Council resolve to move further on applications and be successful then the full impact would be examined.

- **Social**

The completion of these projects would address a range of social and economic issues as outlined in previous reports to Council.

- **Civic Leadership**

The pursuing of the provision of these facilities will address matters outlined clearly in the Looking After of Communities Theme of the Coffs Harbour 2030 Community Plan. The Plan outlines Council's role as provider and facilitator in addressing a range of objectives and strategies in relation to:

LC3 - We enjoy a comprehensive range of community, artistic and cultural opportunities.

- **Economic**

Broader Economic Implications

These projects would have positive economic implications during the construction period and also in the long term. They will result in significant growth in a range of industries in Coffs Harbour.

Delivery Program/Operational Plan Implications

The recommendations contained in this report will have no impact on the 2012/13 Operational Plan. The recommendations will require consideration be given to amending the Delivery Program as part of budget considerations for future years.

With regards to the funding of the recommended project, the Jetty foreshores, Council's contribution is proposed to be sourced from a combination of \$1.5M in funds held in reserve generated by private works activities undertaken by Council and a \$3.5M loan, \$5M in total, to match the \$5M grant being sought from the RDAF.

It is proposed that the loan, to be taken over a 10 year period, be repaid via funding from a combination of three sources at approximately \$160,000 per year each (depending on final loan repayments). The sources proposed are the existing special rate variations for community facilities and priority infrastructure, as well as the Environmental Levy.

In terms of impacts of this on the Delivery Program (and past the four-year timescale of the Delivery Program, i.e. the full 10 year period of the loan) there are no existing commitments regarding the allocation of funds that would prevent Council allocating funds from these programs to the loan.

With regards to the community facilities program, Council will finalise the repayment of existing loans in 2017 and has allocated (at its meeting of 23 June 2011) \$300,000 per year to the public amenities renewal program.

With regards to the priority infrastructure program, whilst the primary target for this was Council's ageing timber bridges, there is nothing to prevent Council from utilizing these funds for the Foreshores project, recognizing this as infrastructure the community considers a priority. A review of the timber bridge replacement program has been undertaken, and while reducing the available funds will slow the pace of the replacement program, there are sufficient funds to cover all critical projects.

With regards to the Environmental Levy, \$800,000 of the \$1.3M raised by the Levy is allocated via the Committee. Effectively, the amount available to allocate to these projects would be reduced. Elements of the proposed works at the foreshores, particularly boardwalks over the dunes, contribute to the achievement of environmental objectives set out in the environmental levy guidelines.

Consultation:

Various levels of internal and external consultation has been undertaken for the projects considered in this report.

Related Policy and / or Precedents:

Council has in the past pursued grant applications whenever it is appropriate.

Statutory Requirements:

There are no statutory requirements in relation to this.

Issues:

Following is an update of the current status of each of the projects as previously reported to Council.

JETTY FORESHORES

Brief Outline of the Proposed Project

Council recently completed stage one of the Harbourside Redevelopment Project. The project focuses only on upgrade and rehabilitation of open space/recreational infrastructure on land which Council has care and control over (land between Jordon Esplanade and Jetty Beach).

Planning and design for the Harbourside Redevelopment Project has progressed based on recommendations from an internal working group meeting in May 2011 at which broad objectives for the project were defined:

"Council has the opportunity to drive change and contribute to significant improvements to the area. We want to demonstrate to the community that change and improvement can be achieved. Aim for the area to be a special place, to be high quality and have a wow factor. Aim for achievable solutions."

Most important inclusions:

1. Create walkway/boardwalk to provide strong visual connection to the water, open up walkways and views. Include good lighting. Consider combinations of raised boardwalk, floating deck and sea walls. Need to connect into Coffs Creek cycleway and Beacon Hill cycleway.
2. Upgrade amenities blocks including connection to sewer (completed as part of stage one).
3. Provide 'Pedestrian Avenue' connection from the Jetty Restaurant Strip through to the Jetty Structure.

Other inclusions after first priority items:

- Structures and memorials - development or relocation of sea scouts, improvements to other structures.
- Development of site for kiosk and temporary van type vendors.
- Possible long term relocation of Marshall's Amusements pending development of showground.
- Interface to railway corridor should be considered.
- Opportunity for timber and aboriginal heritage to be the theme for identifying Coffs Harbour.
- Improvements to visitor facilities.

Objectives are to increase use, create more people spaces and more opportunity for expanded community events. Clearing of vegetation for more space if required.

Sand dredging could provide fill material and future funding:

Preliminary cost estimates for the concept work are in the order of \$10 million. The high impact/iconic design proposal however concentrates on upgrade of the northern end of the precinct including establishment of "boardwalk" link between the Marina Precinct and the Jetty Structure and development of a pedestrian precinct and link to the Jetty Strip.

Information Currently Available to Complete a Quality Application

In preparing designs for the works undertaken in Stage 1 of the project, planning and design for other elements of the project has been carried out. Consequently concept designs are available for key elements of proposed improvements, which include the "boardwalk" proposal connecting the Marina to the Jetty and pedestrian plaza area. While some consultation with stakeholders has been completed, additional community consultation will be required as the design process progresses.

Preliminary cost estimates:

"Boardwalk" between Marina and Jetty	\$2,000,000
Pedestrian Plaza at Jetty	\$600,000
Car Parking and Traffic Calming	\$1,700,000
Jetty market area including performance space/stage	\$650,000
Promenade path in parklands with lighting	\$1,400,000
New regional standard playground and senior's fitness circuit	\$1,800,000
Windbreaks/Public Art/Landscaping	\$1,000,000
Drainage and dune protection fencing	\$450,000
New raised footbridges for beach access	\$400,000
 Total	 \$10,000,000

Additional costs would need to be allowed for in future budgets should the facilities be constructed to cover operational costs, maintenance and depreciation.

These costs would not be able to be included in the RDA grant application.

Timing

With the concept plans already in place the following timeline is estimated to have the project 'shovel ready':

	Announcement of Funding
3 months	Design and Consultation
2 months	Approval and Procurement
1 month	Construction Programming

Subject to successful community consultation and approvals it is probable that the project would be shovel ready in six months from announcement of the funding.

Likelihood of Being 'Shovel Ready' Within the Timeframe

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

BRUXNER PARK ECO TOURISM PROJECT

Brief Outline of the Proposed Project

A program has been developed in partnership with government agencies to transform the Bruxner/Ulidarra area into a premier ecotourism centre. Forests NSW have recently completed construction of a premier viewing platform and car park reconstruction at Sealy Lookout. Concept designs for further development have been prepared and consultants have recommended development elements that include: café and interpretation centre, additional parking, road upgrades, bushwalking, improved signage, eco adventure activities.

The proposed RDA funding application will include essential infrastructure works to ensure the project proceeds to the next stage. This proposed works includes road safety and access works, early sewer, water and power infrastructure, signage, carparking and security gating.

Information currently Available to Complete a Quality Application

The first phases of the project are completed. Forests NSW have completed construction of the viewing platform and operation of an ecoadventure facility is about to commence.

Architectural plans and specifications for the café and interpretation centre have been completed. It is proposed that grant funds be sought for this stage of the program, in respect to building works, road access and safety works, provision of additional parking, provision of water, power, on site sewer, and forest trails.

It is intended that grant and private funding for the construction of this element will be sought.

Estimated Costs

Road Access and Safety upgrade	\$1,400,000
Sewer	\$50,000
Water	\$40,000
Power	\$200,000
Signage and interpretation	\$150,000
Carparking	\$250,000
Korora platform and shelter	\$50,000
Access and security gate	\$25,000
Total	\$2,165,000

The current status of the road under Council management is of poor standard, it is envisaged that an upgrade of the current surface will reduce any short term maintenance costs. Long term maintenance of the road asset will need to be considered.

Timing

Works will be able to commence within the funding programs timelines.

Likelihood of Being 'Shovel Ready' Within the Timeframe

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

COMMUNITY SPACE AT BRELSFORD PARK

No change in status, see previous report

BCU INTERNATIONAL STADIUM WORKS

No change in status, see previous report

REGIONAL SKATE PARK

While this could be considered as a separate project, it is arguably a stronger application when combined with the other elements of the Community Space at Brelsford Park i.e. it satisfies significant economic objectives of the RDAF rather than primarily community outcomes.

CYCLEWAY NEXT TO NEWLY CONSTRUCTED PACIFIC HIGHWAY

No change in status, see previous report

WOOLGOOLGA MULTIPURPOSE CENTRE

Comments in the previous report are still relevant, however Council has resolved that the location of the Centre will be at the West Woolgoolga Sporting Complex in accordance with the plan adopted by Council for this precinct.

DETENTION BASIN NOS 3 AND 4

Brief Outline of the Proposed Project

Council has completed construction of the Bakers Road Retention Basin (Detention Basin No 1) and has commenced construction of the Bennett's Road (Detention Basin No 2). The Upper Shephards Lane (Detention Basin No 3) proposal has been on hold due to issues related to land acquisition. The Spagnolos Road Basin however is progressing with service relocations currently underway.

Funding for the Bennett's Road and Upper Shephards Lane Basins has been identified in Council's City Wide Flood Mitigation Program and submitted to the Natural Disaster Resilience Scheme for grant funding (2:1). The projects do not warrant consideration for RDAF round 3 or 4.

SEATING AT JETTY MEMORIAL THEATRE

No change in status, see previous report

REGIONAL LIBRARY

While this could be considered as a separate project, it is arguably a stronger application when combined with the other elements of the Community Space at Brelsford Park.

SOLITARY ISLANDS COASTAL WALK

No change in status, see previous report

CONCLUSION

With the successful completion of the Jetty Foreshores (Stage One) project it is clear that the Jetty project demonstrates excellent return on investment and has the support of the community and state government agencies. It is recommended that the Jetty Foreshores project be confirmed as the priority for the next round of the RDAF program and an application be prepared for this project.

It is noted that the objectives of the RDAF are not necessarily equivalent to those of Council in regards to the benefits of this project, and the challenge will be presenting a strong case with reference to the RDAF criteria.

Implementation Date / Priority:

The deadline for submission of EOIs for rounds 3 and 4 of the RDAF is 6 December, 2012. If Council's EOI is recommended by Mid North Coast RDA to progress to full application, this must be submitted by 11 April 2013.

Recommendation:

- 1. That Council prepare an Expression of Interest seeking \$5M from round 4 of the RDAF for a \$10M project Redevelopment of the Jetty Foreshores.**
- 2. That Council note that, if the application is successful, the matching funds are proposed to be sourced as \$1.5M from the Private Works General Reserve and \$3.5M from a loan, with repayments funded equally from community facilities and priority infrastructure special rate variations and the Environmental Levy.**

STATUS OF PROJECTS FOR REGIONAL DEVELOPMENT AUSTRALIA FUND APPLICATIONS

Purpose:

The purpose of this report is to provide an update on the status of possible projects to be considered for the Regional Development Australia (RDA) Fund program.

Description of Item:

During the 10 March 2011 meeting of Council it was resolved that:

1. *Council endorses the draft concept plans for the grandstand extensions at the BCU International Stadium, Centre of Excellence and venue upgrades.*
2. *Coffs Harbour City Council immediately formulate concept plans for a Performing Arts Centre including a gallery.*
3. *A report be presented back to Council on the status of these projects for possible inclusion:*
 - *Regional Skate Park*
 - *Jetty Foreshores*
 - *Cycleway next to newly constructed Pacific Highway*
 - *Woolgoolga Multipurpose Centre*
 - *Detention Basin Nos 3 and 4*
 - *Seating at Jetty Memorial Theatre*
 - *Regional Art Gallery*
 - *Regional Library*
 - *Bruxner Park Eco Tourism Project*
 - *Solitary Islands Coastal Walk*

Part 2 of the above resolution has been addressed in a separate report to Council. Details pertaining to the Regional Skate Park are also included in that separate report however reference is included in this report regarding the skate park for prioritising purposes.

Since the above resolution of Council, staff have examined in detail the status of each project listed and this report provides:

- A brief outline of the proposed project.
- Information currently available to complete a quality application.
- Estimated costs
- Timing
- Likelihood of being 'shovel ready' within the timeframe.

The report also includes a matrix which assists in the prioritising of the projects identified by Council.

Sustainability Assessment:

- **Environment**

There are no environment impacts of the matters raised in this report. Should Council resolve to move further on applications and be successful then the full impact would be examined.

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- **Social**

The provision of these projects would address a range of social and economic issues as outlined in previous reports to Council.

- **Civic Leadership**

The pursuing of the provision of these facilities will address matters outlined clearly in the Looking After of Communities Theme of the Coffs Harbour 2030 Community Plan. The Plan outlines Council's role as provider and facilitator in addressing a range of objectives and strategies in relation to:

LC3 - We enjoy a comprehensive range of community, artistic and cultural opportunities.

- **Economic**

Broader Economic Implications

These projects would have positive economic implications during the construction period and also in the long term. They will result in significant growth in a range of industries in Coffs Harbour.

Delivery Program/Operational Plan Implications

The recommendations contained in this report will have no impact on the Operational Plan. The recommendations will require consideration be given to amending the Delivery Program as part of budget considerations. These matters are addressed in the 'Issues' section of this report.

Consultation:

Various levels of internal and external consultation has been undertaken for the projects considered in this report.

Related Policy and / or Precedents:

Council has in the past pursued grant applications whenever it is appropriate.

Statutory Requirements:

There are no statutory requirements in relation to this.

Issues:

The Regional Development Australia Fund (RDAF) is a national program to support Australia's regions and enhance the economic development and livability of their communities. The program is administered by the Department of Regional Australia, Regional Development and Local Government (the Department). It is designed to ensure that new investments are targeted to reflect the characteristics, and to address the opportunities and challenges, of our diverse regions.

The program aims to support localism, and to leverage and better coordinate state, commonwealth, local government and private (including not-for-profit) investments for the long term benefit of communities.

Attachment 1

The first funding round will open for applications when these Guidelines are released. The first round will look to contribute up to \$100 million of Commonwealth funding to approved projects. Applications will be received up to COB on Friday, 13 May 2011.

Funding of between \$500,000 and \$25 million per project will be available.

The objective of the RDAF is to fund projects that support the infrastructure needs and economic and community growth of Australia's regions. The program funds will maximise outcomes through effective partnerships across all levels of government, and the business and non-profit sectors. The program will build synergies and increase the scale of investment by ensuring that projects have a broad regional impact and support communities within those regions.

Funding should only be requested for projects that are "investment ready".

Outcomes of the program will include:

- Identification of regional priorities by local communities and investment in those priorities;
- Support for regional economic development by assisting regions to develop and implement projects with broad based local support and which have identified potential to deliver lasting economic and community benefits;
- Sustained increases to the economic output of local and regional economies;
- Increased social capita, amenity and/or livability within the community;
- Communities which achieve sustainable growth;
- Integrated Australian, state and local government programs, activities and investment;
- New opportunities for private sector participation and partnerships;
- Removal of barriers and/or a direct incentive for business investment in regional locations; and
- Addressing specific areas of disadvantage faced by regional Australia.

It is desirable that projects funded through RDAF achieve these outcomes by maximizing the opportunities generated by other regional programs and investments across the Commonwealth and other levels of government. Projects should also seek to integrate a range of activities and investments such as broadband, health, education and social inclusion, and demonstrate innovation and incentive for new investments in Australia's regions.

Projects much support at least one of the following national priorities:

- Skilling Australia;
- Lifting productivity;
- Maximising the opportunity of broadband;
- Sustaining our environment;
- Social inclusion; and
- Water and energy efficiency.

Given that the RDAF for over \$5 million requires matching funding from Council it is thought that it would be appropriate to make applications for no more than \$5 million. The Guidelines also require Council to include a priority ranking where multiple applications are submitted. Therefore, Council will need to prioritise those projects it wishes to submit.

Following is an outline of the current status of each of the projects as resolved by Council.

BCU INTERNATIONAL STATDIUM WORKS

Brief Outline of the Proposed Project

Stage 1 of the concept plan includes two components - extension to seating and facilities (grandstand wings) and internal roadways/parking.

Component 1

Seating and Facilities Upgrade

Installation of seating extensions either side of the current grandstand, increasing the permanent seating capacity by approximately 2,000 to a total of 3,000. Around 50% of the new seats would be undercover. The project would include new food and beverage and amenity blocks to service the new seating. Upgrades to player facilities to improve the venue's ability to host national teams and events would also form part of the project.

Component 2

Upgrades of Parking and Access Ways

This would be required throughout the venue to successfully cater for major events.

Information Current Available to Complete a Quality Application

On 10 March 2011 Council resolved to endorse the concept plans for these upgrades. The total value of the project is estimated at \$24 million, however, it is designed to be built in a number of stages as funding becomes available.

Estimated Costs

Component 1 - Seating and Facilities Upgrade

Estimated Cost

\$2,130,950	Concourse Level - new seats (2,000), F&B kiosks (2), toilet blocks (2), upgrade existing player facilities
\$1,380,000	Roof/awning
\$ 20,000	FF&E (basic)
\$3,430,950	Sub-total
\$1,063,595	Margins (preliminaries 12%, design and construction contingencies 7.5%, professional fees 10%, authority's fees allowance 1.5%)

\$4,494,545 Total Seating and Facilities Upgrade

Component 2 - Upgrades of Parking and Access Ways

Estimated Cost

\$ 200,000	Upgrade of car parks and internal roadways
\$62,000	Margins (preliminaries 12%, design and construction contingencies 7.5%, professional fees 10%, authority's fees allowance 1.5%)

\$262,000 Total Internal Roadways and Parking

\$4,494,545	Seating and Facilities Upgrade
\$ 262,000	Roadways and Parking

Attachment 1

\$4,756,545 TOTAL STAGE 1

Additional costs would need to be allowed for in future budgets should the facilities be constructed to cover operational costs, maintenance and depreciation. Initial estimates for these are:

Stage 1, based on a capital cost of \$4,756,545

Operational costs @ 1%	\$ 47,565
Maintenance @ 2%	\$ 95,131
Depreciation @ 3%	\$142,696

These costs would not be able to be included in the RDA grant application.

Timing

With the concept plans already in place the following timeline is estimated to have the project 'shovel ready':

	Announcement of Funding
4 months	Design and construction tender
2-3 months	Design and drawings completed
1 month	Construction Certificate approval

It is estimated this process may take a total of 7-8 months. It would therefore be imperative that Council approve the tender process to begin immediately on any funding announcement being made, rather than awaiting official paperwork or the first payment. If this was the case, although still an incredibly tight timeframe with little contingency, with the 1-2 months whilst funding paperwork is finalised, it is probable that the project would be shovel ready in six months from the funding payment being made.

Likelihood of Being 'Shovel Ready' Within the Timeframe

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

REGIONAL SKATE PARK

Brief Outline of the Proposed Project

As part of Council's Open Space Strategy adopted in 2010 the need for planning of a Regional Skate Park facility became apparent through 98 submissions to the Open Space Strategy and a petition submitted by the community with 2,250 signatories. In November 2010 Council engaged Convic Design to prepare a report to evaluate the possible siting of a future community and skate park space at a number of suitable locations within the Coffs Harbour area. The rationale for recommending the Brelsford Park site for development of a Regional Skate Facility is detailed in a separate report.

Information Currently Available to Complete a Quality Application

Convic summarises the essential components of a regional scale Community and Skate Space. The report outlines each component explaining the objectives of each relative to maximizing participation, community and user acceptance, minimizing maintenance and ensuring safety. Included is a sketch diagram which illustrates a possible configuration, at a Master Plan level, for the preferred site. The diagram has notional elements only and provides grounds on which costs can be planned.

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Estimated Costs

Subject to further consultation and adoption of 'elements' to be included in the facility, the Convic report constitutes a concept design from which detailed design and costings can be completed.

Preliminary cost estimate for the project is \$3,200,000.

Additional costs would need to be allowed for in future budgets should the facilities be constructed to cover operational costs, maintenance and depreciation. Initial estimates for these are:

Based on a capital cost of \$3,200,000

Operational costs @ 1%	\$ 32,000
Maintenance @ 2%	\$ 64,000
Depreciation @ 3%	\$ 96,000

These costs would not be able to be included in the RDA grant application.

Timing

With the concept plans in place the following timeline is estimated to have the project 'shovel ready':

	Announcement of Funding
3 months	Design and Consultation
2 months	Approvals and procurement
1 month	Construction programming

Subject to successful community consultation and approvals it is probable that the project would be shovel ready in six months from announcement of the funding.

Likelihood of Being 'Shovel Ready' Within the Timeframe

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

JETTY FORESHORES

Brief Outline of the Proposed Project

Council will be aware that the design and stakeholder consultation has commenced in relation to the Harbourside Redevelopment Project. The project focuses only on upgrade and rehabilitation of open space/recreational infrastructure on land which Council has care and control over (land between Jordon Esplanade and Jetty Beach). A summary of Federal RLCIP grant funding and Council funding toward Stage 1 of the project is the subject of a separate report.

Planning and design for the Harbourside Redevelopment Project has progressed based on recommendations from an internal working group meeting in May 2010 at which broad objectives for the project were defined:

"Council has the opportunity to drive change and contribute to significant improvements to the area. We want to demonstrate to the community that change and improvement can be

Attachment 1

achieved. Aim for the area to be a special place, to be high quality and have a wow factor. Aim for achievable solutions."

Most important inclusions:

1. Create walkway/boardwalk to provide strong visual connection to the water, open up walkways and views. Include good lighting. Consider combinations of raised boardwalk, floating deck and sea walls. Need to connect into Coffs Creek cycleway and Beacon Hill cycleway.
2. Upgrade amenities blocks including connection to sewer.
3. Provide 'Pedestrian Avenue' connection from the Jetty Restaurant Strip through to the Jetty Structure.

Other inclusions after first priority items:

- Structures and memorials - development or relocation of sea scouts, improvements to other structures.
- Development of site for kiosk and temporary van type vendors.
- Possible long term relocation of Marshall's Amusements pending development of showground.
- Interface to railway corridor should be considered.
- Opportunity for timber and aboriginal heritage to be the theme for identifying Coffs Harbour.
- Improvements to visitor facilities.

Objectives are to increase use, create more people spaces and more opportunity for expanded community events. Clearing of vegetation for more space if required.

Sand dredging could provide fill material and future funding:

Preliminary cost estimates for the concept work are in the order of \$10 million. The high impact/iconic design proposal however concentrates on upgrade of the northern end of the precinct including establishment of "boardwalk" link between the Marina Precinct and the Jetty Structure and development of a pedestrian precinct and link to the Jetty Strip.

Information Currently Available to Complete a Quality Application

In preparing designs for the works proposed to be undertaken in Stage 1 of the project, planning and design for other elements of the project has been carried out to ensure that Stage 1 works do not compromise future upgrade works. Consequently concept designs are available for key elements of proposed improvements, which include the "boardwalk" proposal connecting the Marina to the Jetty and pedestrian plaza area. While some consultation with stakeholders has been completed, additional community consultation will be required as the design process progresses.

Estimated Costs

Preliminary cost estimates:

"Boardwalk" between Marina and Jetty	\$2,000,000
Pedestrian Plaza at Jetty	\$1,000,000
Car Parking and Paths	\$2,000,000

Additional costs would need to be allowed for in future budgets should the facilities be constructed to cover operational costs, maintenance and depreciation. Initial estimates for these are:

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Based on a capital cost of \$5,000,000

Operational costs @ 1%	\$ 50,000
Maintenance @ 2%	\$ 100,000
Depreciation @ 3%	\$150,000

These costs would not be able to be included in the RDA grant application.

Timing

With the concept plans already in place the following timeline is estimated to have the project 'shovel ready':

	Announcement of Funding
3 months	Design and Consultation
2 months	Approval and Procurement
1 month	Construction Programming

Subject to successful community consultation and approvals it is probable that the project would be shovel ready in six months from announcement of the funding.

Likelihood of Being 'Shovel Ready' Within the Timeframe

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

CYCLEWAY NEXT TO NEWLY CONSTRUCTED PACIFIC HIGHWAY

Brief Outline of the Proposed Project

Council continues to work with the RTA and the Sapphire to Woolgoolga Joint Venture on planning and design for a continuous cycleway link parallel to the Pacific Highway Upgrade and Service Road proposal. At this stage it is difficult to determine what, if any, links may not be achieved as part of the project. What has always been clear however is that following the Sapphire to Woolgoolga Upgrade the main missing link in the cycleway network will be between Diggers Beach and Korora/Sapphire.

Council has included this section in planning for the Coastline Cycleway project and currently has a funding submission with the Department of Planning for investigation and design.

Information Currently Available to Complete a Quality Application

Concept alignments for the Diggers Beach to Korora link has been determined, however, some investigation and landholder consultation is required for the section between James Small Drive and Charlesworth Bay Road.

Estimated Costs

Sapphire to James Small Drive north	\$200,000
James Small Drive	\$500,000
James Small Drive to Charlesworth Bay Road	\$500,000
Charlesworth Bay Road to Diggers Beach Road	\$400,000
Total	\$1,600,000

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Additional costs would need to be allowed for in future budgets should the facilities be constructed to cover operational costs, maintenance and depreciation. Initial estimates for these are:

Based on a capital cost of \$1,600,000

Operational costs @ 1%	\$ 16,000
Maintenance @ 2%	\$ 32,000
Depreciation @ 3%	\$ 48,000

These costs would not be able to be included in the RDA grant application.

Timing

With the concept plans in place, the following timeline is estimated to have the project 'shovel ready':

	Announcement of Funding
3 months	Design and Consultation
2 months	Approvals and Procurement
1 month	Construction Programming

Subject to successful community consultation and approvals it is probable that the project would be shovel ready in six months from announcement of the funding.

Likelihood of Being 'Shovel Ready' Within the Timeframe

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

WOOLGOOLGA MULTIPURPOSE CENTRE

Brief Outline of the Proposed Project

The proposed Multipurpose Centre is a project proposed by a group of Woolgoolga residents and would include indoor sporting, community and youth facilities comprising two basketball courts, kitchen/café/amenities/change rooms, meeting/breakout rooms, youth pod, storerooms, reception/office and car parking.

Information Currently Available to Complete a Quality Application

Concept plans have been prepared by the Community Committee for the project. The location of the facility is still not finalised, although Council has approved in principal only the allocation of the land.

Estimated Costs

The building would be in the order for 2,500m² and probably cost \$5-6 million. Staging may be possible.

Timing

Timing is uncertain and cannot be determined until the location of the facility is finalised. There is no funding for the project at present.

Likelihood of Being 'Shovel Ready' Within the Timeframe

Attachment 1

It is considered that the project will not be shovel ready within the timeframe and that the project is only of District significance as opposed to Regional.

DETENTION BASIN NOS 3 AND 4

Brief Outline of the Proposed Project

Council has completed construction of the Bakers Road Retention Basin (Detention Basin No 1) and completed detailed design for the Bennetts Road (Detention Basin No 2) and Upper Shephards Lane (Detention Basin No 3) proposals. Funding for the Bennett's Road and Upper Shephards Lane Basins has been identified in Council's City Wide Flood Mitigation Program and submitted to the Natural Disaster Resilience Scheme for grant funding (2:1).

The Spagnolos Road Basin (Detention Basin No 4) is the least effective of the Detention Basins proposed in the Coffs Creek Floodplain Management Plan. The basin footprint falls within the proposed construction zone for the Coffs Harbour Pacific Highway By-pass. Concept design of the basin has shown that coordination of the basin construction prior to construction of the by-pass will be problematic. However, if the basin is constructed as part of the Pacific Highway By-pass works the proposal becomes very cost effective.

Information Current Available Complete a Quality Application

Detail design and cost estimates for Upper Shephards Lane Basin are complete. Land acquisition is underway.

Concept design and preliminary cost estimate for the Spagnolos Road Basin are complete, however, no detail design or land acquisition has been progressed.

Estimated Costs

Upper Shephards Lane (Detention Basin No 3)	\$3,260,000
Spagnolos Road Basin (Detention Basin No 4)	\$2,570,000

Timing

Upper Shephards Lane (Detention Basin No 3) is scheduled to commence construction in July 2011. Spagnolos Road Basin (Detention Basin No 4) is not currently programmed and will only be cost-effective if deferred to coincide with construction of the Coffs Harbour Pacific Highway By-pass.

Likelihood of Being 'Shovel Ready' Within the Timeframe

Subject to completion of land acquisition Upper Shephards lane (Detention Basin No 3) is shovel ready. Spagnolos Road Basin (Detention Basin No 4) is unlikely to be shovel ready within the timeframe required.

SEATING AT JETTY MEMORIAL THEATRE

Brief Outline of the Proposed Project

It is unclear from the resolution whether this is about replacing the existing seats with new ones or looking to increase the seating capacity of the venue.

If it is about replacing the existing seating then it is important to note that any replacement of the existing seats would result in significant loss of seat numbers. This option was investigated thoroughly during the major refurbishment in 2003. The seat numbers at

Attachment 1

approximately 250 makes the venue one of the smallest on the touring circuit. Any further reduction would make it unviable for many ventures to consider performing at the theatre.

If the notion is about increasing the numbers of seating there are options available for retractable seating which may work within the venue.

Information Currently Available to Complete a Quality Application

There is very limited information about either option, however, information about replacement of the existing seats would be easily sourced, however, is not recommended due to the reduction in seat numbers which would result.

In relation to increasing seat numbers, a range of studies in relation to engineering solutions and design requirements would be required.

Estimated Costs

Unknown at this time.

Timing

Unknown

Likelihood of Being 'Shovel Ready' Within the Timeframe

It is considered that the project will not be shovel ready within the timeframe and that the project is only of District significance as opposed to Regional.

REGIONAL ART GALLERY

Brief Outline of the Proposed Project

This is for a purpose built Regional Art Gallery which has adequate space for the full Regional Gallery operations including public programs, workshop and storage.

Information Currently Available to Complete a Quality Application

Functional areas for such a facility have been established, which are able to be combined into an estimated floor area and building footprint.

Estimated Costs

Unknown at this stage.

Timing

Unknown

Likelihood of Being 'Shovel Ready' Within the Timeframe

It is considered that the project will not be shovel ready within the timeframe and that the project is only of District significance as opposed to Regional.

REGIONAL LIBRARY

Brief Outline of the Proposed Project

Attachment 1

This is for a purpose built Central Library which has adequate space for the fully Library operations which meets current NSW Public Library Standards.

Information Currently Available to Complete a Quality Application

Functional areas for such a facility have been established, which are able to be combined into an estimated floor area and building footprint.

Estimated Costs

Unknown at this stage.

Timing

Unknown

Likelihood of Being 'Shovel Ready' Within the Timeframe

It is considered that the project will not be shovel ready within the timeframe and that the project is only of District significance as opposed to Regional.

BRUXNER PARK ECO TOURISM PROJECT

Brief Outline of the Proposed Project

A program is being developed in partnership with government agencies to transform the Bruxner/Ulidarra area into a premier ecotourism. Concept designs have been prepared and consultants have recommended development elements that include: café and interpretation centre, viewing platforms, additional parking, road upgrades, bushwalking, improved signage, eco adventure activities.

The proposed RDA funding application will include essential infrastructure works to ensure the project proceeds to the next stage. This proposed works includes road safety and access works, early sewer, water and power infrastructure, signage, carparking and security gating.

Information currently Available to Complete a Quality Application

The first phases of the project are now underway. Forests NSW have finalised designs and tendering for the viewing platform and selection of an ecoadventure operator is about to be announced.

It is proposed that grant funds of \$2,165,000 be sought for this stage of the program, in respect to road access and safety works, provision of additional parking, provision of water, power, on site sewer, additional viewing Platform at the Korora lookout, forest trails and interpretation and security gating.

Grant funds are being sought elsewhere for design of the café and interpretation centre, quantity surveying, and relevant approvals. Grant and private funding for the construction of this element will be sought at a later stage.

Estimated Costs

Road Access and Safety upgrade	\$1,400,000
Sewer	\$50,000
Water	\$40,000
Power	\$200,000
Signage and interpretation	\$150,000

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Carparking	\$250,000
Korora platform and shelter	\$50,000
Access and security gate	\$25,000
Total	\$2,165,000

The current status of the road under Council management is of poor standard, it is envisaged that an upgrade of the current surface will reduce any short term maintenance costs. Long term maintenance of the road asset will need to be considered.

Timing

Works will be able to commence within the funding programs timelines.

Likelihood of Being 'Shovel Ready' Within the Timeframe

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

SOLITARY ISLANDS COASTAL WALK

Brief Outline of the Proposed Project

The Solitary Islands Coastal Walk concept centres on a 67 kilometre walking route that traverses coastal landscapes within the Coffs Harbour Local Government Area between Sawtell in the south and Red Rock in the north. Additional partners are now being sought to invest in expediting the implementation of identified key strategies, including 10.7 kilometres of walking track infrastructure development, which will assist in tying a broader program of investment together with a high quality walking experience.

Information Currently Available to Complete a Quality Application

Concept designs and detailed cost estimates are complete.

Estimated Costs

It is anticipated that the project will attract matching funding from the Coffs Coast Regional Park and other sources. Council's contribution would require allocation of **\$1,000,000**.

Additional costs would need to be allowed for in future budgets should the facilities be constructed to cover operational costs, maintenance and depreciation. Initial estimates for these are:

Based on a capital cost of \$1,000,000

Operational costs @ 1%	\$ 10,000
Maintenance @ 2%	\$ 20,000
Depreciation @ 3%	\$30,000

These costs would not be able to be included in the RDA grant application.

Timing

Works are ready to proceed on allocation of funding.

Likelihood of Being 'Shovel Ready' Within the Timeframe

Attachment 1

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

The Mayor, Councillor Palmer, the General Manager and a number of Council staff attended a briefing on the Regional Development Australia funding program on 6 April 2011. This was provided by representatives of RDA Mid North Coast. It was made clear during this briefing that:

- There is \$100,000,000 available across 55 RDA regions in this first round of funding.
- The process will be highly competitive.
- The extent to which the project contributes to and sustains economic growth will be very important.
- Those projects which support and/or capitalise on the NBN roll-out will be favorably considered.
- Projects which work in partnership with a number of agencies are also likely to be viewed favourably.

As a result of attendance at the abovementioned briefing and because it was seen that the projects listed in the resolution of Council was not exhaustive, the following project has been included for consideration. It is useful to note that this project meets many of the criteria which were highlighted as being highly desirable during the briefing in early April.

E-DEMO AND INNOVATION CENTRE

Capitalising on the early roll-out of NBN which Coffs Harbour has achieved, the project is to create a "Go Broadband Centre" in the CBD of Coffs Harbour. The purpose of this project is to ready the community to take advantage of the rapidly approaching Digital Age. This will be co-located within a Centre of Enterprise, Innovation and Support, which will be a partnership with SCU and others. This centre along with the NBN Company's Mobile Experience Centre will provide information, awareness and hands-on activity to engage business and the broader community in the Broadband roll-out and encourage a vibrancy and growth to take Coffs into the "Information Communication and Technology" (ICT) world economy.

Brief Outline of the Proposed Project

The E-demo and Innovation Centre is to be located within the CBD of Coffs Harbour to provide information relating to applications that are capable of taking advantage of the Broadband rollout and encouraging innovation in the region.

Information Currently Available to Complete a Quality Application

Documents which outline the project include Building the Digital Economy and other supporting information prepared previously by the EDU.

Estimated Costs

While this is yet to be fully determined preliminary estimates will include partner and other contributions yet to be quantified. NSW Industry and Investment have committed to \$100,000. SCU is a partner organisation. The estimated cost is a \$5,000,000 capital outlay.

Additional costs would need to be allowed for in future budgets should the facility be constructed to cover operational costs, maintenance and depreciation.

These costs would not be able to be included in the RDA grant application and would be the subject of negotiation with the partner agencies.

Attachment 1

Timing

Third quarter 2011.

Likelihood of Being 'Shovel Ready' Within the Timeframe

There is a high likelihood of this project being shovel ready, subject to the above matters relating to timing being considered.

The table below summarises the current status of the projects resolved by Council for consideration, including the Performing Arts Centre. The table also includes recommended priority as this is required to meet the RDA funding program. This has been arrived at by listing those projects that will be shovel ready from the highest \$ value to the lowest. The rationale for this is that this derives the maximum benefit from the funding program.

Project	Information Available	\$ Sought	Criteria	Timing	Shovel Ready	Priority
BCU Stadium Upgrade	Sufficient	\$4,756,545 (Stage 1)	Yes	Yes	Yes	3
Performing Arts Centre	Insufficient	\$20,000,000	Yes	No	No	-
Regional Skate Park	Sufficient	\$3,200,000	Yes	Yes	Yes	4
Jetty Foreshores	Sufficient	\$5,000,000	Yes	Yes	Yes	2
Cycleway near Pacific H'wy	Sufficient	\$1,600,000	Yes	Yes	Yes	6
Woolgoolga Multipurpose Centre*	Sufficient	\$6,000,000	Yes	Yes	No	-
Detention Basins 3 and 4	Sufficient	\$5,830,000	Yes	No	No	-
Seating at Jetty Theatre	Insufficient	-	Yes	No	No	-
Regional Art Gallery	Insufficient	-	Yes	No	No	-
Regional Library	Insufficient	-	Yes	No	No	-
Bruxner Park Eco Tourism Project	Sufficient	\$2,165,000	Yes	Yes	Yes	5
Solitary Islands Coastal Walk	Sufficient	\$1,000,000	Yes	Yes	Yes	7
E-demo and Innovation Centre	Sufficient	\$5,000,000	Yes	Yes	Yes	1

* Please note this is not a Council Project

Criteria include:

- Broadband
- Health
- Education
- Social inclusion
- Skilling Australia
- Lifting Productivity
- Maximising the opportunity for broadband
- Sustaining our Environment
- Water and energy efficiency

Implementation Date / Priority:

The grants to the RDAF program need to be completed by close of business Friday, 13 May 2011.

Attachment 1

Recommendation:

That Council complete applications for funding for the following projects which are listed in priority order:

- 1. E-demo and Innovation Centre**
- 2. Jetty Foreshores**
- 3. BCU Stadium Upgrade**
- 4. Regional Skate Park**
- 5. Bruxner Park Eco Tourism Project**
- 6. Cycleway next to newly constructed Pacific Highway**
- 7. Solitary Islands Coastal Walk**

RDA FUNDING APPLICATION FOR A "COMMUNITY SPACE" AT BRELSFORD PARK

Purpose:

To discuss the economic and community benefits of building a 'community space' at Brelsford Park and Council's opportunity to leverage its own funds to strengthen an application under the Regional Development Australia Fund.

Description of Item:

In the first round of the Federal Government's \$1B Regional Development Australia Fund (RDAF) program, no projects in the Mid North Coast (MNC) RDA received funding. Round two will be extremely competitive. Council may only submit one application to the MNC RDA who in turn may submit only three applications for the region.

Funding guidelines make clear that for Council to stand out our project must have a regional impact on economic growth, benefit the community, leverage additional funding and address priorities in the MNC RDA Regional Plan.

Having regard to the guidelines and Council's adopted priority list from round one of the RDAF, a proposal has been prepared for the construction of a 'community space' at Brelsford Park which, for the sake of 'marketing' to the RDAF, is referred to as

Switching on Coffs in the Heart of the City

There are two key objectives of the proposal. These are to create:

- a vibrant 'community space' at Brelsford Park, the 'heart' of the City
- a 'switched on community' as envisioned in the *Switched on Coffs* Digital Strategy – a strong, innovative and diverse economy (sustainable growth in business and employment), a socially inclusive community – which is spearheaded by the Centre of Open Learning and Business (COLAB) located in the community space.

This report discusses the various elements of the proposal (including a library, pedestrian plaza, café, youth space and other active and passive recreation areas as well as a carpark to service these and the existing uses) and their interrelationships in contributing to the overall objectives.

The role of the COLAB is also clarified. In summary, the COLAB is a collaboration between industries, community and government that aims to capitalise on the economic and social opportunities arising from Coffs Harbour's position as an early roll-out site for the NBN.

Finally, estimated costs for infrastructure and the existing and proposed Council programs that can be leveraged to secure RDAF funding are summarised.

Sustainability Assessment:

- **Environment**

The proposal includes substantial landscaping and the buildings will model sustainable, 'green building' practices.

Attachment 2

- **Social**

The proposal will enhance social inclusion and have flow-on effects to employment, health, service provision and community leadership.

The proposal will create life, vibrancy and diversity in the 'heart' of Coffs Harbour and contribute to a sense of place for the whole community.

- **Civic Leadership**

The proposal strongly delivers on most (around 12 of the 15) of the primary outcomes of Coffs Harbour 2030.

- **Economic**

Broader Economic Implications

The objective of the COLAB is to grow *local business* through strong business clusters, equipping them with the information, support (enterprise facilitation) and networks that will drive innovation and business growth.

COLAB programs also seek to grow skills in the local workforce (with the resulting improvements in *local wages and employment stability*) and increase digital inclusion (enabling a shift to online service provision).

COLAB programs aim to develop strong business clusters and increase skills in the workforce. This, coupled with availability of land and infrastructure and a great lifestyle are all key factors in marketing the region as an attractive one for business. *Business attraction* will be part of the clustering activities under COLAB.

Delivery Program/Operational Plan Implications

The proposal draws together funding from a number of sources, some of which are in current programs, and some which are not. Implications on Council's Delivery Program are discussed in the report.

Consultation:

This proposal brings together a number of existing projects with varying degrees of consultation.

The proposal accommodates all of the features of Council's adopted Brelsford Park master plan including pedestrian plaza, parkland and other active and passive recreation areas. At it's meeting on 14 October 2010, Council resolved to move it's preferred site for the Performing Arts Centre and Art Gallery (previously on the master plan) to City Hill.

The COLAB forms part of the *Switched on Coffs* Digital Strategy, which was the result of consultation with around 200 people from across industry and the community.

Consultation for the proposed youth space (which arose following the receipt of over 2,200 signatures seeking a facility as part of Council's Open Space Strategy) is nearing completion, a feature of which was the 'Sky High' youth event which attracted around 1,000 people seeking input to the facility.

Consultation has begun regarding the proposed CBD Special Rate Variation which, if adopted by Council and approved by IPART, includes funding to complete works on Brelsford Park of a similar scope to the current master plan but without the library.

Attachment 2

Consultation with the representatives of the working party received support for this proposal as it achieves their objectives but in addition would see the construction of a library utilising external funds. Council will consider a report on the CBD Special Rate Variation in December.

Related Policy and / or Precedents:

Nil.

Statutory Requirements:

DLG guidelines on capital projects require a number of steps to be undertaken, which will happen as part of the process in developing the grant application.

Issues:

ELEMENTS OF THE 'COMMUNITY SPACE' AND SYNERGIES BETWEEN THEM

The various elements of the proposed 'community space' on Brelsford Park and the synergies between them are discussed below. It is noted that the library is fundamental to both objectives we need to 'market' for our RDAF application: the 'community space' and a 'switched on community'.

The library as the 'anchor tenant' for the community space

Like a shopping centre needs an 'anchor tenant' to draw the volume of shoppers that then visit the specialty shops, the community space needs a constant stream of visitors to 'activate' it and create life.

Coffs Harbour Library receives 150,000 visitors per year. Studies have shown that with the construction of new facilities, library visitation often doubles and so the library represents a way of attracting around 300,000 visitors annually, a large and diverse group of people, into the community space.

The need for a new library

Quite apart from the life the library can add to the community space there is a real need for a larger library to cater for the needs of the community.

The State Library publishes comprehensive benchmarking information on libraries across NSW. While Coffs Harbour's library service compares favourably in terms of a small number of service quality related benchmarks such as 'Registered library members as % of population', 'Turnover of stock' and 'Library programs' (a credit to the staff and volunteers involved), it is actually rated the lowest in the State in terms of Library expenditure per capita.

The current library is only approximately 990m² while the State Library's recommended minimum standard for a City of Coffs Harbour's current population is approximately 2500m² (which is in the range for most libraries serving a similar population). Because the facility falls below this standard, Council is also ineligible for NSW Government's annual library development grants to address space issues at the facility.

A library building on Brelsford Park

As noted above, the library is fundamental to 'marketing' the proposal for 'Switching on Coffs in the heart of the City' and as such, the library must be located adjacent to the other elements of the proposal. It's location must be nominated as part of the RDAF application.

Attachment 2

Consideration has been given to alternatives to constructing the facility on the Park in recognition of concerns from some in the community to buildings on the Park. It is noted that this proposal would represent a building footprint of only around 6%, far less than the 20% for the current master plan. It should also be remembered that the proposal will provide the opportunity to remove an existing redundant building (old Grandstand) from the site, to be replaced with amenities/mixed function facilities to serve the broader community.

The only alternative is one of the blocks owned by Council on each corner of Park Avenue and Earl Street. The smaller of the blocks with the existing carpark is around 1340m², the larger (currently with buildings on it) is around 2000m². Even the larger block is insufficient for a library (particularly when the proposed co-located elements are included), and there are functional problems with having a library over two levels (security and surveillance, access, manual handling of stock and increased operational costs arising from increased staff required to service multiple customer service areas).

The biggest hurdle with a location off the Park, though, is cost. Carparking must be included in the proposal, and an allowance has been made to construct a new ground level carpark on the larger block. However, if carparking must be catered for as part of a multi-storey facility, the costs of this will increase substantially over a ground-level carpark. Further, the construction costs of a library as part of a multi-storey building will be substantially higher than a ground-level building on the Park.

Arguably, a library and one floor of carparking would also be a substantial underdevelopment of this important site (possible opportunities are discussed under 'Performing Arts Centre and Regional Art Gallery' below).

For the reasons outlined above, Council's only real option at this point is to propose to construct the library on the Park.

There are strong arguments why this is the best option anyway as discussed below, the chief one being that a library would create a focal point that integrates other elements of the community space.

'Main pedestrian plaza' and the library as the focal point integrating elements of the space

It is proposed that the 'main pedestrian plaza' across from Park Avenue in the current master plan be retained to welcome people into the community space, and for staging of events like Carols by Candlelight, night markets, arts and crafts, etc.

There is plenty of space for a building housing the library between here and the children's playground. A well-designed building will create a sense of connectedness and activity both in front (towards Earl Street) and behind (towards the Park), particularly with a co-located café which will again increase activity as well as providing a welcome convenience for visitors to the library, playground or other facilities. Public amenities would also be incorporated in the building.

While the desire to avoid buildings on the Park is acknowledged, it is argued that the presence of a well-designed building will add to the vitality of the community space as a whole (bringing people, activities and a focal point as well as integrating uses of the various elements of the space).

The role of the library in creating a 'switched on community'

The *Switched on Coffs* Digital Strategy envisions a 'switched on community' realising benefits such as social inclusion (isolated people becoming more active in the community),

Attachment 2

skills development (increasing employability) and the enabling of on-line service delivery (for government, industry, health providers and more).

The Strategy recognises that to 'switch on' the community, the benefits of high-speed broadband must be communicated and access facilitated for everyone, particularly the socially isolated and disadvantaged.

Modern libraries are centres providing access to a range of digital technology and their users are among the groups who must be encouraged to 'switch on'. Consequently, the library plays a key role in making a 'switched on community' a reality.

The Centre of Open Learning and Business (COLAB)

A key driver of the *Switched on Coffs* Digital Strategy is the proposed Centre of Open Learning and Business (COLAB), a collaborative partnership of industry, educators and government modelled on successful projects around the world.

COLAB partners work together to inform, support and connect the community in order to maximise uptake of what is arguably our biggest opportunity at present – our place as an early roll-out site for the NBN. The COLAB will naturally provide a forum for broader economic issues, not just the digital economy. The ability of COLAB groups to work together and disseminate information will be greatly enhanced by on-line collaboration tools that are currently being finalised by Council.

Partnerships will be established via an Advisory Committee made up of Council, Southern Cross University, TAFE, Coffs Harbour Chamber of Commerce and industry 'champions' from a number of clusters. 'Champions' from technology, creative industries, health, education, manufacturing and social services industries are already on board as are key partners such as SCU and companies such as Huawei. SCU have recently announced the establishment of the Regional Initiative for Social Innovation and Research (RISIR), which offers to accelerate learning and continuous improvement in COLAB programs as well as adding significant weight to grant applications and investor confidence through independent verification of success. Huawei is one of the biggest telecommunications companies in the world.

A number of high-profile people in the digital economy nationally have agreed to join an 'innovation committee' who (via videoconferencing) will provide 'cutting edge' insight and advice to the Advisory Committee.

Operationally, Council's economic development staff will continue to provide information and support (enterprise facilitation) to business, but their role will extend to facilitation of some activities of the Committee and clusters.

The synergies between COLAB and the rest of the community space

Switched on Coffs identifies the importance of the whole community 'switching on' so reaching a wider audience is critical if the social and economic benefits of the NBN are to be realised. The best way to reach a wider audience is by raising the profile of COLAB, and ideally this would be as part of the community space.

Practically, there are substantial benefits to co-locating the COLAB with the library: cluster groups and the Advisory Committee would have a 'base' with access to meeting rooms and the digital technologies and a display area in the library would be available for COLAB to utilise.

The Federal Government's own *National Digital Economy Strategy* sets very high expectations for the benefits of the NBN, and Coffs Harbour has the opportunity to be the

Attachment 2

benchmark which will then open up opportunities for investment attraction. Already, Senator Stephen Conroy is referring to Coffs Harbour as one of the “three or four Councils in Australia who really ‘get’ what high speed broadband can do for their communities” and this proposal to ‘switch on Coffs in the heart of the City’ would be a huge step in actually realizing these benefits.

Other elements of the community space also support the ‘switched on community’ objectives such as the youth space which will feature digital media performance opportunities and possibly an internet kiosk.

Proposed ‘Youth Space’

Following over 2,200 submissions to the Open Space Strategy in June 2010 calling for a regional skate park, Council investigated various sites having regard to the key issues to create a successful facility: passive surveillance through visibility, access to transport and facilities and remoteness from residential areas that may be impacted by noise.

Council adopted Brelsford Park as its preferred location for a Regional Skate Plaza and provided funds to enable development of a concept design. After considerable consultation with local youth (the climax of which was the ‘Sky High’ event on 8 September which attracted around 1,000 people) the concept design was broadened out to a ‘Youth Space’ and is being finalised using a variety of channels including a Facebook site that has received over 12,000 ‘hits’. Other elements that will be included are a performance space, activity areas for non-skaters and shaded areas to gather and relax.

The inclusion of a space specifically for youth is vital if we are to create a true ‘community space’ catering for the whole community. Further, making the ‘youth space’ a key component emphasises the key role our youth will play in creating the future of the City.

Other active and passive recreation facilities

It is proposed that the current uses of the site including tennis and cricket be retained on the facility. Both the current master plan and also the CBD Special Rate Variation proposal include modifications to these facilities, which could be accommodated in this proposal.

The ‘parkland’ that is part of the current master plan is similarly proposed to be retained with the exception of the Amphitheatre (due to the cost of this element and the plans for Performance Space elsewhere on the site).

Transport considerations

Carparking must be catered for, but not necessarily on the Park as this will limit the usability of the community space. The proposal includes the construction of a carpark on Council’s land on the south west corner of Park Avenue and Earl Street as discussed above.

Given it’s proximity to the bus interchange at Park Avenue and the location of bus stops on its boundaries, the community space would be well serviced by public transport.

Performing Arts Centre and Regional Art Gallery

Council has adopted City Hill as the preferred site for a Performing Arts Centre and Regional Art Gallery. If this proposal for a community space goes ahead, there is still be room for both these facilities on or around the Park (e.g. on top of multi-storey carparking on Council’s blocks on either corner of the Park Avenue / Earl Street intersection, perhaps with shops at street level) if their preferred location was to change.

Attachment 2

In short, there would still be options to incorporate them, and arguably the ‘activation’ of the space by the elements in this proposal (i.e. that draw constant crowds and create ongoing vibrancy rather than during events) will only serve to improve the success of these facilities if they were to be incorporated (as opposed to them being built on the Park with little else to draw crowds).

Summary of the proposed community space

This proposal aims to bring together a number of elements to create a community space in the heart of Coffs Harbour.

The library is fundamental to the space in terms of its attracting volume and diversity of visitors, and also it’s focus as the only building proposed on the site. Given the space limitations of the current facility, a new library is arguably a high priority to cater for the current and future needs of the City.

A café co-located with the library will increase activity, be valued by Park users and link the children’s playground to the pedestrian plaza (a venue for events) and more broadly out into the rest of the Park with its other active and passive recreation areas.

A youth space helps ensure there is ‘something for everybody’ in the community space and emphasises the key role our youth will play in creating the future of the City.

And last but not least the COLAB, co-located with the library, is the driver to create a ‘switched on community’ that is envisioned by the *Switched on Coffs* Digital Strategy. COLAB activities will improve economic and social outcomes including innovation and investment in business, employment opportunities, social inclusion and service delivery to the whole community.

FUNDING

There are several sources of funding or ‘in kind’ support that Council can leverage to support a grant application under the RDA Fund. These are set out in the table below.

Possible funding options	\$M
Community facilities program (already allocated to stage 2 of Brelsford Park)	1.2
Community facilities program (\$300,000 per annum already allocated to Public Amenities renewal program – renewing six toilets, including Brelsford Park)	0.3
CBD Special Rate Variation (proposal only at this stage, if this does not go ahead funds from the sale of the Gordon Street property could partially make up for this)	4
10 year loan funded by leasing current library site and new café co-located with library	3.5
Council’s total possible cash contribution	9
‘In kind’ contribution: land value of block corner Park Ave/Earl Street)	2
Maximum contribution from RDAF (\$11M, including in kind, @ 1:2 ratio)	5.5
Total possible funds (excluding \$2M "in kind" contribution)	14.5

Estimated costs	
Library	7.5
COLAB	1
Café, new amenities, demolition of grandstand	1
Youth Space	3

Attachment 2

Carpark at ground level corner of Park Avenue / Earl Street	0.5
Improvements to active and passive recreation areas on the remainder of Brelsford Park	1.5
Total cost	14.5

Because the proposal would require taking out a loan and also involves the committal of funds that are not as yet allocated, the proposal is referred to Council for endorsement.

An Expression of Interest must be submitted to the Mid North Coast (MNC) RDA by 1 December 2011. Council will be advised on 11 January 2012 if the proposal is one of the three priority projects to be submitted by MNC RDA. If so, we will have until 15 February 2012 to prepare our full submission.

Recommendation:

It is RECOMMENDED that Council:

- 1. Note that the proposed RDA fund application would, if Council is successful, require Council to take out a loan and commit other funds as discussed in the report (or elect to withdraw the application).**
- 2. Provide in-principle support to the proposal and endorse the submission of the grant application.**



Australian Government
**Department of Regional Australia,
Local Government, Arts and Sport**

Mr Steve McGrath
General Manager
Coffs Harbour City Council
Locked Bag 155
COFFS HARBOUR NSW 2450

Dear Mr McGrath

RDAF200009 – Switched On Coffs In The Heart of The City

Thank you for your application for funding from Round Two of the Regional Development Australia Fund (RDAF).

Following careful assessment of all applications, I regret that your application was deemed ineligible for funding as it did not meet all of the mandatory eligibility criteria set out in the Guidelines for Round Two. It is important that these eligibility criteria are met by applicants, as they are key inputs into the Department's assessment of risk and value-for-money.

Reasons for the ineligibility of your application are:

- *Less than 50 per cent of partner funding is cash:* The Guidelines (section 4) state that cash contributions must comprise 50 per cent of the partnership funding. In-kind contributions will be accepted as partnership funding, but are limited to a maximum of half of the partnership contribution.

To assist you in preparing for future rounds, the Department is available to provide more detailed feedback on your application. Please register your interest in having a further discussion with the Department as soon as possible, by sending an email to rdaf@regional.gov.au and quoting your RDAF application ID number listed above.

A review is being conducted by the Department to inform the development of future RDAF Guidelines. If you would like to contribute to this process, a Stakeholder Feedback Round Two questionnaire is available on the Department's website www.regional.gov.au. Please note this is not a mechanism for addressing grievances about the outcomes of Round Two, but rather a means to capture constructive lessons learned. To lodge a genuine grievance, please refer to the Department's RDAF complaints procedure.

Attachment 3

Future rounds will be announced by the Hon Simon Crean MP, Minister for Regional Australia, Regional Development and Local Government and Minister for the Arts, on the Department's website.

Once again, thank you for submitting an application for funding from Round Two of the RDAF program.

Yours sincerely



Gordon McCormick
Assistant Secretary
Regional Development Programs

12 June 2012

Attachment 4

Your ref:
Our ref: 3023837

18 July 2012

The Honourable Simon Crean, MP
Minister for Regional Australia, Regional Development & Local Government
& Minister for the Arts & Sport
Parliament House
Suite MG 47
CANBERRA ACT 2601

Dear Minister,

RDAF guidelines: ineligibility of projects with *too much* partnership funding

I refer to your forward to the round 2 guidelines, particularly your emphasis on partnership funding. It seems difficult to imagine, but Council's project "Switched on Coffs in the Heart of the City" (RDAF200009) was deemed ineligible because it offered too much in-kind partnership funding, despite significant cash!

Our project sought a total of \$5.5M from the RDAF and offered a total of \$7.6M in cash and \$15.5M in-kind contribution (\$1 RDAF to \$4.2 partner funding).

To complete the application accurately, the value of the land upon which the project was to be built was nominated (it is classified under the NSW Local Government Act, 1993 as operational, not community land, and therefore of commercial value).

Council understands the desire to leverage grant funds, thus the 1:2 dollar *preference* given for projects seeking over \$5M from the fund. However, it would appear that due to a bureaucratic application of the guidelines with no regard to the objectives of the RDAF, Council's project was deemed ineligible because of the *absolute requirement* that greater than 50% partnership funding must be cash.

The department's letter of 12 June cites a "careful assessment" of "risk and value for money", however Council would argue that the rejection based on offering \$15.5M in-kind partner funding (rather than a maximum of \$7.6M) suggests a problem!

Switched on Coffs in the Heart of the City is a project of national significance. People know Coffs Harbour for our beautiful environment and Big Banana. We want "Coffs Harbour 2.0" to be the poster-child of the digital economy.

Through our industry-leading site <http://switchedoncoffs.tv/> Coffs Harbour is promoting our transformation enabled by the NBN to the world. Our project proposed that Council partner with the Australian Government to help other communities "switch on".

..2.

- 2 -

**The Hon Simon Crean
Minister for Regional Australia, Regional Development
& Local Government and Minister for the Arts & Sport**

18 July 2012

Senator Stephen Conroy acknowledges Coffs Harbour as one of the only councils who “gets” the opportunities enabled by the NBN and we would encourage you to talk to him about his recent launch of the *Switched on Coffs* Digital Strategy.

Dr Tim Williams, author of the Strategy and CEO the Committee for Sydney (recognised as a leading thinker about high speed broadband and the impact of digital media on communities, public authorities and businesses), also acknowledged our leadership status at the recent launch of *switchedoncoffs.tv* and the Engage Central online collaboration platform. His speech at the launch can be found on the “engage” channel at the site.

We would, of course, be very pleased of the opportunity to discuss this project further.

Council would also appreciate your favourable consideration of amending the guidelines for Round 3 of the RDAF.

If you have any questions regarding this matter, do not hesitate to contact the undersigned on 6648-4101.

Yours faithfully

Steve McGrath
General Manager

BJL:mah



THE HON SIMON CREAN MP

**Minister for Regional Australia, Regional Development and Local Government
Minister for the Arts**

Reference: C12/1377

Mr Steve McGrath
General Manager
Coffs Harbour City Council
Locked Bag 155
COFFS HARBOUR NSW 2450

27 AUG 2012

Dear Mr McGrath

Thank you for your letter of 18 July 2012, concerning the Coffs Harbour City Council's application for funding from Round Two of the Regional Development Australia Fund (RDAF) for the Switching on Coffs in the Heart of the City project. I apologise for the delay in replying.

Following a review of Round One, Round Two Guidelines were revised and refined to encourage stronger, investment-ready applications that had a clear regional benefit. One of the mandatory requirements for eligibility was that cash contributions must comprise 50 per cent of the partnership funding. This was to maximise leveraging and ensure that cash contributions from partners were encouraged. All applications were assessed against this and other mandatory eligibility criteria.

Stakeholder feedback was sought following the completion of Round Two and your feedback will be taken on board, with all other recommendations, in the development of future rounds. Details of future rounds of the RDAF will be released in coming weeks. I encourage you to monitor my Department's website at www.regional.gov.au for further details and to liaise with RDA Mid North Coast about how your project addresses community priorities. The Executive Officer of RDA Mid North Coast, Mr Peter Tregilgas, can be contacted on 02-5525 1500.

You may also wish to access the My Region website at www.myregion.gov.au which provides details of available government grants.

Thank you for raising this matter with me.

Yours sincerely

A handwritten signature in black ink, appearing to be 'Simon Crean', written over a horizontal line.

SIMON CREAN

Attachment 6

Your ref: C12/1377

Our ref: 3023837

5 September 2012

The Hon Simon Crean MP
Minister for Regional Australia, Regional Development
& Local Government, Minister for the Arts
Suite MG 47
CANBERRA ACT 2601

Dear Minister

RDAF guidelines: ineligibility of projects with *too much* partnership funding

Thank you for your recent reply (reference C12/1377) to our letter dated 18 July 2012 concerning Coffs Harbour City Council's application for funding from Round Two of the Regional Development Australia Fund (RDAF) for the Switching on Coffs in the Heart of the City project.

There appears to be a misunderstanding.

Council sought \$5.5M from the RDAF, offering \$7.6M cash and \$15.5M in-kind. The project was rejected on the basis that \$15.5M in kind is larger than \$7.6M cash. Had we only offered \$7.5M in kind together with our cash, it would not have been rejected. Had we offered \$5.51M in cash and \$5.49M in kind, it would not have been rejected.

Council again encourages you to revise the guidelines for Round Three in order to achieve the objective you note of "maximising leverage". Council suggests that the mandatory requirement should read:

Cash contributions must comprise 50 per cent of the partnership funding, unless the cash contribution is greater than the amount requested from the RDAF.

Where the cash contribution exceeds the amount requested from the RDAF, there is no limit to the in kind component of the partnership funding that may be offered.

Council repeats that its project was rejected on the basis of *too much in kind partnership funding* being offered, not insufficient cash, and asks that the guidelines be revised for Round Three.

If you have any questions please feel free to contact me on 6648-4101.

Yours faithfully

Steve McGrath
General Manager

BRELSFORD PARK - REGIONAL SKATE PLAZA / YOUTH SPACE

Purpose:

To seek approval for the next stage of development of Brelsford Park - Regional Skate Plaza/Youth Space.

Description of Item:

As part of Council's Open Space Strategy adopted in 2010 the need for planning of a Regional Skate Park facility became apparent through 98 submissions to the Open Space Strategy and a petition submitted by the community with 2,250 signatories. In November 2010 Council engaged Convic Design (an acknowledged leader in design of community/skate facilities) to prepare a report to evaluate the possible location for a future community and skate park space at a number of locations within the Coffs Harbour area.

The sites were:

- Site 1 - Brelsford Park (cnr Earl Street and Harbour Drive)
- Site 2 - Jetty Park (north of Marina Drive)
- Site 3 - Jetty Park (south of Marina Drive)
- Site 4 - Jetty Park (Navy Cadets site)

Of the four sites, only the Brelsford Park site scored highly on the assessment, which considered safety (particularly arising from visibility), access to public transport and facilities. The site recommended by Convic was the site previously allocated in the Brelsford Park Master plan to a performance centre.

A copy of the full Convic Regional Skate Park site assessment report is available in the Councillors room.

Council at its meeting of 14 April 2011 resolved as follows in relation to Brelsford Park and the Regional Skate Plaza;

1. *Adopt the Brelsford Park site on the corner of Harbour Drive and Earl Street as the preferred site for the development of a Regional Skate Plaza.*
2. *Consider the need for and location of existing and additional local Skate Facilities as part of the future review of Council's Open Space Strategy.*
3. *Allocate \$10,000 from the Brelsford Park Stage 2 works to commence detail design of a Regional Skate Plaza on Brelsford Park to be contained within the footprint previously allocated to the Performing Arts Centre.*
4. *Consider an application being made to Regional Development Australia Fund for funding to complete the Regional Skate Plaza.*
5. *Submit a funding application to NSW Sport and Recreation Facility Grant program for the Regional Skate Plaza project for \$200,000.*

A Concept Design for a skate plaza/youth space on Brelsford Park has subsequently been prepared by Convic. The design includes a combination of varying spaces that provides for a wide section of the community in a high quality urban design presentation. A copy of the concept design is attached to this report.

The next recommended step in the project is to advise the broader community of the concept design plans and commence preparation of detail design plans and cost estimates for construction.

Sustainability Assessment:

- **Environment**

The proposed area is cleared and open land, extensive excavation is not required. It is not anticipated that there will be any negative environmental impacts. Water Sensitive Urban Design techniques will be investigated to mitigate any additional storm water run-off from the proposed works.

A full review of environmental factors would be undertaken prior to commencement of works.

- **Social**

Covered seating and social gathering areas will be provided for seniors, youth and the whole of community. A large shelter is located on the less active part of the facility overlooking the plaza. This area is accessible and will be of a size to accommodate space for mobility scooters, providing a space for social gathering for all ages. Additional weather protected areas are proposed through the space. Performance areas are also proposed to provide a venue for cultural and artistic expression. The space would be used for formal and informal community performances.

A key component of the design is the use of projectors to project digital art into the space. New technology allows for changeable digital media art to be displayed at night into the entrances and main walkways. Seasonal and cultural themes can be displayed in addition to local content from school children. This effect will help to enliven the city centre and provide a point of difference for the city. It will allow an accessible outlet for artistic expression.

A large swing, outdoor fitness station and BBQ area is included and provides for a wide range of the community members.

The community space will have a strong youth focus to showcase the best aspects of what young people want to do, what they think and how they express themselves. This will promote positive effects on adolescent identity development, self-esteem and social integration, improving overall youth physical/mental health and wellbeing in a safe, accessible, low cost, quality venue.

The facility will promote social cohesion through the bringing together of people from a variety of different backgrounds and life experiences. The facility will become a hub for the community and a catalyst for healthy community life, particularly important for a community of higher social disadvantage such as ours.

- **Civic Leadership**

The proposed skate plaza/youth space is on an important civic entrance to Brelford Park. The concept design entrance features a landmark public art sculpture integrated with seating and social gathering areas.

The provision of a skate plaza, and an integrated plan for Brelsford Park is outlined clearly in the Looking After Our Community theme of the Coffs Harbour 2030 Community Plan. The plan outlines Council's role as provider and facilitator in addressing a range of objectives and strategies in relation to:

LC3 - We enjoy a comprehensive range of community, artistic and cultural opportunities.

- **Economic**

- **Broader Economic Implications**

The provision of a skate plaza/youth space will have positive economic implications during the construction period and also in the long term.

The facility will attract and retain people for longer periods of time in the city centre and will attract tourists, events for both BMX and Skate, outdoor events and performances.

Estimated cost for the proposal will depend on the elements chosen for inclusion. The Convic report includes cost estimates totaling around \$3.2M for facilities desirable in a community space, including digital multi-media and additional skate/youth space, but not necessarily required for a regional Skate Facility.

- **Delivery Program/Operational Plan Implications**

Council's current management plan includes \$1.5 million for Brelsford Park Redevelopment Stage Two which follows on from the Brelsford Park Adventure Playground, Stage One works.

Council has submitted funding applications to both Federal and State government through the RDAF program and The NSW Government through its Sport and Recreation Facility Grant program.

While the RDA funding application was unsuccessful, NSW Sport and Recreation has approved a \$50,000 grant toward the project.

Other grant funding opportunities for the project are being pursued including;

- NSW Community Building Partnerships - \$300,000 to enable a the community to participate in sport, cultural and artistic activity, and to enhance interaction between children, youth and seniors.

- NSW Attorney General and Justice Crime Prevention and Community Programs - \$100,000 to activate public spaces, increase amenity and attractiveness of cities.

- T-Qual -Tourism Quality Projects -up to \$100,000 for smaller scale projects to offer quality and variety to the tourism experience

Consultation:

Considerable consultation with key youth groups has occurred during design development. This included:

- Sky High Youth Event held in September 2011 to commence the design process. Over 1000 youth attended. Surveys and direct consultation occurred with a large number of people.
- Orara High School Ambassadors for Design, facilitated by Southern Cross University
- CHERI - Coffs Harbour Extreme Riders Incorporated have been involved at all stages of the design, and will continue to be involved during detail design phase to ensure that the facility has elements to meet a range of levels of skill and that there is a point of difference between our facility and other facilities in the region. Five meetings have been held to understand their requirements for a regional standard skate facility.
- Service Clubs - Six different service clubs were visited to present the concept plan.
- A meeting with The Coffs Harbour Chamber of Commerce has been held. Coffs Harbour District Crime Prevention Officer has been consulted and is supportive of the concept.
- Coffs Harbour Sports Advisory Council, Coffs Harbour District Cricket Association and Cricket NSW Regional Manager, North Coast.

Related Policy and / or Precedents:

Council has recently completed construction of a 'District' level Skate Facility at Corindi funded through Section 94. Council also maintains local Skate Facilities at Toormina and Bray Street.

Council has been in receipt of community requests and petitions for establishment of local Skate Facilities at Mullaway and Sandy Beach.

No funding (including Section 94) has been identified in Council's Delivery and /or Operational Plan for establishment of local Skate Park facilities.

Council's Open Space Strategy adopted in 2010 identifies the establishment of a Regional Skate Park as higher priority than consideration of establishment of additional local skate facilities.

The Master Plan for Brelsford Park, which was adopted in 2008/09 will need to be reviewed.

Statutory Requirements:

The design concept has extensive DDA compliance - equal access to performance area, outdoor stage, large swing, and main pathways and covered viewing / meeting areas.

On adoption by Council of the Master Plan for Brelsford Park it was acknowledged that the Brelsford Park Plan of Management would require review to incorporate the components relating to civic buildings. The works carried out to date on Brelsford Park however (Adventure Playground and car park) have not been in conflict with the Brelsford Park Plan of Management. Similarly it is considered that the Regional Skate Plaza/Youth Space proposal does not conflict with the existing Plan of Management.

No further approvals are required for the proposal (subject to a Part V Environmental Assessment) however it is recommended that the concept design be placed on public exhibition for a period of two weeks.

Issues:

Design

The design process for the youth space has been challenging as there was a need to balance the needs of the skate, bmx community, the needs of the wider community, non skater youths, in addition to a civic/ urban design needs of the park.

Some of the key elements that the youth specifically requested be accommodated in the design include; provision for kiosk/new amenities, quality covered viewing and seating areas, a large plaza skateable street section, a competition standard skate bowl, shade trees, outdoor performance areas, and a fun activity - super sized swing. In addition provision of projectors for digital art projection and Wi-Fi connection.

The design has good permeability with access paths across the space. The central 'spine' path ensures that the general community can enter the park on an equal basis to the skaters. The path rises with wheel chair grades to the upper level. Covered viewing areas are located for use by the whole community. Skating is mainly concentrated on the bowl and street section areas. An outdoor stage has been included for formal and informal performances. A landmark public art piece would be located at the entrance to the park.

Crime and security

As a crime prevention strategy, the proposed Community and Skate Space will provide something for young people to do, thereby reducing boredom and encouraging connection with peers and with the community. The site is generally open and has natural surveillance from Harbour Drive and Earl Street and also from the large supermarket windows opposite. There will be high activity and it is anticipated a high sense of ownership and pride within the space. This will reduce anti social behavior.

Cricket

The Plaza/Youth Space proposal is outside of main impact zone in relation to risk from cricket balls. In addition terraced concrete viewing seating between the skate bowl and the outer field is proposed and investigations are progressing on design of a 'sight screen' on the south east boundary to resolve any conflicts in use at times the cricket ground is active and to potentially act as a backdrop for public art.

Ultimately the Master Plan for Brelsford Park could see relocation of Cricket to other grounds with facility upgrades

Brelsford Park Master Plan

As Council has resolved to proceed with the Regional Skate Plaza/Youth Space on Brelsford Park it would be desirable to also amend the Master Plan and Plan of Management to reflect the proposal. However as previously stated the Skate Plaza does not conflict with the existing Plan of Management and; as the proposed Skate Plaza effectively sits in the footprint of the Performance Space in the Master Plan, does not effect other elements in the Master Plan. The proposed Skate Plaza could therefore proceed immediately with the review of the Master Plan and Plan of Management being carried out after resolution of the other civic and sporting uses of Brelsford Park.

Implementation Date / Priority:

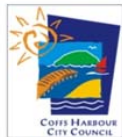
Following adoption of the recommendations in this report, the concept plans for the Regional Skate Plaza/Youth Space on Brelsford Park could be placed on Public Exhibition from 19th November 2012 to 3rd December 2012. Convic design would be engaged to prepare detail design plans of the key skate elements for review and construction cost estimates in early 2013. Construction of the Regional Skate Plaza/Youth Space could commence March 2013.

Recommendation:

That Council:

1. **Endorse the Brelsford Park Regional Skate Plaza/Youth Space concept design.**
2. **Place the Brelsford Park Regional Skate Plaza/Youth Space concept design on Public Exhibition from 19th November 2012 to 3rd December 2012**
3. **Commence detail design of the key skate elements in the Brelsford Park Regional Skate Plaza/Youth Space concept design**

Attachment 1



COFFS HARBOUR YOUTH SPACE - SCHEMATIC DESIGN - DRAFT
 COFFS HARBOUR, NEW SOUTH WALES
 SCALE: nTs (A3) DATE: NOVEMBER 2011





DRAFT WOOLGOOLGA LAKE ESTUARY, WILLIS CREEK ESTUARY & DARKUM CREEK ESTUARY COASTAL ZONE MANAGEMENT PLANS

Purpose:

The purpose of this report is to have the Draft 'Woolgoolga Lake Estuary, Willis Creek Estuary and Darkum Creek Estuary Coastal Zone Management Plans approved by Council for public exhibition.

Description of Item:

Woolgoolga Lake, Willis Creek and Darkum Creek, are features of the Woolgoolga locality owing to their environmental and recreational value. Increases in population, tourism and recreational activities are placing pressures on the natural processes, health and integrity of these estuaries and their foreshores. In 2004, Coastal and Estuary Management Advisory Committee (CEMAC) adopted the goal "to assist council in achieving an integrated, balanced, responsible and ecologically sustainable use of the Woolgoolga Lake Estuary." The committee has identified a number of issues that it considers important in affecting the health, attractiveness and productivity of the Darkum Creek, Woolgoolga Lake and Willis Creek estuaries.

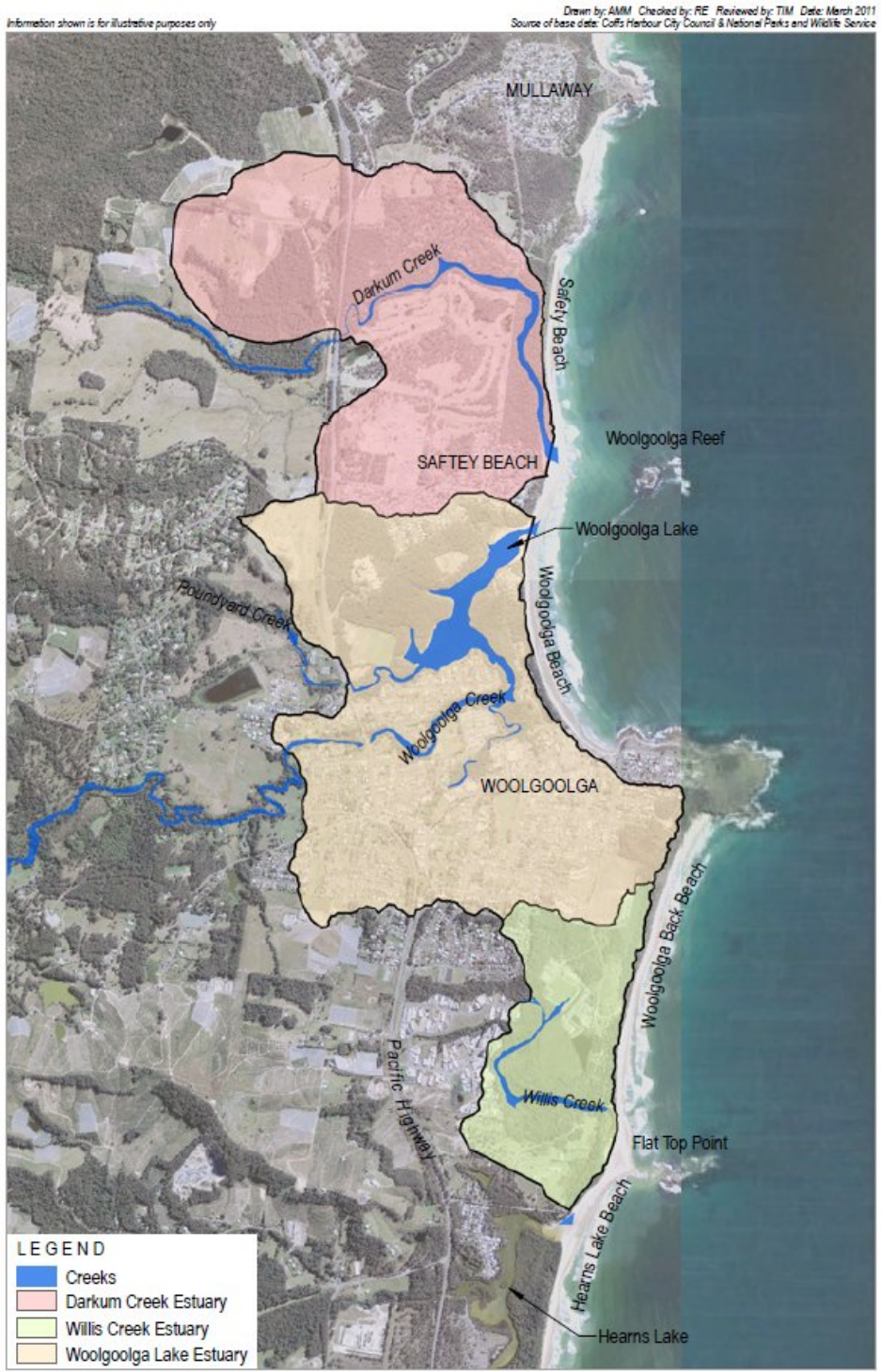
Geolink was contracted in July 2010 to prepare an Estuary Processes Study, Estuary Management Study and Estuary Coastal Zone Management Plan for Woolgoolga Lake, Willis Creek and Darkum Creek. Estuary Processes Study details the driving function and health within each estuary. This includes catchment, hydrodynamic, entrance, geomorphological, coastal, ecological, biological and water quality processes and was completed September 2011. The management study and plan use the processes study and community consultation to identify issues and values of the estuaries to develop management strategies.

The area addressed by these CZMP's comprises the Woolgoolga Lake, Willis Creek and Darkum Creek waterways and tributaries, foreshores and the catchment draining to the estuary up to the tidal limit of the tributary creeks as shown in Figure 1.

These draft Coastal Zone Management Plans (CZMP's) describes proposed actions to be implemented by Coffs Harbour City Council, other public authorities and the private sector to address priority management issues for the Woolgoolga Lake, Willis Creek and Darkum Creek estuaries.

The Draft Management Plan has been developed in accordance with State Government Guidelines for Preparing Coastal Zone Management Plans, which has provided a structured management process that has lead to an integrated, balanced and community based plan. Council and Council's Coast and Estuary Management Advisory Committee (CEMAC) recognised the need to minimise human impacts on the estuarine environment and to ensure that the natural assets of the estuary are managed to meet both present and future needs.

Identification of key estuary management issues and development of management strategies has been undertaken based on technical studies and consultation with the community and key stakeholder organisations.



Study Area

Figure 1 Woolgoolga Lake, Willis Creek and Darkum Creek Estuary Locality and Catchment

Sustainability Assessment:

- **Environment**

The primary goal of the Coastal Zone Management Plan for Woolgoolga Lake, Willis Creek and Darkum Creek Estuaries is to encourage the integrated, balanced, responsible and ecologically sustainable use of the Woolgoolga Lake, Willis Creek and Darkum Creek Catchments. This is reflected in the management strategies developed in consultation with regulatory authorities, stakeholders and the community, in relation to the future nature conservation, rehabilitation and development of the estuary.

The Plan has a number of recommended measures that vary from on ground works to policy development and public awareness programs.

A range of potential management strategies have been developed, prioritised and detailed to address the key issues. Specific environmental outcomes targeted through strategies outlined in these documents include:

Woolgoolga Lake Estuary Coastal Zone Management Plan

- Entrance Management
- Stormwater Management and Catchment Pollutants
- Foreshores and Riparian Areas
- Water Quality
- Climate Change Impacts on Estuary Ecology
- Fish Stocks
- Aquatic Habitats
- Environmental Weeds
- Climate Change Impacts on Water Quality
- Water Quality Monitoring
- Recreational Facilities and Opportunities
- Visual Amenity

Willis Creek Estuary Coastal Zone Management Plan

- Stormwater Management and Catchment Pollutants
- Water Quality
- Riparian Vegetation
- Recreational Amenity
- Climate Change Impacts on Water Quality
- Fish Kills and Algal Blooms
- Climate Change Impacts on Estuary Ecology
- Water Quality Monitoring
- Little Terns
- Visual Amenity
- Entrance Management

Darkum Creek Estuary Coastal Zone Management Plan

- Stormwater Management and Catchment Pollutants
- Riparian Vegetation
- Water Quality
- Urban Development
- Aquatic Habitats
- Climate Change Impacts on Water Quality
- Recreational Use
- Climate Change Impacts on Estuary Ecology
- Water Quality Monitoring
- Visual Amenity
- Entrance Management

- **Social**

The development of the draft Management Plan included investigations into numerous social considerations, covering:

- The essential features of the estuary including economic, social and aesthetic values;
- Current uses and activities, including land tenure, control and conflicts of use;
- Communities knowledge and appreciation of the values;
- Acceptable commercial & public development, works & activities; and

The actions within Coastal Zone Management Plans had particular social importance. These actions are aimed to educate the community on the diverse plants and animals, natural and cultural values and issues affecting the estuaries.

Woolgoolga Lake Estuary Coastal Zone Management Plan

Action 1.4 Raise community awareness of the natural opening and closing regime of Woolgoolga Lake

Action 2.1 Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities

Action 3.5 Construct a foreshore platform to enhance water edge recreational use and address bank erosion at the central and most popular section of the Lakeside Reserve Picnic Area

Action 4.1 Minimise the input of domestic animal faecal materials into the waterway.

Action 7.1 Liaise with landholders around the foreshore of Woolgoolga Lake to address impact to aquatic habitats

Action 11.1 Maintain and improve facilities that support existing passive recreational activities at Woolgoolga Lakeside Reserve and along the foreshores of the Lakeside Caravan Park.

Action 11.2 Improve the path network around the foreshores and tributaries of the lake

Action 11.4 Address Rubbish around the Foreshores

Willis Creek Estuary Coastal Zone Management Plan

Action 1.1 Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities

Action 11.4 Raise community awareness of the natural opening and closing regime of Willis Creek

Darkum Creek Estuary Coastal Zone Management Plan

Action 1.1 Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities

Action 2.1 Raise awareness in the local community of the importance of native riparian vegetation and aquatic habitats along the banks and foreshore of Darkum Creek

Action 3.1 Minimise domestic pet faecal inputs to the waterway

Action 7.1 Maintain the existing minimum level of access and recreational activity to preserve the natural values of the creek environment

Action 7.2 Incorporate additional interpretive signage within the estuary area

Action 11.4 Raise community awareness of the natural opening and closing regime of Darkum Creek

- **Civic Leadership**

The CZMP's is consistent with the aspirations of the Coffs Harbour community as articulated in the 2030 Plan. The 2030 Plan covers five themes including Moving Around and Looking after our Environment which are more directly applicable to this CZMP. The 2030 Plan outlines outcomes, objectives and actions for each theme. The actions applicable to this CZMP are listed in Table I.1 below. The final two columns of the table list the CZMP strategy actions that address the listed 2030 Plan strategies.

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
MA2 Many of us walk and cycle from place to place	MA2.2 We have constructed an interconnected network of cycle ways, footpaths and walking tracks that connect our urban communities, hinterland and coastal villages.	MA 2.2.1 Work in partnership to provide cycle ways and footpaths.	11.2	Improve the path network around the foreshores and tributaries of the lake Potential future path along southern foreshore
			3.1	
LE1 We understand and value our unique natural environment and its cultural connections	LE1.3 We have many opportunities for nature experiences and learning through improved access to natural areas.	LE1.3.1 Promote connection to the environment through learning in the environment.	11.1 11.2	Interpretive signage
		LE1.3.2 Create and extend walking trails and	3.5	Construct foreshore platform

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
		other opportunities for environmental experiences.	11.2	Improve the path network around the foreshores and tributaries of the lake
LE2 We protect and restore our environment to conserve its unique biodiversity for future generations	LE2.1 Our forests, beaches, headlands, ocean, rivers, forested mountain backdrop, plants and animals are conserved for future generations.	LE2.1.1 Ensure land use management policies and practices conserve the region's unique environmental and biodiversity values.	Strategy 2 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities and forestry operations Urban stormwater management Management of foreshores and riparian vegetation Environmental weed strategy Modify uses along Lake Road to ensure environmental values predominate Ensure consistency with Flying-fox management strategy
			Strategy 3 actions	
			Strategy 8 actions 11.3	
			12.1	
		LE2.1.2 Enhance protection of our marine areas and manage for change.	As above with respect to Strategy 2 and 3 5.1	As above with respect to Strategy 2 and 3 actions Buffers to enable aquatic habitats to respond to sea level rise
		LE2.1.3 Maintain and conserve biodiversity through protected reserve systems and other land conservation mechanisms.	5.1 12.1	Buffers to enable aquatic habitats to respond to sea level rise Ensure consistency with Flying-fox management strategy
		LE2.1.5 Implement climate change planning, adaptation and mitigation strategies.	1.3	Address increased flooding risks that will impact on artificial entrance

- **Economic**

Broader Economic Implications

The Draft Coastal Zone Management Plans, through its recommended strategies and actions, looks to preserve the local and citywide economic values currently experienced through our Council's Vision 2030. Without protecting our natural assets in a sustainable nature, i.e. through the principles of ESD, the Coffs Harbour image of a pristine coastline could fade, allowing a more degraded image to take hold. By not properly protecting our natural assets (and thereby image), Coffs Harbour may be affected by broader economic implications.

Delivery Program/Operational Plan Implications

The management strategies in the CZMP's are presented in general order of priority (Strategy 1 being the highest priority). Specific priorities have also been assigned to each strategy action in terms of "very high", "high", "medium" or "low" priority. The priorities and timeframes provided in this CZMP are indicative and are to be used to guide the order of implementation. Priorities were established in response to:

- the degree to which the management strategies will impact on estuary issues;
- timeframe over which the strategy impacts will extend (the longer the better);
- extent of the estuary addressed by each management strategy;
- community rating of issues addressed by each management strategy (based on a community survey); and
- the likely cost of effective implementation of the management strategy.

Council is the lead agency in a number of the management strategies recommended within the Draft Coastal Zone Management Plans. These timeframes are recommended as the best periods to protect/rehabilitate the Woolgoolga Lake, Willis Creek and Darkum Creek catchments, however strategies will only be implemented when resources and funding becomes available.

After the formal adoption by Council, opportunities to gain funding for implementation of the strategies will be sought through organisations such as NSW Office of Environment and Heritage (OEH) and the Northern Rivers Catchment Management Authority (NRCMA) and Environmental Levy. These funding opportunities are not available without a formal management plan.

Strategies will be reviewed annually by Council staff and opportunities to obtain funding and utilise resources to implement strategies will be explored.

Consultation:

The development of the Coastal Zone Management Plan has had considerable community input through the various stages of development. They are as follows:

1) Establish Coastal and Estuary Management Advisory Committee:

The Coast and Estuary Management Advisory Committee (CEMAC) has been established in the Coffs Harbour LGA with committee members from the NSW Office of Environment and Heritage (OEH) – Coasts and Catchments, Marine Parks Authority, OEH-National Parks and Wildlife Authority, NSW Maritime, Coffs Harbour Regional Landcare, Crown Lands Division, community representatives, Council staff and Elected Councillors.

This management committee oversees the development of the management plan and ensures the plan has input from State and Local Government agencies, community groups, councillors and public representatives constantly. The committee itself is a form of public consultation.

2) Prepare Estuary Processes Study

This study has been prepared to provide an understanding of the relationship between the estuary processes, external influences and issues of concern. This provides the necessary information for development and prioritisation of management strategies for the management plans for each estuary.

The main aims of this study and report are:

- identify, collate and review all available existing data sources relevant to the management of the estuaries (including reports, digital data sets and aerial photographic records);
- identify information gaps in the existing data that are potentially limiting to the development of the Coastal Zone Management Plans. These information gaps are targeted in the Estuary Processes Study component;
- identify the processes driving function and health within each estuary. This includes catchment, hydrodynamic, entrance, geomorphological, coastal, ecological, biological and water quality processes; and
- provide an understanding of the relationship between the estuary processes, external influences and issues of concern.

The first community workshop was held at Woolgoolga Community Centre on 14 September 2010. The purpose of the initial Community Workshop was to gain input on community values, issues and objectives for the three estuaries. Approximately 30 people attended the workshop.

Council and the consultant team (GeoLINK / GECO Environmental / Aquatic Science and Management) provided an introduction on the Estuary Management Plan process. The attendees then formed five groups to discuss and compile a list of key issues and goals for the estuaries. Following the group work a representative from each group summarised their key issues and goals. A final question time was undertaken before the workshop concluded.

The key focus of the attendees was generally Woolgoolga Lake, however some specific comments relating to Darkum Creek were provided. The main issues arising from the workshop related to the need for improved water quality and reduced sedimentation in Woolgoolga Lake and an entrance management protocol to assist these two issues.

3) Prepare Estuary Management Study

This study develops the framework for the preparation of a Coastal Zone Management Plan's (CZMP) for Woolgoolga Lake, Willis Creek and Dark Creek estuaries. This study identifies:

- the pressures impacting on the health and values of the estuary; and
- management options to address these pressures.

A community survey was undertaken over a two month period from April to May 2011, encompassing a school holiday period to provide opportunity to capture input from the widest possible catchment of users. The surveys were located at Council offices, local outlets in the estuary catchments such as caravan parks, newsagents and post offices. In addition, a web survey was made available through the website.

A second community workshop was held on 13 October 2012. This workshop provided community with an understanding of the Estuary Processes Study, community values and issues. In groups the community worked on developing strategies to address values and issues of the 3 estuaries.

An analysis of potential management strategies was undertaken between Geolink, OEH and Council after the initial draft report. All non-relevant strategies were reworked to offer additional management potential. These strategies were incorporated into the Coastal Zone Management Plan.

4) Prepare Coastal Zone Management Plan

The Draft Woolgoolga Lake, Willis Creek and Darkum Creek Coastal Zone Management Plans were presented to the CEMAC on 12 June 2012. The three management plans were technically reviewed by members of the committee.

The management strategies in the CZMP's are presented in general order of priority (Strategy 1 being the highest priority). Specific priorities have also been assigned to each strategy action in terms of "very high", "high", "medium" or "low" priority. The priorities and timeframes provided in this CZMP are indicative and are to be used to guide the order of implementation. Priorities were established in response to:

- the degree to which the management strategies will impact on estuary issues;
- timeframe over which the strategy impacts will extend (the longer the better);
- extent of the estuary addressed by each management strategy;
- community rating of issues addressed by each management strategy (based on a community survey); and
- the likely cost of effective implementation of the management strategy.

Public Exhibition is an integral part of the community consultation process in developing the Coastal Zone Management Plans. If adopted by Council the Draft Woolgoolga Lake, Willis Creek and Darkum Creek Coastal Zone Management Plan's will be put on public exhibition for 28 days. The draft Plan will be displayed by hard copy at the Council Administration Building and libraries and electronically on Council's webpage, plus a notification of the public exhibition will be placed in local media.

Related Policy and / or Precedents:

Council has the following policies and adopted management plans that are consistent with the Woolgoolga Lake, Willis Creek and Darkum Creek Coastal Zone Management Plans.

Adopted Estuary Management Plans

- Moonee Creek Estuary Management Study & Plan
- Hearn's Lake Estuary Management Study & Plan
- Pipe Clay Lake Estuary Management Plan
- Coastal Zone Management Plan for Boambee/ Newports Estuary

Statutory Requirements:

There is a requirement under the Coastal Protection Act 1979, Part 4A Coastal zone management plans, Division 1 General, *55B Requirements for coastal zone management plans* for Councils to prepare coastal zone management plans.

Additionally the draft study and plan has been prepared under the NSW Government's Guidelines for Preparing Coastal Zone Management Plans. The plan also satisfies the goals of the Northern Rivers Catchment Management Authorities (NRCMA) management target C2 – *complete management plans for all estuaries; and implement identified priority actions that contribute to the improved natural resource condition.*

Issues:

While all strategies have varying levels of difficulty to complete, once the document has been formally adopted increased funding opportunities will be available to Council to allow more effective undertaking of individual projects. Strategies outlined in the 3 management plans address recreational, aesthetic, social and environment values and have involved community in the decision making process. However the following strategy will have an unknown staffing resources and costs to Council's operational budget.

Strategy – Stormwater Management and Catchment Pollutants

Action under this strategy to '*Control land modification activities on rural lands*' has unknown additional staffing resources and costs to Council's operational budget. It must be highlighted that there is currently no resource capacity for this action.

This action has specific tasks which require the investigation into the requirement for consent for development captured by the relevant Standard Instrument Local Environmental Plan (SiLEP) provisions, investigation into compliance with development conditions in regard to erosion and sediment control measures and compliance where development may have occurred without consent.

These tasks would have a direct benefit to community and the environment through implementation of controlled land modification activities on rural lands. It must be highlighted however, that if Council was to further explore this regulation change, there are potential social and/or economic impacts by requiring new approval processes for earthworks associated with agricultural practices?

Implementation Date / Priority:

Following adoption by Council of the Draft Coastal Zone Management Plan, it will be placed on public exhibition for 28 days, after which any public comments will be taken into account by Council staff and the CEMAC when finalising the Plan.

The completed Coastal Zone Management Plan will then be recommended to Council for formal adoption, where the document will become an official Management Plan of Council. Implementation of the recommended strategies will follow the ranking and priorities given in the Plan subject to available funds and resources.

Recommendation:

That Council approve the Draft Woolgoolga Lake Estuary Coastal Zone Management Plan, Willis Creek Estuary Coastal Zone Management Plan and Darkum Creek Estuary Coastal Zone Management Plan for public exhibition for a period of 28 days.



Woolgoolga Lake Estuary Coastal Zone Management Plan

Draft for Public Exhibition



Coffs Harbour City Council has prepared this document with financial assistance from the NSW Government through the Office of Environment and Heritage. This document does not necessarily represent the opinions of the NSW Government or the Office of Environment and Heritage.

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Coastal Zone Management Plan

Woolgoolga Lake Estuary Draft for Public Exhibition

Prepared for: Coffs Harbour City Council and
Office of Environment and Heritage
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1616935	Final Draft	06/07/2012	Tim Ruge	Cate Walsh
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Executive Summary

This draft Coastal Zone Management Plan (CZMP) describes proposed actions to be implemented by Coffs Harbour City Council, other public authorities and the private sector to address priority management issues for the Woolgoolga Lake estuary. The area addressed by this CZMP comprises the Woolgoolga Lake waterway and tributaries, foreshores and the catchment draining to the estuary up to the tidal limit of the tributary creeks. The CZMP also considers issues associated with the wider catchment upstream of the tidal limit.

Woolgoolga Lake is an Intermittently Closed and Open Lakes and Lagoon (ICOLL) meaning the entrance naturally alternates between being open or closed to the ocean. The estuary is part of the Solitary Islands Marine Park.

The estuary has areas of high environmental, recreational and aesthetic value. A key focus of recreational activity occurs at the public picnic area adjacent to the Woolgoolga Lakeside Holiday Park near the estuary entrance. The close proximity of residential communities and the variety of natural settings around Woolgoolga Lake combine to create a broad range of passive land and water based recreational opportunities that optimise the scenic potential of the area.

The catchment area of Woolgoolga Lake includes a significant area of State Forest in the upper limits of the catchment. Banana plantations and blueberry farms cover a significant proportion of the upper slopes in the mid-catchment. Residential development and the commercial centre of Woolgoolga occupy a significant proportion of the lower catchment.

Identification of key estuary management issues and development of management strategies has been undertaken based on technical studies and consultation with the community and key stakeholder organisations. Consultation has included community workshops in 2010 and 2011, a community survey in 2011. The outcomes from community consultation for the 1991 Woolgoolga Lake Plan of Management have also been considered.

Estuary Management Issues

The key estuary management issues for the estuary relate to:

- artificial opening of the estuary entrance to address flood mitigation and other issues while minimising interference with the natural opening and closing processes and associated estuary processes;
- management of sediment, nutrient and other pollutant inputs from the catchment;
- poorly managed recreational activities and land management practices have the potential to impact on riparian vegetation and also degrade the recreational experience and scenic / natural amenity of the lake;
- climate change impacts on the estuarine ecology and water quality (particularly as a result of sea level rise and consequent lake water level increases); and
- the need to upgrade and manage existing recreational facilities and opportunities to enhance and protect the recreational experience offered by Woolgoolga Lake.

Estuary Management Strategies

A range of potential management strategies have been developed, prioritised and detailed to address the key issues. These strategies are summarised in the following Implementation Schedule. The key management strategies include:

- formalising a policy for artificial opening of the entrance and minimising the need for artificial opening in the long-term by active measures such as implementing flood mitigation measures for flood-risk properties and removing, relocating or otherwise managing items of low-lying infrastructure that currently necessitate openings;

- continue educational and incentive schemes that address the management of soil resources and pesticide / herbicide / fertiliser use in agricultural activities, encourage establishment of vegetated riparian zones on farm watercourses, and ensure that best practice erosion control methods are applied during forestry operations in the upper catchment;
- control significant land modification activities on rural lands by enforcing development consent where required under Council's Local Environmental Plan to enforce erosion and sediment controls for significant earthworks;
- encourage the regeneration of riparian vegetation on the southern foreshores of the lake. This would include developing a landscape plan with the input of local landholders / residents and actively re-establishing riparian vegetation along sections of the foreshore reserve with due regard to the amenity of adjoining residents;
- manage inappropriate mowing practices that impact on riparian vegetation using measures such as establishing a defined maintenance boundary between riparian vegetation and mown grass areas at key locations such as the foreshore residences on the southern foreshores of the lake and the foreshores of the Woolgoolga Lakeside Reserve Picnic Area and Woolgoolga Lakeside Caravan Park;
- implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise;
- maintain and consolidate the existing function and capacity of the Woolgoolga Lakeside Reserve Picnic Area as the main focus for family, water and land based recreational activity around the lake (including addressing bank erosion). This includes constructing a foreshore platform to enhance water edge recreational use and address bank erosion at the central and most popular section of the Lakeside Reserve Picnic Area; and
- consolidate and upgrade walking trails around the lake, replace and rationalise the existing signage system, remove and revegetate unnecessary routes and provide a continuous walking track along the southern shore of the lake, Jarrett and Woolgoolga Creeks to formalise and enhance the recreational experience for public use.

Dredging of the lake has been recommended by some community groups. Anecdotal evidence suggests that the estuary was previously deeper in the 1970's. Community consultation has highlighted a perceived loss of recreational opportunity due to decreased waterway depth relative to this period. Historical aerial photography indicates that water depths in 1943 were similar to present conditions, and deeper water depths were experienced in the 1960's and 1970's. This is attributed to very large flooding events in combination with large ocean swell events during the 1960's and 1970's which had the effect of removing a significant amount of marine derived sediments near the entrance. Since the 1960's and 1970's marine derived sediments have gradually built-up and subsequently reduced water depths in the vicinity of the lake picnic area / lake entrance. Fluctuations in the amount of marine sediment in the estuary and consequent fluctuations in water depths are a natural trend.

This estuary management study does not recommend dredging of Woolgoolga Lake for the purpose of providing deeper water depths on the basis of the following considerations:

- long-term fluctuations in water depths associated with infilling of the estuary by marine derived sands is a natural process that has occurred prior to the 1970's;
- dredging is expensive and generally only achieves short-term benefits in respect to removal of sediment;
- dredging can have significant negative impacts on water quality, estuary processes, health, and ecology;
- the lake is part of the Solitary Islands Marine Park and is listed as 'Habitat Protection Zone' which has the objective of protecting habitats and reducing high impact activities (e.g. dredging); and
- an approval process involving NSW government agencies is required before dredging is undertaken and it is considered unlikely that dredging would be approved for Woolgoolga Lake for the primary purpose of increasing water depths for improved swimming amenity.

Implementation Schedule

The proposed management strategy actions are detailed in the following Implementation Schedule. Included in the schedule is:

- the lead agency responsible for executing the strategy action (other relevant support agencies are included in the strategy action details in the main body of the CZMP);
- the timeframe for implementing the strategy action. The year relates to the time following adoption of this CZMP e.g. “Years 2 – 5” indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP (refer to strategy action details in the main body of the CZMP with respect to monitoring of each action);
- The strategy actions are listed in general order of priority with a specific priority assigned to each strategy action in terms of “very high”, “high”, “medium” or “low” priority.

Prior to implementation of the Woolgoolga Lake estuary strategy actions Council will need to review to ensure consistency with the Coastal Zone Management Plan for the Coffs Harbour coastline and consistency with the Regional Park Management Plan.

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Implementation Schedule

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
Strategy 1 - Entrance Management						
1.1	Prepare a Review of Environmental Factors for artificial opening of the entrance to Woolgoolga Lake estuary	CHCC	Year 1	Staff time	CHCC operating budget	High
1.2	Refine, adopt and implement Woolgoolga Lake Entrance Management Policy	CHCC	Year 1	<ul style="list-style-type: none"> ▪ Staff time for adoption of policy. ▪ Internal costs associated with backhoe, personnel and monitoring / reporting for each artificial opening event. 	CHCC operating budget	High
1.3	Prepare a Floodplain Risk Management Study and Plan for Woolgoolga Lake and address flooding risks that have the potential to trigger artificial opening of the entrance	CHCC	<ul style="list-style-type: none"> ▪ Years 1 - 2 for Floodplain Risk Study and Plan ▪ Years 2 – 5: audit and assessment ▪ Years 5 – 25: implement measures 	<ul style="list-style-type: none"> ▪ \$100,000 for Floodplain Risk Management Study and Plan ▪ Audit and assessment: Council Staff time ▪ Implement measures: dependant on proposed works 	<ul style="list-style-type: none"> ▪ OEH Floodplain Management Grants ▪ CHCC – Coffs Harbour Water budget for audit and assessment and subsequent implementation of measures / augmentation works 	Medium
1.4	Raise community awareness of the natural opening and closing regime of Woolgoolga Lake	CHCC	Years 1 - 5	Included in the costs in Strategy Action 3.2	<ul style="list-style-type: none"> ▪ Caring for Our Country. ▪ CHCC Environmental Levy. ▪ OEH Coastal and Estuary Management Program. 	Low

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
Strategy 2 – Stormwater Management and Catchment Pollutants						
2.1	Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities	DPI – Agriculture NSW	Year 1	\$5,000 per workshop for preparation, materials and delivery.	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC Environmental Levy ▪ NRCMA ▪ OEH - Environmental Education Grants 	High
2.2	Encourage horticultural landowners to uptake incentives program for Best Practice Management	NRCMA	Years 1 – 5	<ul style="list-style-type: none"> ▪ Staff budget time for coordinating uptake of the incentives program ▪ \$20,000 pa for incentives funding from CHCC Environmental Levy ▪ \$20,000 pa for incentives funding from NRCMA 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ NRCMA – Best Practice Management Horticultural Program 	Very High
2.3	Best practice sediment, erosion and water quality management on forestry operations in the catchment	DPI – Forests NSW	Life of the Plan	\$50,000 to \$100,000 for auditing and monitoring of export water quality.	DPI and EPA – Forests operating budget	Medium
2.4	Stormwater management for new urban development	CHCC	Review policy and guidelines every 5 years	Part of Council’s operational budget	n/a	Medium

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
2.5	Stormwater management for existing urban development	CHCC	Initial audit: Years 1 – 5 Retrofit works: long term	<ul style="list-style-type: none"> ▪ Stormwater management plan: \$50 - \$80k ▪ Retrofit works: dependant on proposed works 	CHCC Environmental Levy	Medium
2.6	Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management	NRCMA	Years 1 – 5	Part of cost listed in Strategy Action 2.2.	Same funding as listed in Strategy Action 2.2.	Very High
2.7	Control land modification activities on rural lands	CHCC	Year 1	Unknown additional staffing resources and additional costs to Council's operational budget	n/a	Very High
Strategy 3 - Foreshores and Riparian Areas						
3.1	Establish a defined edge between mown land and riparian vegetation along the southern foreshore of Woolgoolga Lake adjacent to Sunset Lakes Estate.	CHCC	Years 1 - 2	<ul style="list-style-type: none"> ▪ Establishment of defined edge and initial re-establishment of riparian vegetation: \$5,000 ▪ Management / consultation: staff time ▪ Landscape Plan: CHCC staff time 	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC Environmental Levy 	Very High

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
3.2	Improve the extent of riparian vegetation along the southern foreshore of Woolgoolga Lake adjacent to Sunset Lakes Estate.	CHCC	Years 3 – 5	<ul style="list-style-type: none"> ▪ Planting works: \$5,000 ▪ Management / consultation: staff time 	CHCC Environmental Levy	High
3.3	Modify the existing landscape plan for the Woolgoolga Lakeside Reserve Picnic Area	CHCC	Year 1	<ul style="list-style-type: none"> ▪ Landscape Plan: no cost - CHCC and DPI - Crown Lands staff time 	Not applicable	High
3.4	Establish a defined edge between mown land and riparian vegetation along the foreshore of Woolgoolga Lakeside Reserve Picnic Area and Woolgoolga Lakeside Caravan Park and revegetate riparian areas	CHCC as Reserve Trust Manager	Years 1 - 2	<ul style="list-style-type: none"> ▪ Establishment of defined edge and initial re-establishment of riparian vegetation: \$5,000 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy 	Very High
3.5	Construct a foreshore platform to enhance water edge recreational use and address bank erosion at the central and most popular section of the Lakeside Reserve Picnic Area	CHCC	Years 1 - 5	<ul style="list-style-type: none"> ▪ Foreshore structure¹: \$50,000 ▪ General site upgrades: new edging, paths, plants and signage: \$20,000 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ Caring for Our Country 	Medium
3.6	Maintain and enhance other water edge access points at Lakeside Reserve Picnic Area.	CHCC	Years 1 - 5	\$2,000 for any general site upgrades	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy 	Medium

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
Strategy 4 - Water Quality						
4.1	Minimise the input of domestic animal faecal materials into the waterway.	CHCC	Years 2 – 3	<ul style="list-style-type: none"> ▪ Staff time ▪ Installation of units \$1,500 p/unit ▪ Maintenance of units \$1000 per unit p/annum 	Caring for Our Country	Medium
Strategy 5 - Climate Change Impacts on Estuary Ecology						
5.1	Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise	CHCC	Years 1 – 2	Staff time	CHCC operating budget	High
Strategy 6 – Fish Stocks - No direct fish stock improvement actions are proposed such as artificially stocking the lake. Other strategies and actions proposed in this CZMP will adequately address the issue of fish stocks. These strategies include: improve the extent and condition of aquatic habitat (Strategy 7 actions); improve the condition and continuity of riparian vegetation (Strategy 3 and Strategy 8 actions) and improve water quality (Strategy 2 actions).						
Strategy 7 – Aquatic Habitats						
7.1	Liaise with landholders around the foreshore of Woolgoolga Lake to address impact to aquatic habitats	CHCC	Years 1 - 5	Staff time	<ul style="list-style-type: none"> ▪ CHCC operating budget. ▪ MPA - SIMP operating budget 	High

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
Strategy 8 - Environmental Weeds						
8.1	Develop a weed management strategy which prioritises areas of riparian foreshore to be treated and priority weeds to be targeted.	CHCC	Years 1 - 2	Strategy development: \$5,000 if done external to CHCC.	NRCMA will fund the development of a recognised NRM Plan up to a total cost of \$5,000.	High
8.2	Utilise specialist bush regeneration contractors to undertake primary weed control in priority areas.	CHCC	Years 2 – 5	Subject to development of the Weeds Management Strategy under Strategy Action 8.1 above. If external contractors are to be used, funds required is subject to the Weed Management Strategy but initially estimated at 400 hours per year @ \$35/hr (\$14,000/yr) over 5 years.	<ul style="list-style-type: none"> ▪ NRCMA funding for implementation of recognised NRM Plans. ▪ Environmental Trust Restoration and Rehabilitation grants. ▪ Grants through NSW Government for weed control works on Crown Lands. ▪ CHCC Environmental Levy. 	High
8.3	Foster a local Bushcare group to undertake the secondary control or follow-up maintenance of areas treated by contractors.	CHCC	Long term commitment required to support community groups	Dependent on activities, but generally limited to provision of tools, consumables, and support.	Support available through Coffs Landcare Network. Funding available through NRCMA where a recognised NRM plan exists and any other grants available from time to	Medium

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
					time such as Environmental Trust Community Bush Regeneration and/or Restoration and Rehabilitation Grants. CHCC Environmental Levy	
Strategy 9 - Climate Change Impacts on Water Quality - Addressing current issues in accordance with Strategy Action 1.2 and Strategy 2 actions will be the best preparation for the impacts of climate change on water quality. No further actions are proposed to address this issue.						
Strategy 10 - Water Quality Monitoring						
10.1	Continue to implement the Ecohealth water quality monitoring program for Woolgoolga Lake	CHCC	Ongoing	\$20,000 every 4 years	<ul style="list-style-type: none"> ▪ CHCC operating budget. ▪ MPA - SIMP: in kind assistance 	Medium
Strategy 11 - Recreational Facilities and Opportunities						
11.1	Maintain and improve facilities that support existing passive recreational activities at Woolgoolga Lakeside Reserve and along the foreshores of the Lakeside Caravan Park.	CHCC	Years 1 - 5	<ul style="list-style-type: none"> ▪ Upgrade park furniture and signage: \$20,000 ▪ Visitor surveys: CHCC staff time 	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ Sport and Recreation Facility Grant program 	Medium

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
11.2	Improve the path network around the foreshores and tributaries of the lake	CHCC	Years 5 – 10	<ul style="list-style-type: none"> ▪ Cycle path plan: CHCC staff. ▪ New signage system: \$15,000. ▪ Upgraded tracks - north side \$5,000. ▪ Upgraded tracks – south side: \$20,000. ▪ High school path: \$2,000. ▪ Lake mouth path: \$2,000. 	<ul style="list-style-type: none"> ▪ Caring for Our Country. ▪ Sport and Recreation Facility Grant program. ▪ CHCC Environmental Levy 	Medium
11.3	Modify existing and proposed uses along Lake Road to ensure that environmental values are protected.	Lake Road Reserve Trust Woolgoolga Beach Reserve Trust	Years 1 – 5:	<ul style="list-style-type: none"> ▪ \$5,000 - create a barrier along Lake Road and restore cleared areas / manage Rainbow Bee-Eater nesting locations 	<ul style="list-style-type: none"> ▪ Caring for Our Country. ▪ CHCC Environmental Levy. ▪ NRCMA. 	High
11.4	Address Rubbish Around the Foreshores	CHCC	Ongoing	CHCC staff time for liaison, maintenance and Clean Up Australia support	NSW Government Litter Prevention Program – grants managed by the Sustainability Programs Division of OEH	Low
Strategy 12 - Flying-Fox Camp						
12.1	Ensure consistency between the Flying-fox management strategy and any related CZMP actions	CHCC	1 – 2 years	CHCC staff time for internal liaison.	Nil	High

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
Strategy 13 - Visual Amenity						
13.1	Preserve and enhance the natural values of Lake Woolgoolga to maintain its high level of visual amenity.	CHCC	1 - 2 years	<ul style="list-style-type: none"> ▪ Car tyre removal: \$2,000 assuming CHCC staff time ▪ Replace / modify timber wall: \$5,000 assuming CHCC staff time 	<ul style="list-style-type: none"> ▪ CHCC operating budget ▪ CHCC Environmental Levy. 	Medium - Low

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Introduction

This document presents a draft Coastal Zone Management Plan (CZMP) for Woolgoolga Lake estuary. The primary purpose of this CZMP is to describe proposed actions to be implemented by Coffs Harbour City Council, other public authorities and the private sector to address priority management issues for the Woolgoolga Lake estuary. These management issues relate to:

- risks to public safety and built assets;
- pressures on estuary health; and
- community uses of the estuary.

The area addressed by this CZMP comprises the Woolgoolga Lake waterway and tributaries, foreshores and the catchment draining to the estuary up to the tidal limit of the tributary creeks. The CZMP also considers issues associated with the wider catchment upstream of the tidal limit. The Woolgoolga Lake estuary is shown below and the extents of this area are mapped overleaf in **Illustration I.1**.



Source: NSW Office of Environment and Heritage

Plate I.1 Aerial Image of Woolgoolga Lake Estuary

Background

In 2010, Coffs Harbour City Council (Council) and Office of Environment and Heritage (OEH) engaged GeoLINK in association with Aquatic Science and Management and GECO Environmental to develop a CZMP for Woolgoolga Lake estuary. Council's Coastal Estuary Management Advisory Committee's goal for the CZMP is to "to assist Council in achieving an integrated, balanced, responsible and ecologically sustainable use of the Woolgoolga Lake Estuary."

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: April 2012
Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



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Coastal Zone Management Plan - Woolgoolga Lake Estuary
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Geographical Extent of Coastal Zone Management Plan

Illustration I.1

Development of this draft CZMP has included the following preliminary phases: literature and information review; technical study of the relationship between the estuary processes, external influences and issues of concern; community uses assessment and development of key management objectives and issues. These preliminary studies are reported in the following documents:

- *Data Compilation and Estuary Processes Study – Darkum Creek, Woolgoolga Lake and Willis Creek* (GeoLINK et al., 2011a); and
- *Estuary Management Study – Woolgoolga Lake* (GeoLINK et al., 2011b).

Summaries of these preliminary phases are contained in:

- **Appendix D** – summary of literature and information review and technical study of estuary processes;
- **Appendix E** – summary of community uses assessment; and
- **Appendix F** – summary of development of key management objectives and issues.

Consultation

Community and stakeholder consultation was undertaken to gain input to the development of management action for Woolgoolga Lake estuary. Consultation has included community workshops in 2010 and 2011, a community survey in 2011 and liaison with relevant stakeholders. The outcomes from community consultation for the 1991 Woolgoolga Lake Plan of Management have also been considered.

Addressing Coastal Management Principles

The notes below describe how this CZMP has considered the relevant Coastal Management Principles as detailed in the *Guideline for Preparing Coastal Zone Management Plans* (DECCW, 2010).

Principle 1: *The Plan will consider the objects of the Coastal Protection Act 1979 and the goals, objectives and principles of the NSW Coastal Policy 1997 and the NSW Sea Level Rise Policy Statement 2009.*

The NSW Coastal Policy deals with population and economic growth whilst protecting the natural, cultural, heritage and spiritual values of the coastal environment. The policy has a strong focus on the principles of Ecologically Sustainable Development. The NSW Coastal Protection Act 1979 aims to protect, enhance, maintain and restore the environment with concern for both the natural and built environments. These principles formed the basis of development and prioritisation of management strategies for Woolgoolga Lake estuary.

The benchmarks and guidelines in the *NSW Sea Level Rise Policy Statement 2009* have been considered in development of the entrance management policy, and in relation to climate change impacts on estuary ecology, hydrodynamics and community infrastructure.

Principle 2: *Optimise links between plans relating to the management of the coastal zone.*

Development of this CZMP including the literature review component has considered Council's Coastal Processes and Hazard Definition Study and Coastal Zone Management Study for the coastline, Council's Climate Change Mitigation and Adaptation Action Plan and other studies and management plans related to Woolgoolga Lake estuary.

Principle 3: *Involve the community in decision-making and make coastal information publicly available.*

As indicated above, community consultation was undertaken to gain input to the development of management action for Woolgoolga Lake estuary including community workshops in 2010 and 2011, and a community survey in 2011 and liaison with relevant stakeholders. The outcomes from community consultation for the 1991 Woolgoolga Lake Plan of Management have also been considered.

Principle 4: *Base decisions on the best available information and reasonable practice; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach.*

The estuary processes study component of the CZMP considered the above issues. Development of management strategies has included a continuous improvement management approach such as the measures outlined in the entrance management strategy to minimise the future need for artificial opening events.

Principle 5: *The priority for public expenditure is public benefit; public expenditure should cost effectively achieve the best practical long-term outcomes.*

Development of strategies and priorities has included consideration of public expenditure.

Principle 6: *Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risks where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented.*

This principle is not directly applicable to the issues for the Woolgoolga Lake estuary.

Principle 7: *Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions.*

This principle is not directly applicable to the issues for the Woolgoolga Lake estuary.

Principle 8: *Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded coastal ecosystems.*

Development and prioritisation of strategies has considered the above approach such as management of environmental weeds which has been prioritised for riparian vegetation classified as either 'good' or 'very good' condition.

Principle 9: *Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy.*

This principle is not directly applicable to the issues for the Woolgoolga Lake estuary, however, actions under Strategy 11 address a key public access location for swimming and canoeing in Woolgoolga Lake.

Principle 10: *Support recreational activities consistent with the goals of the NSW Coastal Policy.*

Strategy 11 in this CZMP directly addresses recreational activities related to Woolgoolga Lake estuary.

Key Values of Woolgoolga Lake Estuary

The natural settings of the estuaries and coast within the Mid North Coast are a feature that attracts visitors and locals to the area. Woolgoolga Lake estuary is in keeping with this natural setting, and forms part of a network of bushland settings along the coastal zone of the Coffs Harbour region.

Key values of the estuary include its natural setting and recreational opportunities including the public picnic area adjacent to the lake and the walking and cycling track network. A key focus of recreational activity occurs at the public picnic area adjacent to the Woolgoolga Lakeside Holiday Park. The area has a long open foreshore that allows easy, soft water entry for swimming and canoe / kayak launching.

The close proximity of residential communities and the variety of natural settings around Woolgoolga Lake combine to create a broad range of passive land and water based recreational opportunities that optimise the scenic potential of the area. The sites attributes create a highly attractive and popular recreation destination for the local and wider community.

The majority of the foreshores around the lake comprise a continuous edge of natural vegetation, often extending well back from the foreshores and rising up adjoining slopes. This mostly intact and healthy riparian vegetation contributes significantly to the value and health of the estuary.

Water quality in the lake shows high levels of variability common to this type of estuary. However, the water quality is generally acceptable for primary contact recreation and protection of aquatic ecosystems.

The entrance to the Woolgoolga Lake estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Key Management Issues

The key estuary management issues that have been identified relate to:

- the estuary entrance which naturally alternates between being open or closed to the ocean. The issue relates to artificial opening of the entrance to address flood mitigation while minimising interference with the natural opening and closing regime and associated estuary processes;
- sediment, nutrient and other pollutant inputs from the catchment;
- recreational activities and other practices that have the potential to impact on riparian vegetation and degrade the recreational experience and scenic / natural amenity of the lake;
- climate change impacts (particularly sea level rise and consequent lake water level increases) on the estuarine ecology and water quality; and
- the need to upgrade and manage existing recreational facilities and opportunities to enhance and protect the recreational experience offered by Woolgoolga Lake.

Key Management Strategies

Key management strategies for Woolgoolga Lake estuary include:

- adoption of an entrance management policy that addresses flood mitigation issues but minimises interference with the natural opening and closing regime of the lake. The entrance management strategy also includes minimising the need for artificial entrance opening in the long-term by active measures such as removing flooding risks to low-lying infrastructure;
- a range of actions addressing soil erosion, stormwater management and pesticide / herbicide / fertiliser use in agricultural activities;
- undertaking better maintenance practices and restoring riparian vegetation in poorly or inappropriately maintained areas such as the southern foreshores of the lake;

- maintain and consolidate the existing function and capacity of the lakeside picnic area as the main focus for family, water and land based recreational activity around the lake while addressing issues that impact on bank erosion and riparian vegetation; and
- consolidate and upgrade walking trails around the lake, remove and revegetate unnecessary routes and other works required to formalise and enhance the recreational experience for public use.

The management strategies in this document are presented in general order of priority (Strategy 1 being the highest priority). Specific priorities have also been assigned to each strategy action in terms of “very high”, “high”, “medium” or “low” priority. The priorities and timeframes provided in this CZMP are indicative and are to be used to guide the order of implementation. Priorities were established in response to:

- the degree to which the management strategies will impact on estuary issues;
- timeframe over which the strategy impacts will extend (the longer the better);
- extent of the estuary addressed by each management strategy;
- community rating of issues addressed by each management strategy (based on a community survey); and
- the likely cost of effective implementation of the management strategy.

Coffs Harbour 2030 Plan

The Coffs Harbour 2030 Plan (CHCC, 2009), a strategic plan for the Coffs Harbour community (‘the 2030 Plan’), was adopted by Council in December 2009. The 2030 Plan is driven by the Community Vision 2030 and outlines the steps needed to create a sustainable future for Coffs Harbour LGA. It is the overarching plan that integrates planning and reporting frameworks, while mapping out the community’s aspirations for the future of the Coffs Harbour LGA to 2030 and beyond.

This CZMP is consistent with the aspirations of the Coffs Harbour community as articulated in the 2030 Plan. The 2030 Plan covers five themes including *Moving Around* and *Looking after our Environment* which are more directly applicable to this CZMP. The 2030 Plan outlines outcomes, objectives and actions for each theme. The actions applicable to this CZMP are listed in **Table I.1** below. The final two columns of the table list the CZMP strategy actions that address the listed 2030 Plan strategies.

Table I.1 – Coffs Harbour 2030 Plan

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
MA2 Many of us walk and cycle from place to place	MA2.2 We have constructed an interconnected network of cycle ways, footpaths and walking tracks that connect our urban communities, hinterland and coastal villages.	MA 2.2.1 Work in partnership to provide cycle ways and footpaths.	11.2	Improve the path network around the foreshores and tributaries of the lake Potential future path along southern foreshore
			3.1	
LE1 We understand and value our unique natural environment and its cultural connections	LE1.3 We have many opportunities for nature experiences and learning through improved access to natural areas.	LE1.3.1 Promote connection to the environment through learning in the environment.	11.1	Interpretive signage
			11.2	
		LE1.3.2 Create and extend walking trails and	3.5	Construct foreshore platform

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
		other opportunities for environmental experiences.	11.2	Improve the path network around the foreshores and tributaries of the lake
LE2 We protect and restore our environment to conserve its unique biodiversity for future generations	LE2.1 Our forests, beaches, headlands, ocean, rivers, forested mountain backdrop, plants and animals are conserved for future generations.	LE2.1.1 Ensure land use management policies and practices conserve the region's unique environmental and biodiversity values.	Strategy 2 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities and forestry operations Urban stormwater management Management of foreshores and riparian vegetation Environmental weed strategy Modify uses along Lake Road to ensure environmental values predominate Ensure consistency with Flying-fox management strategy
			Strategy 3 actions	
			Strategy 8 actions 11.3	
			12.1	
		LE2.1.2 Enhance protection of our marine areas and manage for change.	As above with respect to Strategy 2 and 3 5.1	As above with respect to Strategy 2 and 3 actions Buffers to enable aquatic habitats to respond to sea level rise
		LE2.1.3 Maintain and conserve biodiversity through protected reserve systems and other land conservation mechanisms.	5.1 12.1	Buffers to enable aquatic habitats to respond to sea level rise Ensure consistency with Flying-fox management strategy
		LE2.1.5 Implement climate change planning, adaptation and mitigation strategies.	1.3	Address increased flooding risks that will impact on artificial entrance

Coffs Harbour 2030 Plan			Related CZMP Strategy	
Outcome	Objective	Strategy	Strategy Action No.	Description
			5.1	openings Buffers to enable aquatic habitats to respond to sea level rise
	LE2.2 We have active programs to restore and improve our environment.	LE2.2.2 Manage our catchments effectively and adaptably.	Strategy 2 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities and forestry operations Urban stormwater management
		LE2.2.3 Build ecosystem resilience through a system of local and regional habitat corridors.	Strategy 3 actions 5.1	Management of foreshores and riparian vegetation Buffers to enable aquatic habitats to respond to sea level rise
LE3 We manage our resources and development sustainably.	LE3.1 We are responsible in the use and management of our natural resources and work to reduce our ecological footprint.	LE3.1.2 Use best practice to prevent pollution impacts on our environment.	Strategy 2 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities and forestry operations Urban stormwater management

Coffs Harbour Coastal Zone Management Plan

Council is preparing a separate Coastal Zone Management Plan that addresses coastal risks along the Coffs Harbour coastline. This coastline plan will define the level of risk from coastal hazards and provide a co-ordinated approach to management of coastal hazards.

Initial review of draft actions proposed in the coastline plan does not indicate any inconsistencies with the Woolgoolga Lake estuary strategy actions. However, prior to implementation of the Woolgoolga Lake estuary strategy actions Council will need to review to ensure consistency with the Coastal Zone Management Plan for the Coffs Harbour coastline.

Coffs Harbour Regional Park Management Plan

Council is also preparing a Regional Park Management Plan. Prior to implementation of the Woolgoolga Lake estuary strategy actions Council will need to review to ensure consistency with the Regional Park Management Plan.

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Strategy 1 - Entrance Management

The entrance to the Woolgoolga Lake estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Many ICOLL's are manually or artificially opened to the ocean by authorities to 'drain' the estuary for a range of reasons, often to reduce the impacts of flooding around the estuary foreshores. Artificial opening of the Woolgoolga Lake entrance has been initiated in the past by Council to prevent flooding of the adjoining sewerage system.

However, artificially opening ICOLL's can impact on the health of the estuary. Therefore it is desirable to minimise interference with the natural opening and closing regime of ICOLL's. Therefore a policy is required to outline if and when the entrance to Woolgoolga Lake estuary should be artificially opened.



Image: Artificial opening of Burrill Lake. Photo by R. Massie
Source: NSW Government (undated)

1.1 Summary of Proposed Actions

- Prepare a Review of Environmental Factors for artificial opening of the entrance to Woolgoolga Lake estuary;
- Refine, adopt and implement the Woolgoolga Lake Entrance Management Policy outlined in this CZMP;
- Prepare a Floodplain Risk Management Study and Plan for Woolgoolga Lake and address flooding risks that have the potential to trigger artificial opening of the entrance; and
- Raise community awareness of the natural opening and closing regime of Woolgoolga Lake.

1.1.1 Related Strategies

- **Strategy 2** Stormwater Management and Catchment Pollutants
- **Strategy 4** Water Quality
- **Strategy 6** Fish Stocks
- **Strategy 7** Aquatic Habitats
- **Strategy 9** Climate Change and Sea Level Rise Impacts on Water Quality
- **Strategy 14** Dredging

1.1.2 Objectives Addressed

- Develop a formal Entrance Management Policy;
- Minimise interference with natural entrance opening / closing processes; and
- Minimise flooding of properties and infrastructure.

1.2 Details of Proposed Actions

Strategy Action 1.1				
Prepare a Review of Environmental Factors for artificial opening of the entrance to Woolgoolga Lake estuary				
Background: Artificial opening of the entrance to Woolgoolga Lake estuary for the purpose of flood mitigation (a key objective of the entrance management policy) is permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a Review of Environmental Factors (REF) for proposed artificial opening of the entrance to Woolgoolga Lake estuary. The REF needs to be consistent with the adopted CZMP and entrance management policy for Woolgoolga Lake estuary.				
Specific Tasks Prepare an REF for artificial opening of the entrance to Woolgoolga Lake estuary in consultation with relevant state government agencies. The REF will confirm the necessary approvals and licences required for artificial opening of the entrance.				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Year 1	Staff time	CHCC operating budget	Implementation of this action is an appropriate benchmark.
Strategy Action 1.2				
Refine, adopt and implement Woolgoolga Lake Entrance Management Policy				
Background: The development of an entrance management policy is a requirement for Coastal Zone Management Plans for ICOLL's under the OEH <i>Guidelines for Preparing Coastal Zone Management Plans</i> (DECCW, 2010). Therefore a policy has been drafted with the aim to: <ul style="list-style-type: none"> ▪ minimise interference with the natural opening and closing regime for the estuary; ▪ minimise flooding of the local sewerage system from elevated water levels in the estuary; and ▪ minimise flooding of properties from elevated water levels in the estuary. 				
Specific Tasks <ul style="list-style-type: none"> ▪ Refine the Woolgoolga Lake Entrance Management Policy outlined in this CZMP (refer to Appendix A) based on the outcomes of the REF under Strategy Action 1.1. ▪ Adopt and implement the Woolgoolga Lake Entrance Management Policy. 				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Year 1	<ul style="list-style-type: none"> ▪ Staff time for adoption of policy. ▪ Internal costs associated with backhoe, personnel etc for each artificial opening event. 	CHCC operating budget	Implementation of this action is an appropriate benchmark.

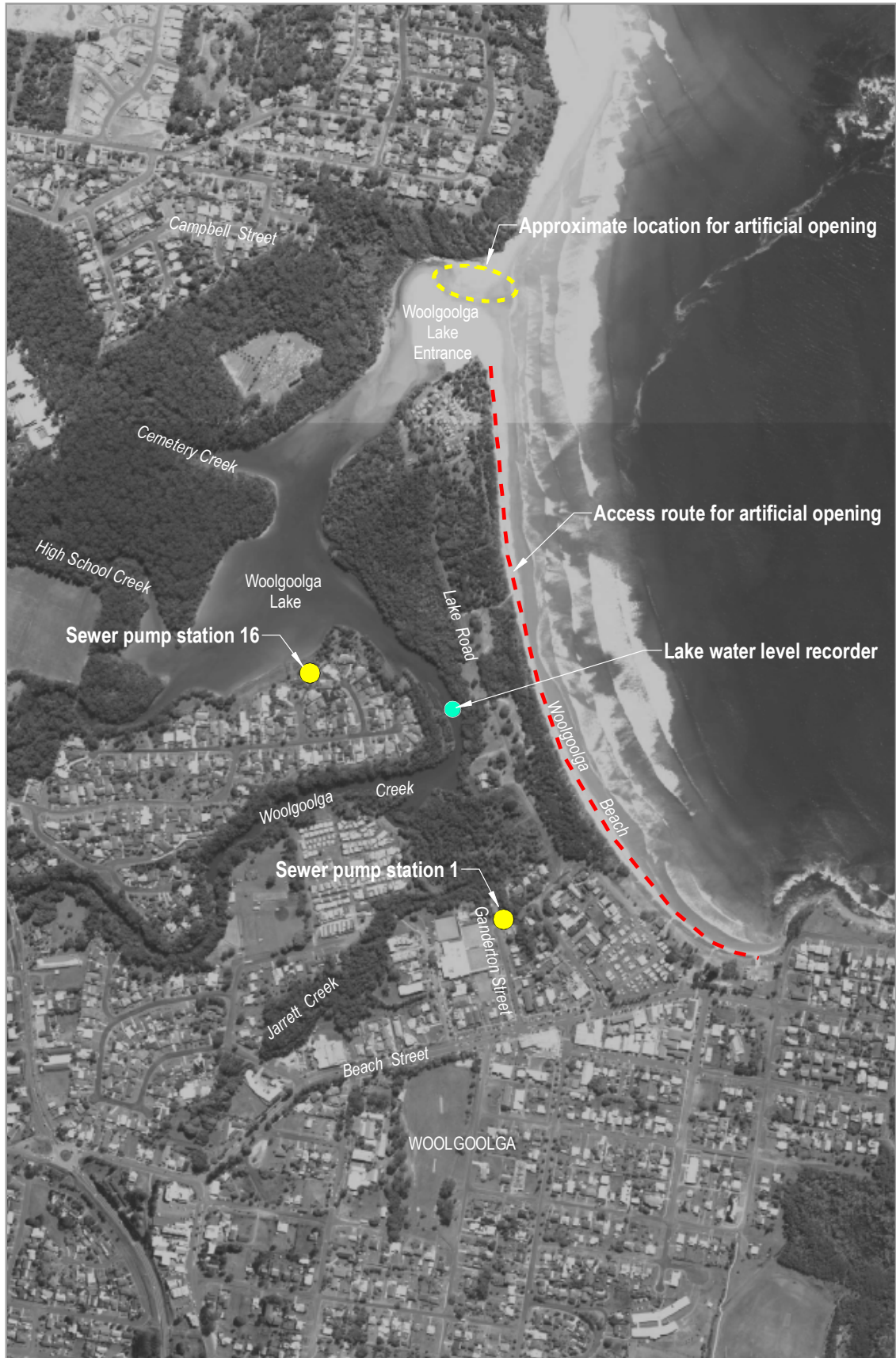
Strategy Action 1.3				
Prepare a Floodplain Risk Management Study and Plan for Woolgoolga Lake and address flooding risks that have the potential to trigger artificial opening of the entrance				
Background:				
<p>The current need for artificial opening of the entrance is largely dictated by the need to prevent flooding of low-lying properties such as Sunset Caravan Park and properties in Pacific Street, Wharf Street, Boundary Street and Haines Close. This necessitates opening the lake entrance when lake water levels reach 1.6 m AHD which is at the higher end of the range of water levels at which the lake opens naturally. Therefore the policy to open at 1.6 m AHD will generally not impact on the natural opening and closing regime of the lake entrance. However, as sea level rise is realised, the lake water levels will rise by similar values as will the natural breakout levels of the lake. This will potentially result in the 1.6 m AHD trigger water level encroaching into the natural breakout levels thereby impacting on the natural opening and closing regime of the lake entrance. Therefore it may be necessary to raise the trigger level in the future by a similar amount as sea level rise.</p> <p>It is noted that the local sewerage scheme experiences flooding at lake water levels of 1.8 m AHD.</p> <p>The trigger water level for artificial opening can be raised in the future by implementing flood mitigation measures for at-risk properties and items of low-lying infrastructure. The intention of this objective is to minimise the need for interference to the natural opening / closing regime of the lake entrance.</p>				
Specific Tasks				
<ul style="list-style-type: none"> ▪ Prepare a Floodplain Risk Management Study and Plan for Woolgoolga Lake which addresses the objective of minimising interference to the natural opening / closing regime of the lake entrance; ▪ In association with Council's <i>Climate Change Mitigation and Adaptation Action Plan</i> (BMT WBM, 2010): <ul style="list-style-type: none"> – undertake an audit and assessment to identify key services and assets vulnerable to sea level rise impacts around Woolgoolga Lake which have the potential to necessitate artificial opening of the lake entrance (e.g. sewer PS 1 and PS 16 and low-lying properties). Develop appropriate strategies for relocation, replacement or modification of these services and assets (this relates to Action A-3 and A-4 in Council's <i>Climate Change Mitigation and Adaptation Action Plan</i>); – relocate, replace or modify essential services and assets where appropriate to reduce potential for disruption and/or the need for artificial opening of the entrance (this relates to Action A-7 in Council's <i>Climate Change Mitigation and Adaptation Action Plan</i>). 				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	<ul style="list-style-type: none"> ▪ Years 1 - 2 for Floodplain Risk Management Study and Plan ▪ Years 2 - 5 for audit and assessment ▪ Years 5 – 25 implement measures 	<ul style="list-style-type: none"> ▪ \$100,000 for Floodplain Risk Management Study and Plan ▪ Audit and assessment: Council Staff time ▪ Implement measures: dependant on proposed works 	<ul style="list-style-type: none"> ▪ OEH Floodplain Management Grants ▪ CHCC – Coffs Harbour Water budget for audit & assessment and subsequent implementation of measures / augmentation works 	Implementation of this action is an appropriate benchmark

Strategy Action 1.4				
Raise community awareness of the natural opening and closing regime of Woolgoolga Lake				
Specific Tasks				
To assist with establishing broad based community understanding and support for the entrance management policy for Woolgoolga Lake it is recommended that information on the natural opening and closing regime of Woolgoolga Lake is included in the interpretive centre proposed under Strategy Action 3.2 (Strategy 3) .				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 - 5	Included in the costs in Strategy Action 3.2	<ul style="list-style-type: none"> ▪ Caring for Our Country. ▪ CHCC Environmental Levy. ▪ OEH Coastal and Estuary Management Program. 	Implementation of this action is an appropriate benchmark.

Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

Drawn by: RE Checked by: TIM Reviewed by: TIM Date: June 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



GeoLINK
 environmental management and design

Coastal Zone Management Plan - Woolgoolga Lake Estuary
 1616812

Strategy 1 - Entrance Management

Illustration 1.1

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Strategy 2 – Stormwater Management and Catchment Pollutants

Catchment inputs in the form of stormwater, diffuse runoff and point source inputs are typically the major sources of poor water quality in estuaries and other coastal water bodies. The effects of poor water quality inputs can be magnified in ICOLLs such as Woolgoolga Lake depending on the status of the entrance.

An overview of the various land uses in the Woolgoolga Lake catchment is shown overleaf in **Illustration 2.2**. Stormwater and catchment pollutant modelling undertaken during the Woolgoolga Lake Estuary Processes Study (EPS) suggests that forestry operations in the upper catchment has the potential to be the major source of sediment and nitrogen inputs to the estuary (refer to **Illustration 2.1**). It also suggests that phosphorus input is dominated by agricultural land uses. Careful management of both of these activities within the catchment may lead to long term improvements in water quality.

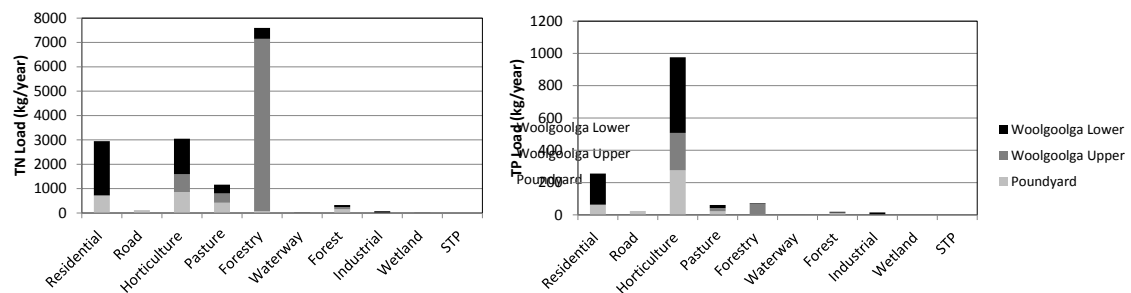


Illustration 2.1 Modelled Nitrogen and Phosphorus Loads for Woolgoolga Lake by Land Use

Community consultation indicates concern regarding pesticide and herbicide runoff from agricultural activities (mostly blueberry and banana farming and hothouse horticulture). Guidelines for best practice management of soil and water resources on blueberry (NSW DPI 2008a) and banana farms (NSW DPI 2008b) are available and have been used in the study area in the past as a basis for workshops and training activities for farmers.

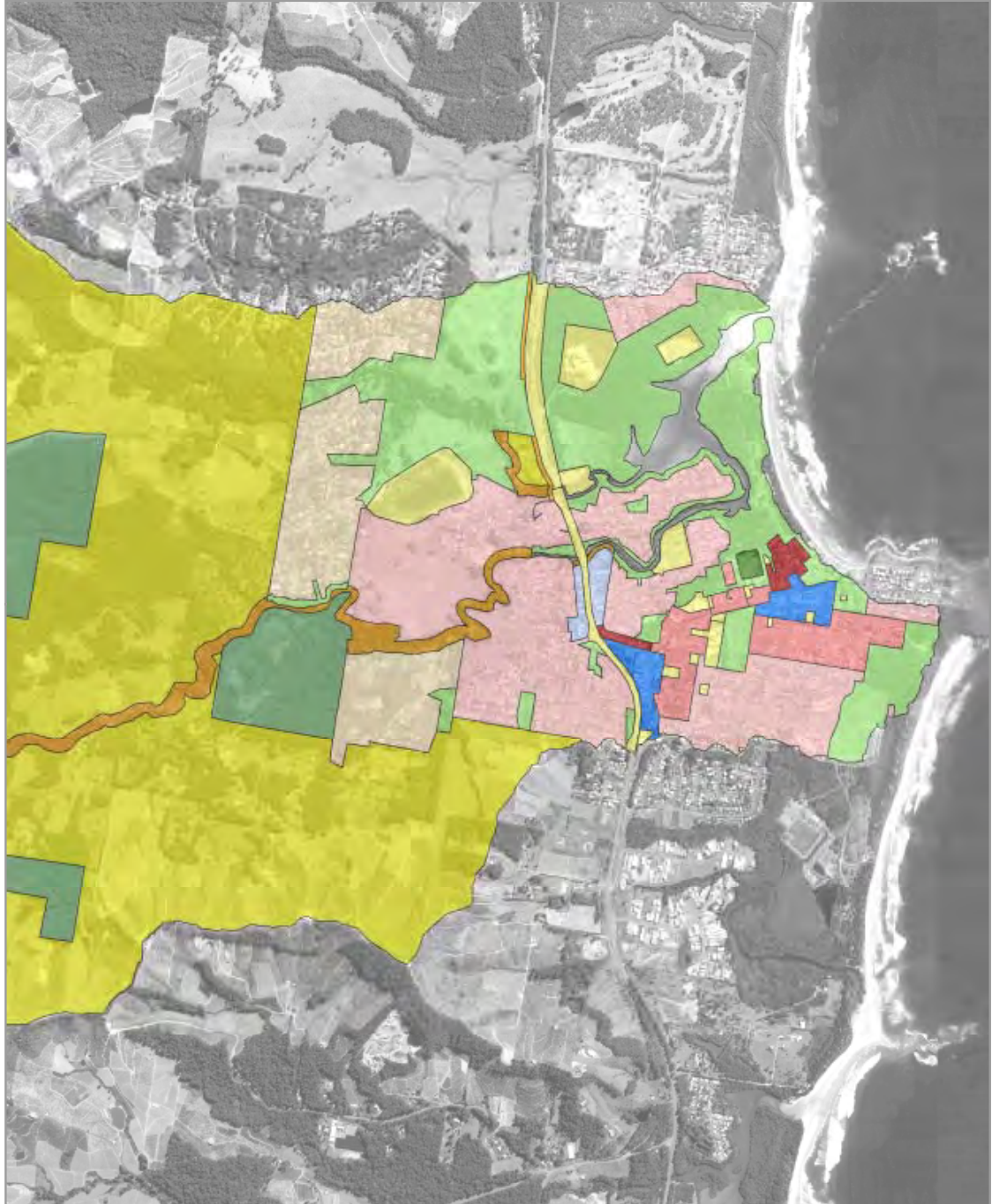


Of a more direct nature, investigation of a fish kill led to a prosecution of a Woolgoolga resident accused of dumping pesticides (dieldrin and aldrin) directly into Woolgoolga Creek. This specific issue is addressed in **Strategy 15**.

There have also been occasions when sewage infrastructure has flooded leading to direct inputs of untreated sewage into the waterway.

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: June 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



LEGEND

- Agriculture
- Urban
- Business
- Industrial
- Community purpose
- Open space recreation
- Environmental protection



GeoLINK
 environmental management and design

Landuse in the Woolgoolga Lake Catchment Area

Coastal Zone Management Plan - Woolgoolga Lake Estuary
 1616169

Illustration 2.2

2.1 Summary of Proposed Actions

- Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities.
- Encourage horticultural landowners to uptake incentives program for Best Practice Management.
- Best practice sediment, erosion and water quality management on forestry operations in the catchment.
- Stormwater management for new urban development.
- Stormwater management for existing urban development.
- Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management.
- Control land modification activities on rural lands.

2.1.1 Related Strategies

- **Strategy 1** Entrance Management.
- **Strategy 4** Water Quality.
- **Strategy 6** Fish Stocks.
- **Strategy 7** Aquatic Habitats.
- **Strategy 9** Climate Change and Sea Level Rise Impacts on Water Quality.
- **Strategy 10** Water Quality Monitoring.
- **Strategy 15** Residues from the 1989 Dieldrin/Aldrin Spill.

2.1.2 Objectives Addressed

- Improve the condition and extent of aquatic habitats.
- Make provisions for the ecological effects of climate change and sea level rise.
- Improved water quality.

2.2 Details of Proposed Actions

<p>Strategy Action 2.1</p> <p>Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities</p>
<p>Background:</p> <p>Community consultation indicates concern that agricultural activities (mostly blueberry and banana farming and hothouse horticulture) may be negatively impacting water quality in Woolgoolga Lake via inputs of sediment, nutrients and agricultural chemicals.</p> <p>A campaign of awareness targeting rural landholders is considered an appropriate way of addressing these concerns, improving agricultural practices and having a positive effect on water quality in Woolgoolga Lake. Workshops run by Coffs Harbour Regional Landcare in 2011 (Coffs Harbour Landcare 2011) targeting fertiliser use on blueberry farms are an example of recent initiatives that could be expanded upon. Workshops could be based upon existing guidelines (NSW DPI 2008a & b) and utilise the expertise of NSW DPI (Agriculture) staff from the Coffs Harbour region. In order to achieve the best outcomes for waterways the workshops should focus on best practice soil management and chemical use.</p> <p>Specific Tasks</p> <p>Develop and deliver a series of workshops aimed at blueberry and banana farmers in the catchment that describe:</p> <ul style="list-style-type: none"> ▪ strategies to reduce erosion, such as contour alignment of rows, installation of trafficable cross banks at

<p>regular intervals, establishment of groundcovers, adequate riparian buffer widths on rural properties and the use of subsurface drainage;</p> <ul style="list-style-type: none"> ▪ strategies to maintain and monitor soil moisture such that irrigation is always used in the most efficient manner; ▪ strategies to maximise the efficiency of fertiliser, herbicide and pesticide use and application, such that the overall use is minimised and concentrations in runoff can be minimised; and ▪ strategies to minimise the risk of accidental spillage of fertiliser, herbicides and pesticides such as appropriate storage, transport and disposal.
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Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
<p>Lead Agency:</p> <ul style="list-style-type: none"> ▪ DPI -- Agriculture NSW <p>Related Agencies:</p> <ul style="list-style-type: none"> ▪ CHCC; ▪ NRCMA; ▪ Landcare. 	Year 1	\$5,000 per workshop for preparation, materials and delivery.	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC Environmental Levy ▪ NRCMA ▪ OEH - Environmental Education Grants 	Delivery of workshops is an appropriate benchmark.

Strategy Action 2.2
Encourage horticultural landowners to uptake incentives program for Best Practice Management

Background:

Community consultation indicates concern that agricultural activities (mostly blueberry and banana farming) may be negatively impacting water quality in Woolgoolga Lake via inputs of sediment, nutrients and agricultural chemicals.

The Northern Rivers Catchment Management Authority (NRCMA) provides funding for landholders in specific horticultural industries to assist with the adoption of Best Management Practices for soil health in high priority landscapes including the Woolgoolga area. The targeted horticultural industries include blueberry, banana, macadamia, vegetable and coffee growers and growers of other perennial horticulture crops.

Eligible project activities include, but are not limited to improvements to soil condition / soil health through application of mulch, organic matter, compost, cover crops, minimum tillage, use of crop residues etc. or other biological farming techniques; soil conservation works such as runoff controls, diversion banks, waterways or other erosion control earthworks; and, establishment / improvement of ground cover to stabilise soil. It is also proposed that establishing a vegetated riparian zone along watercourses on horticultural land is encouraged via the incentives program – refer to **Strategy Action 2.6**.

Successful applications are those that contribute to the soil health targets of the NRCAP, use the Best Management Practice techniques outlined in the Horticulture BMP Guidelines (eg. *Soil and Water Management Practices for Blueberry growers in Northern NSW, 2008*) and have in-kind contributions from the landholder with an ongoing commitment to maintaining the project.

The program is funded by Caring for our Country and the NSW Government’s Catchment Action NSW.

Specific Tasks

Council, NRCMA and Regional Landcare to promote and coordinate uptake of the incentives program amongst horticultural landowners.

Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ NRCMA Related Agencies: <ul style="list-style-type: none"> ▪ CHCC; ▪ Landcare; ▪ DPI. 	Years 1 – 5	<ul style="list-style-type: none"> ▪ Staff budget time for coordinating uptake of the incentives program ▪ \$20,000 pa for incentives funding from CHCC Environmental Levy ▪ \$20,000 pa for incentives funding from NRCMA 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ NRCMA – Best Practice Management Horticultural Program 	CHCC to report annually on uptake numbers and implemented measures

Strategy Action 2.3
 Best practice sediment, erosion and water quality management on forestry operations in the catchment

Background:
 Stormwater and catchment pollutant modelling suggests that forestry operations in the upper catchment has the potential to be the major source of sediment and nitrogen inputs to the estuary. A number of complaints about logging operations in Wedding Bells State Forest have been made in recent times (NEFA 2011). Some of the issues raised could impact upon water quality in Woolgoolga Creek and its tributaries through increased sediment loads.

Specific Tasks
 Ensure that best practice methods with respect to soil erosion and water quality are applied during forestry operations within the Woolgoolga Lake catchment. These include:

- Monitoring of suspended sediment and turbidity in downstream waters before during and after active logging operations, particularly those referred to as ‘Scheduled Activities’ under the Upper North East Integrated Forestry Operations Approval (IFOA) (OEH 2011);
- Maintenance of adequate riparian buffer/filter strip widths around mapped and unmapped drainage lines;
- Installation and maintenance of sediment fencing around crossings and tracks during operations;
- Restrictions on harvest in steep country as determined by the IFOA;
- Drainage management on cleared areas including the network of unsealed roads; and
- Independent auditing of the ability to meet licensing approvals in the IFOA that relate to water quality and soil erosion.

Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
<ul style="list-style-type: none"> ▪ DPI – Forests NSW ▪ NSW Environment Protection Authority – Crown Forestry Policy & 	Life of the Plan	\$50,000 to \$100,000 for auditing and monitoring of export water quality.	DPI and EPA – Forests operating budget	During forestry operations the suspended sediment loads in runoff should be monitored to ensure that

Regulation Section				sediment and erosion controls are effective.
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Strategy Action 2.4
Stormwater management for new urban development

Background:
Future urban growth areas are proposed in the estuary catchment as shown in **Plate 2.1**. New development areas have the potential to reduce the quality of catchment runoff during and after the construction phase. It is important that controls placed on new developments are sufficient and enforced to ensure no negative net impact upon water quality.

Council currently has a contemporary policy and associated guidelines addressing stormwater management for new development (Coffs Harbour City Council Water Sensitive Urban Design (WSUD) Policy, 2009). These guidelines are consistent with current best-practice management measures in the industry. Therefore, this estuary management plan recommends continued implementation of Council's policy and guidelines for stormwater management and ongoing updating of the policy and guidelines in line with developments in the stormwater management industry. No additional strategies are considered necessary in respect to controlling stormwater management for new development.

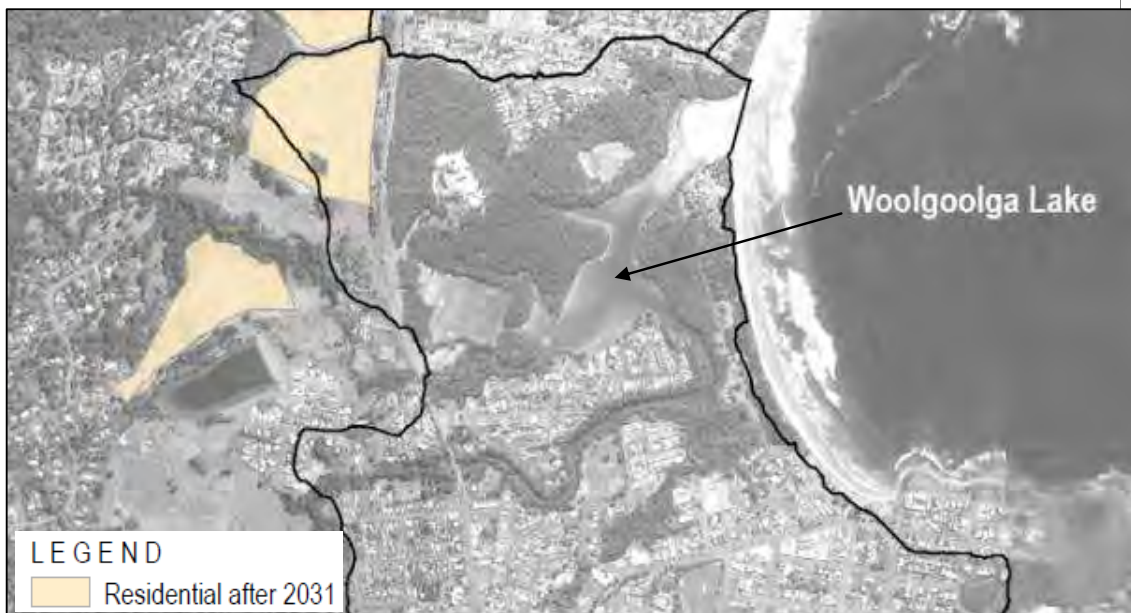


Plate 2.1 Future Growth Areas

Specific Tasks

- Ongoing updating of Council's Water Sensitive Urban Design (WSUD) Policy (2009) and associated guidelines in line with developments in the stormwater management industry.

Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Review policy and guidelines every 5 years	Part of Council's operational budget	n/a	Review policy and guidelines every 5 years

<p>Strategy Action 2.5 Stormwater management for existing urban development</p>				
<p>Background: Urban development comprises over half of the immediate estuary catchment area of Woolgoolga Lake. It is important that stormwater management improvements (treatment and detention) are pursued in existing urban areas where existing arrangements are deficient. This may include retrofitting of existing drainage systems to improve treatment and detention as opportunities arise in association with redevelopment.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> Develop a stormwater management plan for the existing urban area of Woolgoolga Lake catchment with a focus on auditing key stormwater outlets and associated drainage catchments to identify sub-standard treatment or sub-standard detention of flows and opportunities for retrofitting of the existing system. It is recommended this task is undertaken in association with Action A-3 in Council's Climate Change Mitigation and Adaptation Action Plan (BMT WBM, <i>et al</i>, 2010) which aims to identify vulnerable essential services (e.g. stormwater) to determine assets at risk from sea level rise (refer also to Strategy Action 1.2); Based on the above audit, retrofit high-priority stormwater drainage systems with treatment and/or detention systems. It is recommended this task is undertaken in association with Action A-7 in Council's Climate Change Mitigation and Adaptation Action Plan (BMT WBM, <i>et al</i>, 2010) which aims to relocate or replace vulnerable essential services (e.g. stormwater) to reduce potential for interference from sea level rise (refer also to Strategy Action 1.2). 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Initial audit: Years 1 – 5 Retrofit works: long term	<ul style="list-style-type: none"> Stormwater management plan: \$50 - \$80k Retrofit works: dependant on proposed works 	CHCC Environmental Levy	Implementation of this action is an appropriate benchmark
<p>Strategy Action 2.6 Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management</p>				
<p>Background: When looked at over the whole state of NSW, water quality data shows that the condition of an ICOLL degrades significantly once natural vegetation is lost from more than half of the catchment (Haines 2008). Clearly increased urban and agricultural development can result in negative impacts on waterways within the catchment. However, making provisions for adequate riparian buffer widths throughout a catchment can result in a number of benefits to receiving waters, such as reduced sediment and nutrient loads. It can also serve greater environmental purposes such as provision of wildlife corridors between alternative habitats.</p> <p>Generally, the urbanised tributaries of Woolgoolga Lake are provided with vegetated riparian buffers of a minimum of 10 to 20 m width. The Processes Study indicates that riparian vegetation in the study area is predominately in moderate to good condition (GeoLINK <i>et al.</i>, 2011a). However, some tributaries in the upper catchment in horticultural areas are lacking any vegetated riparian buffer as indicated in the following plate.</p>				

NSW DPI recommend a minimum buffer of 50 m between watercourses and greenhouse horticulture in its handbook for managing land use conflict issues on the NSW North Coast (Learmonth, *at. al.*, 2007). The handbook recommends minimum buffer distances between watercourses and grazing land or non-greenhouse horticulture to be based on 'best practice management'.



An indication of what may be considered 'best practice management' is provided in NSW Office of Water recommendations for vegetated riparian zone widths – these widths should contain fully structured native vegetation (including groundcovers, shrubs and trees).

These recommended widths are based on watercourse order as classified under the Strahler System of ordering watercourses and based on current 1:25 000 topographic maps (see table below). The width of the riparian zone should be measured from the top of the highest bank and on both sides of the watercourse. Based on the table below a minimum 10 metre wide vegetated riparian zone on either side of the watercourses is recommended in the upper tributaries.

Type of watercourse	Width of CRZ
Any first order watercourse and where there is a defined channel where water flows intermittently or any 'river' not identified on a topographic map	10 metres
<ul style="list-style-type: none"> ■ any permanently flowing first order watercourse, or ■ any second order watercourse and where there is a defined channel where water flows intermittently or permanently.	20 metres
Any third order or greater watercourse, where there is a defined channel and where water flows intermittently or permanently. Includes estuaries, wetlands and any parts of rivers influenced by tidal waters.	20 - 40 metres ¹

¹ merit assessment based on riparian functionality of the river, lake or estuary, the site and long-term land use. Source: NSW Office of Water, 2011

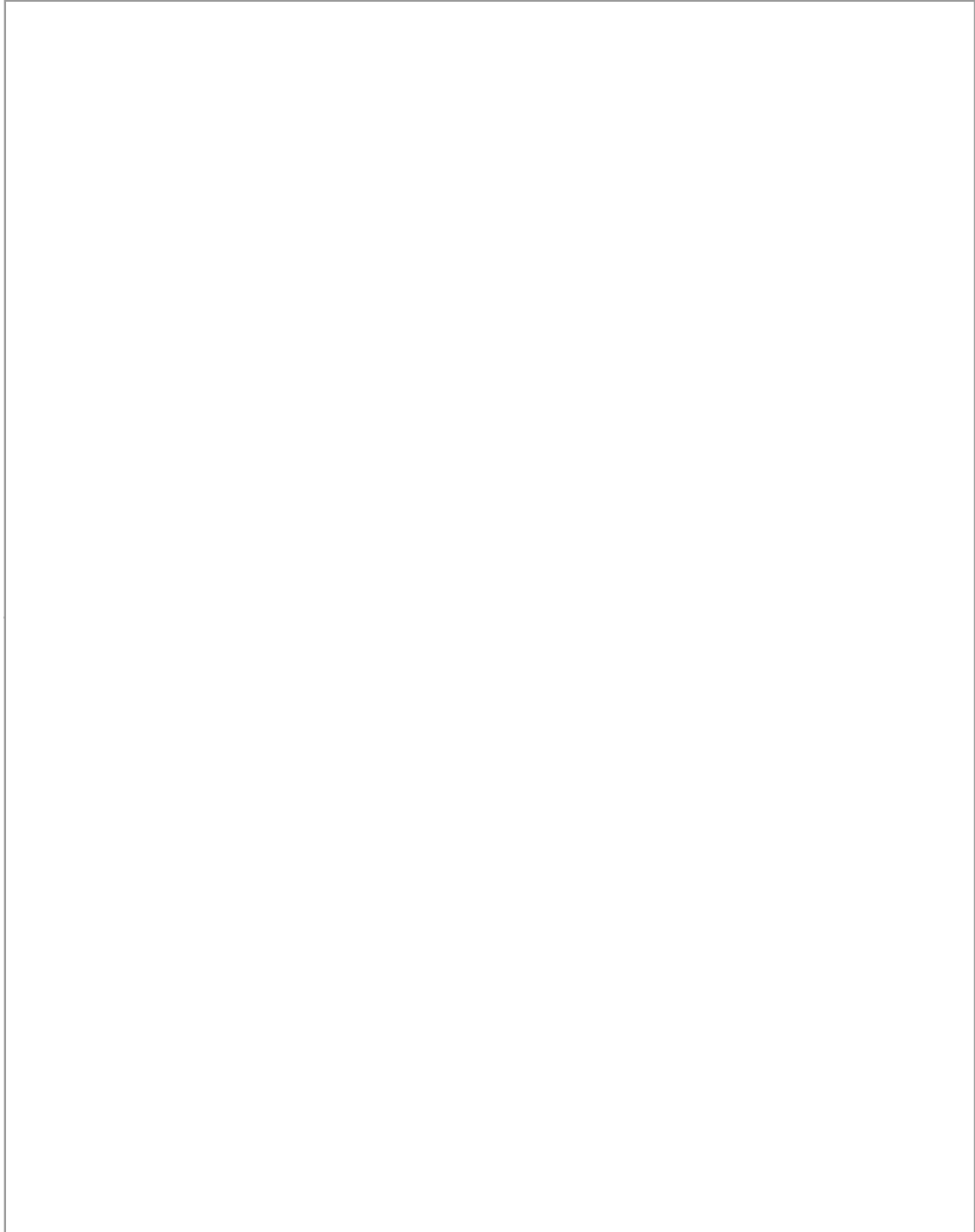
It is considered that the best approach to establishing a vegetated riparian zone in the upper tributaries on rural land is via the incentives program for Best Practice Management for horticultural landowners in **Strategy Action 2.2**. Therefore no additional actions or tasks are proposed.

Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ NRCMA. Related Agencies: <ul style="list-style-type: none"> ▪ CHCC; ▪ Landcare; ▪ DPI – Agriculture NSW. 	Years 1 – 5	Part of cost listed in Strategy Action 2.2 .	Same funding as listed in Strategy Action 2.2 .	Part of reporting as described for Strategy Action 2.2 .
















Strategy Action 2.7				
Control land modification activities on rural lands				
<p>Background:</p> <p>Land disturbance associated with the construction, installation or maintenance of buildings, roads, or other infrastructure creates the potential for increased levels of soil erosion and consequent sediment pollution of waterways.</p> <p>There has been significant development of the greenhouse horticulture industry in the upper catchment of Woolgoolga Lake. Development of this industry can involve significant earthworks associated with the construction of building pads for greenhouse structures. These earthworks create the potential for significant sediment pollution of waterways without proper erosion and sediment control measures.</p> <p>Past development of the greenhouse horticulture industry has generally proceeded without the requirement for development consent. There have been reported incidences where significant erosion and sediment control issues have occurred in association with construction of greenhouse structures. These incidences have been addressed under the Protection of the Environment Operations Act 1997. It is considered that a more proactive approach by Council to ensuring implementation of proper erosion and sediment control measures will provide a better outcome. This can be achieved through the development consent approach utilising relevant provisions from the proposed Standard Instrument Local Environment Plan (SiLEP) such as Clause 7.7 Earthworks of the draft SiLEP (2012).</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Educate rural land holders about the above provisions / requirement for development consent in timing with the adoption of the proposed SiLEP. ▪ With respect to enforcing the provisions of the proposed SiLEP relevant to the above issues, Council is to undertake the following tasks when issues are brought to Council's attention: <ul style="list-style-type: none"> – investigate the requirement for consent for development captured by the relevant SiLEP provisions; – investigate compliance with development conditions in regard to erosion and sediment control measures; – investigate compliance where development has occurred without consent (and not been exempt development under the SiLEP or SEPP (Exempt and Complying Development Codes) 2008; and – utilise the provisions of the Protection of the Environment Operations Act 1997 to enforce erosion and sedimentation control where poorly managed earthworks pose a risk to, or have impacted, the environment. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Year 1	Unknown additional staffing resources and additional costs to Council's operational budget	n/a	Review development application / consent numbers and comparison with hothouse development based on aerial imagery

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: June 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



LEGEND

- | | |
|--|---|
|  1A Rural Agriculture |  3D Business Tourist Service Centre |
|  1B Rural Living |  3E Business Town Centre Support |
|  1F Rural State Forest |  5A Special Uses |
|  2A Residential Low Density |  6A Open Space and Public Recreation |
|  2B Residential Low Density |  6C Open Space Private Recreation |
|  2C Residential Medium-High Density |  7A Environmental Protection Habitat and Catchment |
|  2E Residential Tourist |  7B Environmental Protection Scenic Buffer |
|  3C Business Town Centre | |



Strategy 2 - Stormwater Management and Catchment Pollutants



Coastal Zone Management Plan - Woolgoolga Lake Estuary
 1616813

Illustration 2.3

Strategy 3 - Foreshores and Riparian Areas

The riparian vegetation of the estuary (vegetation bordering the waterway) is predominantly in moderate to very good condition (GeoLINK *et al*, 2011). Only a small area of the riparian zone is in very poor condition, occurring on the southern foreshore of Woolgoolga Lake, immediately adjacent to the residential area of Sunset Lakes Estate.

The riparian vegetation along the foreshores of Woolgoolga Lake provides a significant contribution to maintaining estuary health, ecology, bank stability and the scenic values of Woolgoolga Lake. The objectives of this strategy are to enhance, protect and restore natural values to riparian and foreshore areas while maintaining and enhancing existing passive water and land based recreational experiences and opportunities and the scenic values of the lake.

This strategy also addresses bank erosion impacts to foreshore values of Woolgoolga Lake. Bank erosion is not a significant issue in the Woolgoolga Lake estuary (GeoLINK *et al*, 2011) due to the relatively low energy environment of the estuary, the cohesive nature of the bank materials, and the mostly well-vegetated estuary banks. Nevertheless, active management is required in some locations where minor bank erosion intersects with areas of importance from a recreational, estuarine health, or estuarine ecology perspective.

3.1 Summary of Proposed Actions

- Establish a defined edge between mown land and riparian vegetation along the southern foreshore of Woolgoolga Lake adjacent to Sunset Lakes Estate.
- Improve the extent of riparian vegetation along the southern foreshore of Woolgoolga Lake adjacent to Sunset Lakes Estate.
- Modify the existing landscape plan for the Woolgoolga Lakeside Reserve Picnic Area.
- Establish a defined edge between mown land and riparian vegetation along the foreshore of Woolgoolga Lakeside Reserve Picnic Area and Woolgoolga Lakeside Caravan Park and revegetate riparian areas.
- Construct a foreshore platform to enhance water edge recreational use and address bank erosion at the central and most popular section of the Lakeside Reserve Picnic Area.
- Maintain and enhance other water edge access points at Lakeside Reserve Picnic Area.

3.1.1 Related Strategies

- **Strategy 11** Recreational facilities and opportunities.
- **Strategy 13** Visual amenity.

3.1.2 Objectives Addressed

- Implement bank stabilisation and rehabilitation works in areas with important estuary values.
- Restore terrestrial habitats of high ecological or conservation value.
- Maintain and enhance existing passive water and land based recreational experiences and opportunities in a manner that complements and sustains the natural values of the estuary.
- Enhance, protect and restore natural values to foreshore areas.
- Preserve and enhance the natural appearance of the lake particularly along the foreshores.
- Optimise the attractive outlook across the lake and creeks from path routes, recreation areas and other destinations for public enjoyment.

3.2 Details of Proposed Actions

Strategy Action 3.1

Establish a defined edge between mown land and riparian vegetation along the southern foreshore of Woolgoolga Lake adjacent to Sunset Lakes Estate.

Background:

While the majority of the foreshore environment around Woolgoolga Creek and Lake estuary is considered to be in moderate to very good condition (GeoLINK *et al*, 2011), there is a contrasting lack of vegetation around the lake's southern edge adjacent to the residential community of Sunset Lakes Estate. This area includes Crown Reserve No. 752853 for Future Public Requirements – managed by DPI – Catchments and Lands (Crown Lands).

A primary objective of estuary management is to establish a more diverse structure of riparian vegetation along the estuary foreshores and banks to maintain estuary health, biodiversity, bank stability and visual amenity. The re-establishment of native riparian vegetation including saltmarsh habitats across this site is therefore considered a high priority toward meeting this objective.



Plate 3.1 Southern Foreshore of Woolgoolga Lake

Specific Tasks

- Seek relevant licences with respect to the following works on Crown Lands.
- Liaise with local residents and landholders to seek support for the implementation of the general strategy and the following tasks.
- Develop a landscape plan with the input of local landholders/residents that sets out the scope of implementation tasks as set out in this strategy action and **Strategy Action No. 3.2**.
- Reduce the extent of mowing within the public reserve and install a defined edge (e.g. bollards or a simple 'pegged' boundary) between mown land and riparian vegetation along the foreshore to reduce unnecessary impacts and to protect existing and newly planted or regenerating foreshore vegetation (refer also to **Plate 3.1** above). If a future path is constructed along the foreshore, the pathway could become the defined edge. Consideration should be given to water edge access at key locations to compensate for any restrictions imposed by the revegetation works. Provide low key site support and infrastructure (e.g. paths, boardwalks, steps, viewing platforms) if necessary to minimise site impacts and to enhance user experience.
- Actively re-establish riparian vegetation along the foreshore with due regard to the amenity of adjoining residents.
- Monitor the foreshore area for environmental weed regrowth and control as necessary to facilitate more rapid regeneration of native riparian plants.

Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC Related Agencies: <ul style="list-style-type: none"> ▪ DPI – Catchments and Lands (Crown Lands); 	Years 1 - 2	<ul style="list-style-type: none"> ▪ Establishment of defined edge and initial re-establishment of riparian vegetation: \$5,000 (not including infrastructure assoc. with water edge access at key locations) ▪ Management of work and public consultation: CHCC and DPI - Crown Lands staff time; ▪ Landscape Plan: CHCC staff time 	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC Environmental Levy 	<ul style="list-style-type: none"> ▪ A benchmark for achievement of this action is the establishment of a defined edge. ▪ Routinely check mowing practices and planting establishment
<p>Strategy Action 3.2</p> <p>Improve the extent of riparian vegetation along the southern foreshore of Woolgoolga Lake adjacent to Sunset Lakes Estate.</p>				
<p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Actively re-establish vegetation along sections of the foreshore reserve with due regard to the amenity of adjoining residents. Extend riparian vegetation where appropriate along footpath connections and install new or replace existing street trees with locally indigenous street trees along road reserves throughout the residential community. ▪ Encourage residents to incorporate locally indigenous vegetation in private gardens and to recognise and avoid installing invasive or inappropriate plants. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC Related Agencies: <ul style="list-style-type: none"> ▪ DPI – Catchments and Lands (Crown Lands); 	Years 3 – 5	<ul style="list-style-type: none"> ▪ Planting works: \$5,000 ▪ Management of public consultation: CHCC and DPI - Crown Lands staff time; 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy 	The benchmark for achievement of this action is the installation of locally indigenous street trees along road reserves throughout Sunset Lakes Estate.

<p>Strategy Action 3.3</p> <p>Modify the existing landscape plan for the Woolgoolga Lakeside Reserve Picnic Area</p>				
<p>Background:</p> <p>The popularity of the Woolgoolga Lakeside Reserve has led to disturbance to sections of the foreshore and the need to amend the existing landscape plan for the picnic area and extend it to include the wider foreshore area including the Woolgoolga Lakeside Reserve Picnic Area and Woolgoolga Lakeside Caravan Park.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> Modify the existing landscape plan for the Reserve to incorporate and integrate the recommendations set out in the following Strategy Actions (3.4 to 3.7) as a basis for future implementation of capital works and improved maintenance practices. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Year 1	Landscape Plan: no cost - CHCC and DPI - Crown Lands staff time	Not applicable	The benchmark for achievement of this action is the completion and adoption of a revised Landscape Plan
<p>Strategy Action 3.4</p> <p>Establish a defined edge between mown land and riparian vegetation along the foreshore of Woolgoolga Lakeside Reserve Picnic Area and Woolgoolga Lakeside Caravan Park and revegetate riparian areas</p>				
<p>Background:</p> <p>This strategy relates to Crown Reserve No. 63076 for Public Recreation and Resting Place – managed by Council as the Reserve Trust Manager for the Woolgoolga Beach Reserve Trust.</p> <p>Grass mowing close to the foreshore both within the picnic area and along the pedestrian link to the lake entrance / beach has caused unnecessary environmental damage. Excessive mowing and the gradual spread of exotic grass into the foreshore environment create a significant and increasing threat to the sustainability of remnant vegetation.</p> <p>Efforts to restore and regenerate the riparian vegetation in this area while maintaining recreational amenity would greatly benefit the estuarine / riparian habitat of the Reserve and fulfil a key objective of this CZMP.</p>				
<p>Specific Tasks</p> <ul style="list-style-type: none"> Seek relevant licences with respect to the following works on Crown Lands. Install a defined border around all mown grass areas particularly along the lake foreshores to establish a permanent and visible demarcation line for ease of grass maintenance and to prevent unnecessary incursions into surrounding natural vegetation. Ensure that new walking tracks where proposed are carefully aligned adjacent to the riparian vegetation to reinforce boundary definition. Identify sections of foreshore where water edge access should be discouraged and natural values predominate. Set protection zones back from the lakeside embankment to create wider, more sustainable vegetation areas and supplement with additional riparian planting as required. Liaise with park management to generate a greater understanding of the site’s natural values and to establish 				



<p>maintenance practices that will complement and help sustain this environment.</p> <ul style="list-style-type: none"> Install new or replacement locally indigenous trees throughout the Reserve as necessary to ensure that the visual character and dominance of existing trees is maintained. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC as Reserve Trust Manager	Years 1 - 2	<ul style="list-style-type: none"> Establishment of defined edge and initial re-establishment of riparian vegetation: \$5,000 	<ul style="list-style-type: none"> CHCC Environmental Levy 	<ul style="list-style-type: none"> A benchmark for achievement of this action is the establishment of a defined edge. Routinely check mowing practices and planting establishment as part of park maintenance

Strategy Action 3.5

Construct a foreshore platform to enhance water edge recreational use and address bank erosion at the central and most popular section of the Lakeside Reserve Picnic Area

Background:

This strategy potentially relates to Crown Reserve No. 63076 (for Public Recreation and Resting Place) and Reserve No. 70416 (for Public Recreation) – both managed by Council as the Reserve Trust Manager for the Woolgoolga Beach Reserve Trust.

The popularity of the Woolgoolga Lakeside Reserve particularly for water based recreation has led to unsustainable disturbance to sections of the foreshore highlighted by vegetation loss and erosion of the unprotected embankment.



Concentrated pedestrian access onto a small sandy cove at the Lakeside Reserve has detrimentally affected foreshore vegetation and exacerbated bank erosion.

Specific Tasks

- Seek relevant licences with respect to the following works on Crown Lands.
- Formalise access to the central and most popular section of the lake foreshore with steps, ramps and platforms to maintain and enhance water edge recreational use while preventing further damage to the embankment. The structure will include bank erosion protection works beneath the platform to prevent further erosion from wave actions. To facilitate the implementation of this action, a design for a new formalised water edge structure has been prepared - refer **Appendix B**.


<i>Responsible Agencies</i>	<i>Timeframe</i>	<i>Cost</i>	<i>Potential Funding Sources</i>	<i>Monitoring</i>
CHCC	Years 1 - 5	<ul style="list-style-type: none"> ▪ Foreshore structure¹: \$50,000 ▪ General site upgrades: new edging, paths, plants and signage: \$20,000 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ Caring for Our Country 	<ul style="list-style-type: none"> ▪ A benchmark for achievement of this action is the establishment of the foreshore structure and picnic area upgrades. ▪ Routinely check mowing practices and planting establishment as part of park maintenance
<p>Note: 1. Foreshore structure cost includes design and construction of jetty structure including ramp and seating and erosion protection measures to embankment beneath jetty – refer to drawing in Appendix B</p>				
<p>Strategy Action 3.6 Maintain and enhance other water edge access points at Lakeside Reserve Picnic Area.</p>				
<p>Background: This strategy potentially relates to Crown Reserve No. 63076 (for Public Recreation and Resting Place) and Reserve No. 70416 (for Public Recreation) – both managed by Council as the Reserve Trust Manager for the Woolgoolga Beach Reserve Trust.</p> <p>Aside from the central water access location addressed in Strategy Action 3.5, there are a number of low key water edge access points at Lakeside Reserve Picnic Area.</p>				
<p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Seek relevant licences with respect to the following works on Crown Lands. ▪ Identify other attractive water edge access points and provide low key site support and infrastructure if necessary to reduce site vulnerability. ▪ Maintain the existing kayak and canoe soft launching location. Monitor potential foreshore impacts particularly bank erosion and vegetation loss caused by unsustainable use levels. Undertake corrective measures including site reconfiguration if necessary to address impacts. 				
<i>Responsible Agencies</i>	<i>Timeframe</i>	<i>Cost</i>	<i>Potential Funding Sources</i>	<i>Monitoring</i>
CHCC	Years 1 - 5	<ul style="list-style-type: none"> ▪ \$2,000 for any general site upgrades 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy 	Routinely check embankment stability and access breaches along foreshore as part of park maintenance

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: August 2012
Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only

Strategy Action 3.2:
Install new / supplementary street trees using locally indigenous species within the residential communities fronting the lake to mitigate the existing dominance of built form across the skyline.

LEGEND

 Crown land reserves



Strategy Action 3.3:
Modify the existing landscape plan for the Woolgoolga Lakeside Reserve Picnic Area.

Strategy Action 3.4:
Establish a defined edge between mown land and riparian vegetation along the foreshore of Woolgoolga Lakeside Reserve Picnic Area and Woolgoolga Lakeside Caravan Park and revegetate riparian areas.

Strategy Action 3.5:
Construct a foreshore platform to enhance water edge recreational use and address bank erosion at the central and most popular section of the Lakeside Reserve Picnic Area.

Strategy Action 3.6:
Maintain and enhance other water edge access points at Lakeside Reserve Picnic Area.

Strategy Action 3.1:
Establish a defined edge between mown land and riparian vegetation along the southern foreshore of Woolgoolga Lake adjacent to Sunset Lakes Estate and actively re-establish riparian vegetation along the foreshore with due regard to the amenity of adjoining residents

Strategy Action 3.1:
Rationalise water edge access along the southern foreshores to key locations and provide low key site support and infrastructure such as viewing platforms to optimise the attractive outlook across the lake at key vantage points.



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Strategy 4 - Water Quality

It is common practice to compare water quality measurements with guideline values in order to determine the status of water quality in an aquatic system. For the protection of aquatic ecosystems in coastal waterways such as Woolgoolga Lake the most commonly applied guideline values are described by ANZECC (2000) and for the assessment of estuary condition DECCW (now OEH) released a set of guideline values based upon the salinity range in the waterway.

Comparison of existing water quality against guideline values revealed that turbidity, total nitrogen and chlorophyll-a measurements are all slightly elevated in Woolgoolga Lake, based upon a limited set of samples and the available guidelines (GeoLINK 2011a).

4.1 Summary of Proposed Actions

Elevated levels of turbidity, nitrogen and chlorophyll-a are most likely to be a result of inputs of these pollutants from urban and non-urban areas in the catchment. As there are no point source inputs of sediments and nutrients into Woolgoolga Lake the only tools available to reduce the loads of sediments and nutrients into the waterways are associated with reducing the concentrations of sediments and nutrients in diffuse runoff from the catchment in general and in stormwater from urban areas. This is addressed in **Strategy 2** of this document. The only additional action proposed is:

- minimise the input of domestic animal faecal materials into the waterway.

4.1.1 Related Strategies

- **Strategy 1** Entrance Management.
- **Strategy 2** Stormwater Management and Catchment Pollutant.
- **Strategy 6** Fish Stocks.
- **Strategy 7** Aquatic Habitats.
- **Strategy 9** Climate Change and Sea Level Rise Impacts on Water Quality.
- **Strategy 10** Water Quality Monitoring.

4.1.2 Objectives Addressed

- Improve the Condition and Extent of Aquatic Habitats.
- Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise.
- Improved Water Quality.

4.2 Details of Proposed Actions

Strategy Action 4.1

Minimise the input of domestic animal faecal materials into the waterway.

Background:

Animal faecal material washed into waterways can contribute significantly to nutrient loads (as well as faecal indicator organism concentrations). Whilst the contribution from native animals such as wading birds and mammals that inhabit the riparian zone cannot be controlled a reduction in nutrient contributions from domestic pets can be achieved by responsible pet ownership.

Specific Tasks				
<ul style="list-style-type: none"> ▪ Provide waste collection bags at the heads of walking trails. ▪ Educate pet owners about the effects of pet faecal materials on waterways in ratepayer newsletters and council newspaper advertisements. ▪ Police council policies with respect to pet ownership. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 2 – 3	<ul style="list-style-type: none"> ▪ Staff time ▪ Installation of units \$1,500 p/unit ▪ Maintenance of units \$1000 per unit p/annum 	Caring for Our Country	Release of educational materials and installation of waste collection bag units.

Strategy 5 - Climate Change Impacts on Estuary Ecology

Under current projections for climate change and associated sea level rise there are likely to be a number of impacts upon estuary ecology. These may include direct impacts upon mangroves and saltmarsh and direct impacts upon fish diversity and abundance.

The ecology of ICOLLs is dependent on a number of physical and chemical processes, including waterway hydrodynamics. The most significant change to hydrodynamics as a result of climate change will be an increase in sea level and a corresponding similar increase in average lake water levels. This will also have significant repercussions for estuarine ecology, most notably fringing wetlands and saltmarsh communities (Haines, 2006).



It is expected that mangroves communities will typically migrate landward in response to higher lake water levels. The distribution and species of mangroves may change due to higher water temperatures (Walsh, 2004a cited in Haines, 2006). Saltmarsh communities are considered to be particularly vulnerable to increases in average lake water levels, as they occupy relatively flat ground near the waters edge. Small changes in sea level will therefore result in extensive inundation (Walsh, 2004a cited in Haines, 2006). Further, landward migration of saltmarsh, mangroves, and other wetland communities in response to rising lake water levels may be restricted by existing development or barriers (e.g. embankments associated with residential lands raised above flood levels, natural elevated banks adjoining the lake) resulting in a loss of habitat (Pittock, 2003; Walsh, 2004b, Gilman, 2004 cited in Haines, 2006). This is the case in some, but not all, of the estuarine foreshores of Woolgoolga Lake. It would be prudent to ensure that, where possible, buffers remain protected from future development to allow for the upslope migration of mangroves and saltmarsh.

There may also be indirect impacts upon estuary ecology related to climate change impacts upon water quality. Strategies that will reduce the impacts of forecast climate change scenarios upon water quality are discussed under **Strategy 9**.

5.1 Summary of Proposed Actions

In order to address the issue of potential impacts of climate change upon estuary ecology the following actions are proposed;

- Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise.

5.1.1 Related Strategies

- **Strategy 7** Aquatic Habitats.
- **Strategy 9** Climate Change and Sea Level Rise Impacts on Water Quality.

5.1.2 Objectives Addressed

- Improve the Condition and Extent of Aquatic Habitats.
- Increase Fish Stocks.
- Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise.
- Improved Water Quality.

5.2 Details of Proposed Actions

Strategy Action 5.1

Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise

Background:

Currently, mangroves and saltmarsh in Woolgoolga Lake are mostly located below the 1.5 m.AHD contour line and all located below the 2 m AHD contour line. The response of mangroves and saltmarsh colonies to sea level rise forecasts is likely to be a mixture of sediment accretion (i.e. no migration) and upslope migration. The exact balance will be dependent upon a variety of geomorphic, biogeographic and development factors that will vary significantly by location. However, it can be safely assumed that the future total vertical migration of mangroves and saltmarsh is likely to be closely aligned with future total sea level rise (i.e. approx. 0.9 m by 2100) as the distribution of saltmarsh and mangroves is strongly defined by tidal heights. In areas where upslope migration is made possible by low sloping land, low development pressure and compatible current landuse careful planning for the future may result in improved outcomes.

In addition to buffers allowing the upslope migration of mangroves and saltmarsh it is important to allow horizontal buffers for landward migration of riparian vegetation so that a suitable riparian strip is maintained under sea level rise scenarios. Current best practice suggests that a 40m riparian buffer is suitable for maintaining the environmental integrity of estuaries (see **Strategy Action 2.6** and NSW Office of Water, 2011).

The majority of the Woolgoolga Lake foreshore is currently zoned 6A – Open Space and Public Recreation. This is considered an adequate zoning for the protection of vertical and horizontal buffers for the upslope migration of saltmarsh and mangroves resulting from sea level rise over the near future. However, in the case that changes to the current zoning of foreshore land around Woolgoolga Lake be proposed or the Coffs Harbour LEP is reviewed, appropriate horizontal and vertical buffers must be protected to ensure the future integrity of mangrove and saltmarsh habitat in addition to a riparian buffer zone. A vertical buffer incorporating the 3 m AHD contour line and a horizontal buffer of 40 m landward from the 3 m AHD contour line will be adequate to preserve the ecological integrity of the system.

Specific Tasks

- Map a buffer zone around Woolgoolga Lake incorporating all lands currently zoned 5A, 6A and 7A falling within 40 m landward of the 3 m AHD contour line.
- Develop Development Control Plan (DCP) provisions for the above buffer zone that controls or limits development within the buffer zone such that potential upslope migration of mangroves and saltmarsh is not impeded.

Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 2	Staff time	CHCC operating budget	Preparation of a report which describes priority potential areas for future colonisation

Information shown is for illustrative purposes only

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: August 2012
 Source of base data: Coffs Harbour City Council and Department of Primary Industries



LEGEND

- Contours between 1.5 and 3.5 m AHD inclusive
- 2A Residential Low Density
- 3D Business Tourist Service Centre
- 5A Special Uses
- 6A Open Space and Public Recreation
- 7A Environmental Protection Habitat and Catchment
- Saltmarsh (Department of Primary Industries - 2011)
- Mangrove (Department of Primary Industries - 2011)



Strategy 6 - Fish Stocks

Recreational fishing is a common use of the Woolgoolga Lake estuary. Diminished fish stock was raised as a potential issue during the community consultation phase of preparing this CZMP.

Fish sampling undertaken as part of this CZMP development and a review of previous studies concludes that fish and macroinvertebrate populations are scarce and lack diversity in Woolgoolga Lake. However, it is noted that ICOLL's generally exhibit lower fish species diversity when compared to permanently open estuaries (Pollard, 1994a; Roy *et al.*, 2001; Williams *et al.*, 2004; Dye and Barros, 2005 cited in Haines, 2008).

Improving fish stocks in Woolgoolga Lake is intricately linked with improving the extent and condition of aquatic habitat, maintaining a natural opening / closing regime for the lake entrance, improving the condition and continuity of riparian vegetation, and improving water quality.

6.1 Summary of Proposed Actions

No direct fish stock improvement actions are proposed such as artificially stocking the lake. Other strategies and actions proposed in this CZMP will adequately address the issue of fish stocks. These strategies include: improve the extent and condition of aquatic habitat (**Strategy 7** actions); improve the condition and continuity of riparian vegetation (**Strategy 3** and **Strategy 8** actions) and improve water quality (**Strategy 2** actions).

6.1.1 Related Strategies

- **Strategy 1** Entrance Management.
- **Strategy 2** Stormwater Management and Catchment Pollutants.
- **Strategy 3** Foreshores and Riparian Areas.
- **Strategy 4** Water Quality.
- **Strategy 5** Climate Change Impacts on Estuary Ecology.
- **Strategy 7** Aquatic Habitats.
- **Strategy 9** Climate Change and Sea Level Rise Impacts on Water Quality.
- **Strategy 15** Residues from the 1989 Dieldrin/Aldrin Spill.

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Strategy 7 – Aquatic Habitats

The Northern Rivers Catchment Management Authority (NRCMA) Catchment Action Plan (CAP) lists rehabilitation of aquatic habitats among its goals. A decline in the extent and condition of seagrass beds, mangroves, saltmarsh and sedge heath communities was identified by Council's Coastal Estuary Management Advisory Committee (CEMAC) as possible issues concerning Woolgoolga Lake.



Young mangroves adjoining residential land on Woolgoolga Lake

Detailed mapping analysis of aquatic habitats shows that seagrass has disappeared from Woolgoolga Lake in recent years and it is clear from site visits that some saltmarsh and mangrove habitats show signs of disturbance. The factors causing the decline in the area of seagrass are uncertain, though factors commonly associated with seagrass loss that may be present in Woolgoolga Lake include:

- high suspended sediment loads in catchment runoff;
- natural fluctuations in the area of seagrass common to ICOLLs; and
- natural fluctuations in the position of the marine tidal delta.

7.1 Summary of Proposed Actions

- Liaise with landholders around the foreshore of Woolgoolga Lake to address impact to aquatic habitats.

Elevated sediment delivery from the catchment has been identified as a potential contributor (in addition to natural variables) to fluctuations in seagrass cover in Woolgoolga Lake. Follow strategies to reduce the inputs of sediment from the catchment (see **Strategy 2** actions) to maximise the opportunities for the recruitment of seagrass to the system.

7.1.1 Related Strategies

- **Strategy 1** Entrance Management to Address Water Quality, Sedimentation and Flooding.
- **Strategy 2** Stormwater Management and Pollutant Inputs from the Catchment.
- **Strategy 3** Foreshores and Riparian Areas.
- **Strategy 4** Elevated Turbidity, Total Nitrogen and Chlorophyll-a Values.
- **Strategy 5** Impacts of Climate Change on Estuary Ecology.
- **Strategy 6** Diminishing Fish Stocks.
- **Strategy 9** Water Quality Impacts Associated with Climate Change and Sea Level Rise.

7.1.2 Objectives Addressed

- Improve the Condition and Extent of Aquatic Habitats.
- Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise.

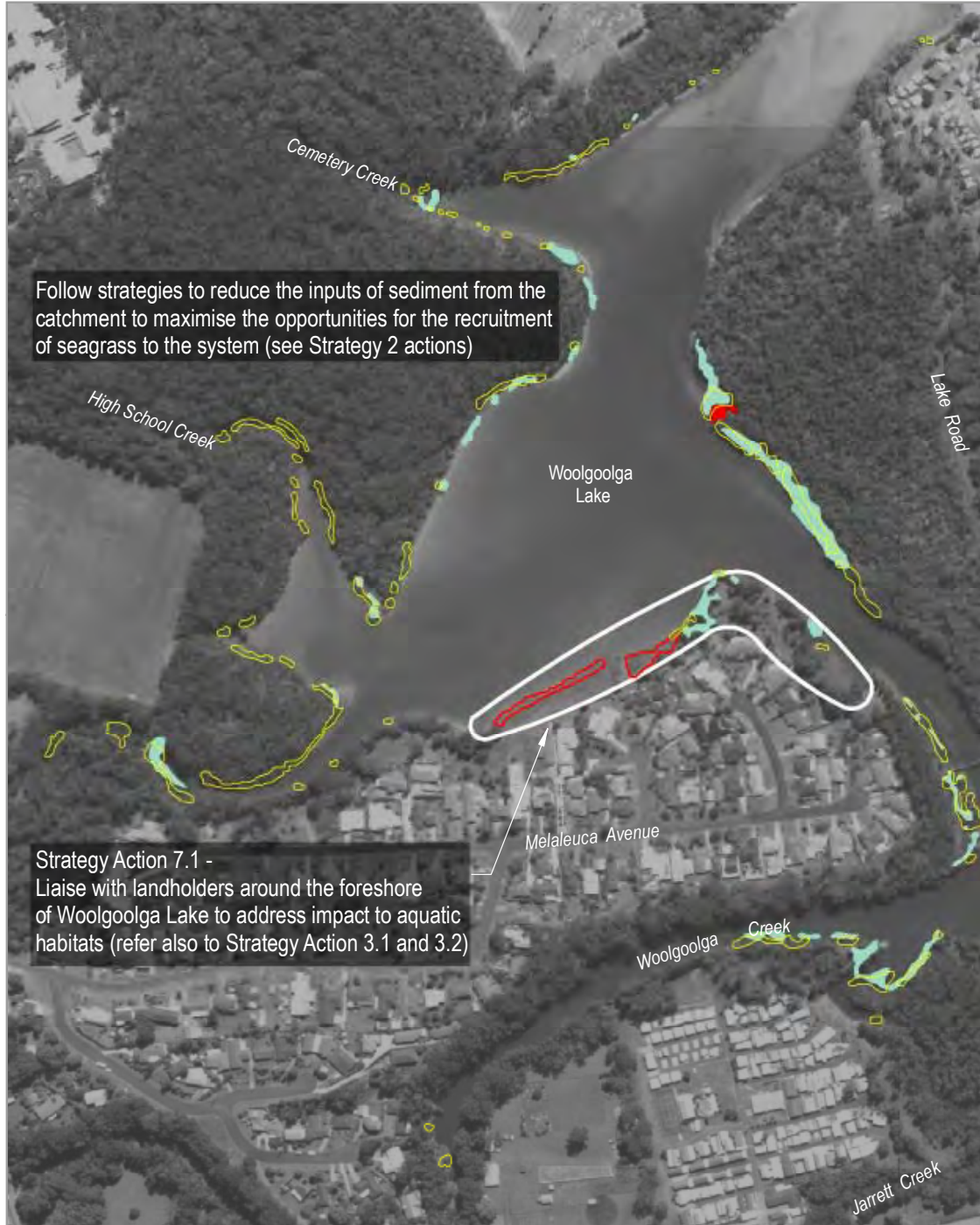
7.2 Details of Proposed Actions

Strategy Action 7.1				
Liaise with landholders around the foreshore of Woolgoolga Lake to address impact to aquatic habitats				
Background:				
<p>There are some residential areas that back onto the Woolgoolga Lake foreshore, particularly in the south eastern corner of the lake and around the confluence with Woolgoolga Creek. Landholder actions that may disturb sensitive saltmarsh and mangrove colonies in these areas include mowing, watering, vegetation removal and pruning, creating pathways for access and drainage activities.</p>				
Specific Tasks				
<ul style="list-style-type: none"> ▪ Develop a liaison strategy in consultation with NSW Primary Industries (Fisheries) and Solitary Islands Marine Park to address the issue of land maintenance impacts (e.g. mowing) on aquatic habitats at key locations around the estuary such as the southern foreshores of the lake. This liaison strategy would include an educational component and may form part of Strategy Action 3.1 and 3.2. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 - 5	Staff time	<ul style="list-style-type: none"> ▪ CHCC operating budget. ▪ MPA - SIMP operating budget 	Routinely check mowing practices, embankment stability and access breaches along foreshore as part of park maintenance

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: June 2012

Source of base data: Colts Harbour City Council and Department of Primary Industries

Information shown is for illustrative purposes only



LEGEND

- Saltmarsh (Department of Primary Industries - 2011)
- Saltmarsh (Comprehensive Coastal Analysis - 2004)
- Mangrove (Department of Primary Industries - 2011)
- Mangrove (Comprehensive Coastal Analysis - 2004)



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Strategy 8 - Environmental Weeds

A variety of terrestrial habitats of high conservation value have been identified within riparian zones of Woolgoolga and Poundyard Creek. However, riparian weed mapping in the two creeks undertaken in January 2011 identified the presence of four environmental weed species listed as priority weeds in the *Northern Rivers Invasive Plants Action Strategy 2009-2013 (NRIPAS: Oakwood, 2009)*. Environmental weeds degrade the native riparian vegetation, reducing its ecological value and in some cases potentially impacting upon bank stability and other estuary values including recreational amenity and aesthetics.

The restoration of riparian vegetation is listed among the goals of the NRCMA Catchment Action Plan. Additionally, the Coffs Harbour Settlement Strategy lists the enhancement of riparian corridors as a key strategy for the Woolgoolga area to provide ecological links between coast and hinterland (Coffs Harbour City Council, 2011a).

This strategy is aimed at the protection and rehabilitation of native riparian vegetation communities with high ecological or conservation value where degradation through weed infestation has occurred. The strategy focuses on environmental weeds species identified in the NRIPAS as being Priority C or above.

8.1 Summary of Proposed Actions

- Develop a weed management strategy which prioritises areas of riparian foreshore to be treated and priority weeds to be targeted.
- Utilise specialist bush regeneration contractors to undertake primary weed control in priority areas.
- Foster a local *Bushcare* group to undertake the secondary control or follow-up maintenance of areas treated by contractors.

8.1.1 Related Strategies

- **Strategy 3** Foreshores and Riparian Areas.
- **Strategy 13** Visual Amenity.

8.1.2 Objectives Addressed

- Restore terrestrial habitats of high ecological or conservation value.
- Enhance, protect and restore natural values to foreshore areas.
- Preserve and enhance the natural appearance of the lake particularly along the foreshores.

8.2 Details of Proposed Actions

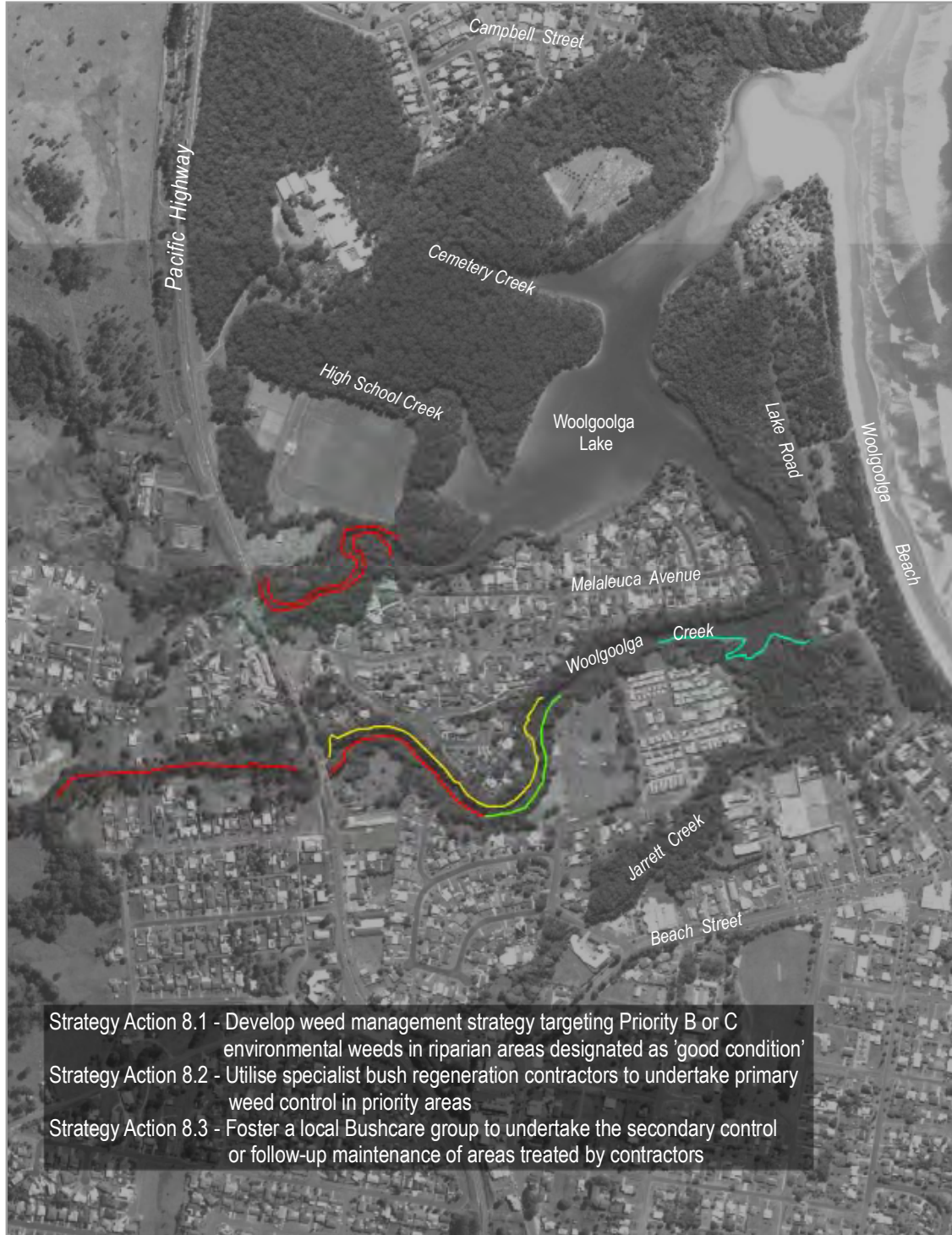
Strategy Action 8.1				
Develop a weed management strategy which prioritises areas of riparian foreshore to be treated and priority weeds to be targeted.				
Background:				
Weed mapping undertaken in January 2011 identified the presence of environmental weeds in the upper reaches of Woolgoolga and Poundyard Creeks (GeoLINK <i>et al.</i> , 2011a). The main species identified included groundsel bush, winter cassia, camphor laurel, and pink lantana.				
According to the <i>Northern Rivers Invasive Plants Action Strategy 2009-2013 (NRIPAS: Oakwood, 2009)</i> , groundsel bush is the highest priority (Priority B) invasive weed species identified during the field assessment. The Strategy also identifies lantana (Priority C) and camphor laurel (Priority D) as priority weeds in riparian landscapes, and winter cassia (Priority C) in coastal landscapes.				
Weed control is a long-term and costly management action and so it is recommended that areas with important estuary values be targeted as a priority.				
Illustration 8.1 identifies reaches where the riparian vegetation has been mapped as being in good to very good condition but where environmental weeds identified as either Priority B or C under the NRIPAS were also identified (i.e. in this catchment: groundsel bush, senna/winter cassia, or lantana). These reaches are considered to be the highest priority for weed control for the next 5 years under this CZMP and should be the focus of the Weed Management strategy for Woolgoolga Creek/Lake and Poundyard Creek.				
Specific Tasks				
It is recommended to develop a strategy based on existing mapping which:				
<ul style="list-style-type: none"> ▪ sets clear objectives for weed management along the estuary over a 5 year timeline; ▪ identifies priority areas for control efforts; ▪ defines responsibilities for control works; ▪ outlines appropriate methods for control works in estuarine environments; ▪ estimates the number of hours required for primary control works and estimates hours required for maintenance over the 5 year time period; ▪ outlines a strategy for raising community awareness of actions which can contribute to the spread of environmental weeds along the estuary; ▪ identifies funding sources; and ▪ sets monitoring and evaluation criteria. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC Related Agencies: <ul style="list-style-type: none"> ▪ NRCMA; ▪ Landcare. 	Years 1 - 2	Strategy development: \$5,000 if done external to CHCC.	NRCMA will fund the development of a recognised NRM Plan up to a total cost of \$5000.	The benchmark for this Action is the development of a recognised NRM Plan for the Management of priority weed species in areas of Woolgoolga and Poundyard Creeks.

Strategy Action 8.2				
Utilise specialist bush regeneration contractors to undertake primary weed control in priority areas.				
Background:				
<p>Estuarine and riparian areas are highly sensitive environments. As such, weed control work in these environments needs to be undertaken by specialist bush regenerators with skills in plant identification and knowledge of appropriate methods of control of weeds near waterways (especially where chemical control methods are to be used). In addition, such areas can be hazardous to workers, so it is essential that appropriate OHS strategies are implemented to ensure control works are undertaken in a safe manner.</p>				
Specific Tasks				
<ul style="list-style-type: none"> ▪ Priority areas for weed control, species to be targeted, appropriate methods to be used, total available contract hours, and monitoring and evaluation actions/maintenance are to be defined in the Weed Management Strategy developed in Strategy Action 8.1 above. ▪ Priority works should where possible be scheduled into the operations/works plan of Council's Bush Regeneration team, alternatively specialist contractors could be engaged where funding is available. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
<p>Lead Agency:</p> <ul style="list-style-type: none"> ▪ CHCC - Weeds Officer to provide oversight. <p>Related Agencies:</p> <ul style="list-style-type: none"> ▪ NRCMA; ▪ Landcare. 	Years 2 – 5	<p>Subject to development of the Weeds Management Strategy under Strategy Action 8.1 above.</p> <p>If external contractors are to be used, funds required is subject to the Weed Management Strategy but initially estimated at 400 hours per year @ \$35/hr (\$14,000/yr) over 5 years.</p>	<ul style="list-style-type: none"> ▪ NRCMA funding for implementation of recognised NRM Plans. ▪ Environmental Trust Restoration and Rehabilitation grants. ▪ Grants through NSW Government for weed control works on Crown Lands. ▪ CHCC Environmental Levy. 	The benchmark for this Action is the engagement of specialist contractors to control priority weeds in areas identified in the Weed Management Strategy developed in Strategy Action 8.1

Strategy Action 8.3				
Foster a local Bushcare group to undertake the secondary control or follow-up maintenance of areas treated by contractors.				
Background: The effective control of environmental weeds requires a long-term and consistent approach. To be successful, the initial control works undertaken by the CHCC team or specialist contractors needs to be followed by periodic maintenance to ensure areas cleared of weeds do not become re-infested by regrowth or new weed seedlings. A model that has worked in many parts of the North Coast region has been to support local care groups operating under the Landcare umbrella. Small scale funding and support in the form of insurance coverage and tools is often available through the Landcare network. Group activities are also often part funded via NRCMA small grants (where a recognised NRM Plan exists), via CHCC Environmental levies, Environmental Trust grants, etc.				
Specific Tasks Liaise with Coffs Harbour Landcare to determine the appropriate actions for establishing a Woolgoolga Creek/Woolgoolga Lake Care group.				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC. Related Agencies: <ul style="list-style-type: none"> ▪ NRCMA; ▪ Landcare. 	Long term commitment required to support community groups	Dependent on activities, but generally limited to provision of tools, consumables, and support.	Support available through Coffs Landcare Network. Funding available through NRCMA where a recognised NRM plan exists (such as that formed under Strategy Action 8.1) any other grants available from time to time such as Environmental Trust Community Bush Regeneration and/or Restoration and Rehabilitation Grants. CHCC Environmental Levy	The benchmark for this action is the successful formation of a Woolgoolga Creek Care group which includes as its activities the long term maintenance of high conservation value riparian vegetation communities.

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: June 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



LEGEND

- Riparian vegetation in good condition but with groundsel, winter cassia and lantana present
- Riparian vegetation in good condition but with lantana present
- Riparian vegetation in good condition with mangrove community but with lantana present
- Riparian vegetation in good condition with winter cassia and lantana present



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Strategy 9 - Climate Change Impacts on Water Quality

Forecast climate change and sea level rise scenarios are likely to result in a number of changes to water quality processes in ICOLLs such as Woolgoolga Lake. Some of the impacts will be direct, such as changes to average water temperature, whilst some will be indirect, following on from changes to physical processes such as hydrodynamics (Haines 2006). Climate change scenarios may also result in an intensification of existing issues with water quality.

9.1 Summary of Proposed Actions

Addressing current issues in accordance with **Strategy Action 1.2** and **Strategy 2** actions will be the best preparation for the impacts of climate change on water quality. No further actions are proposed to address this issue.

9.1.1 Related Strategies

- **Strategy 1** Entrance Management.
- **Strategy 2** Stormwater Management and Catchment Pollutants.
- **Strategy 4** Water Quality.
- **Strategy 5** Climate Change Impacts on Estuary Ecology.
- **Strategy 7** Aquatic Habitats.

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Strategy 10 - Water Quality Monitoring

The collection of water quality data is an important aspect of overall estuary management. When collected in a suitable fashion, water quality data informs managers of:

- typical and abnormal processes occurring in the waterway;
- risks to public safety associated with recreational uses of the estuary;
- risks to public safety associated with the consumption of aquatic foods;
- potential risks to aquatic ecosystems;
- trends with respect to the 'health' of the aquatic system; and
- the impacts of soil, water and other water quality related management strategies implemented throughout the catchment.

The long term dataset available for Woolgoolga Lake is not detailed or consistent enough to provide clear information about a number of the above listed items.

10.1 Summary of Proposed Actions

- Continue to implement the Ecohealth water quality monitoring program for Woolgoolga Lake.

10.1.1 Related Strategies

- **Strategy 2** Stormwater Management and Catchment Pollutants.
- **Strategy 4** Water Quality.
- **Strategy 9** Water Climate Change and Sea Level Rise Impacts on Water Quality.
- **Strategy 15** Residues from the 1989 Dieldrin/Aldrin Spill.

10.1.2 Objectives Addressed

- Improved water quality.
- Improve the monitoring of water quality.

10.2 Details of Proposed Actions

Strategy Action 10.1				
Continue to implement the Ecohealth water quality monitoring program for Woolgoolga Lake.				
<p>Background:</p> <p>The Ecohealth program outlines a framework for the development of a catchment-based aquatic health monitoring program in the Northern Rivers CMA region to provide consistency in monitoring and reporting, and establish the partnerships required for local and regional participation in the sampling program, identification of appropriate management actions and communication of outcomes. The Ecohealth program integrates information from the NSW Monitoring, Evaluation and Reporting (MER) Program, NSW State of Environment (SoE) reports, and a range of other reporting programs.</p> <p>Woolgoolga Lake is currently included in the Ecohealth water quality monitoring program. However, the combined water quality dataset for Woolgoolga Lake has been identified as lacking in continuity and detail. Continuation of the Ecohealth water quality monitoring program for Woolgoolga Lake will assist in supplementing the current water quality dataset.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Continue to implement the Ecohealth water quality monitoring program for Woolgoolga Lake with a review of: <ul style="list-style-type: none"> – appropriate temporal and spatial scales for sampling; and – a comprehensive list of parameters that will add to the understanding of the health of Woolgoolga Lake; – the issue of pesticides and herbicides used in the catchment and the 1989 spill of Dieldrin and Aldrin (refer to Strategy 15). 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC Related Agencies: <ul style="list-style-type: none"> ▪ NRCMA; ▪ OEH; ▪ MPA - SIMP 	Ongoing	\$20,000 every 4 years	<ul style="list-style-type: none"> ▪ CHCC operating budget. ▪ MPA – SIMP: in kind assistance 	Reporting every 4 years in line with SoE reporting

Strategy 11 - Recreational Facilities and Opportunities

This strategy complements the objectives and proposed actions of **Strategy 3** – Foreshores and Riparian Areas which aim to enhance and protect the natural values of the lake.

Woolgoolga Lake offers a range of desirable assets including high scenic amenity, close proximity to the town centre and a range of passive land and water based recreational opportunities. These attributes have in the past provided an incentive for tourist development which has raised concern for the potential impact on the natural values and visual character of the area.

A public picnic area along the southern foreshores of the lake adjacent to the Woolgoolga Lakeside Caravan Park offers a highly attractive and popular recreation destination for the local and wider community. Given the importance of the picnic area as an important community asset, a key objective of this strategy is to maintain and consolidate its existing function and capacity as the main focus for family, water and land based recreational activity around the lake.

Recreational activity elsewhere around the lake attracts quieter, individual activities such as walking, jogging and cycling. While tracks provide access to significant parts of the foreshore area, they are poorly connected and fail to offer a continuous network around the lake periphery and its tributaries. There is also a lack of a legible signage system to provide adequate guidance and information.

There is some concern amongst the community that littering around the foreshore area is a problem. Lack of responsibility with rubbish reflects poorly on community pride and impacts on the visual amenity and recreational experience for visitors.

11.1 Summary of Proposed Actions

In order to address the above issues the following actions are proposed:

- Woolgoolga Lakeside Reserve and Lakeside Caravan Park:
 - support non-motorised water craft use such as kayaks by providing easier access and a dedicated soft launching area along the foreshore of the lakeside picnic area;
 - continue to prohibit the use of recreational motorised watercraft in the lake; and
 - replace car tyres used to protect the southern bank near the entrance (adjoining the caravan park) with a more visually sympathetic, natural treatment; and
 - install an interpretive centre at the picnic area to enhance appreciation of the visual, cultural and environmental values of the lake and install low key signage at path junctions and at the start of walking tracks to facilitate site orientation and legibility.
- Walking Trails:
 - remove and revegetate unnecessary or duplicated path routes;
 - upgrade tracks to generate visual continuity with a consistent standard;
 - ensure that path routes are clearly defined and continuous between destinations;
 - replace and rationalise the existing signage system and highlight starting points with signs or maps to ensure legibility;
 - provide a continuous, universally accessible walking track along the southern shore of the lake and along one or both sides of Jarrett and Woolgoolga Creeks; and

- investigate opportunities to install a footpath through land belonging to Woolgoolga High School along the eastern foreshores of Woolgoolga Creek to provide a continuous public access route.
- Abandon previous proposals specified in the *Woolgoolga Lake and Lake Reserve Plan of Management* (John Allen & Associates and Bruce Fidge & Associates, 1992a) for further tourism development including cabin, caravan park and backpacker accommodation;
- Prevent unnecessary car movement into the western side of Lake Road;
- Replace and enhance existing park furniture over the longer term by adopting a consistent theme and suite of new fixtures and materials that are robust, attractive and complementary with the natural visual character of the setting
- Rubbish around the foreshores:
 - continue to provide appropriate rubbish disposal and removal facilities in high use foreshore areas; and
 - organise foreshore clean-up activities for the local community.

11.1.1 Related Strategies

- **Strategy 3** Foreshores and Riparian Areas
- **Strategy 13** Visual Amenity

11.1.2 Objectives Addressed

- Maintain and enhance the existing passive water and land based recreational experiences and opportunities in a manner that complements and sustains the natural values of the lake and its tributaries.
- Encourage low key recreational activities that are compatible with each other and the natural environment.
- Enhance, protect and restore natural values to foreshore areas.
- Preserve and enhance the natural appearance of the lake particularly along the southern foreshores adjacent to existing residential development.
- Optimise the attractive outlook across the lake and creeks from path routes, recreation areas and other destinations for public enjoyment.

Strategy Action 11.2:
Walking Trails
 - Upgrade tracks to generate visual continuity with a consistent standard
 - Ensure path routes are clearly defined and continuous between destinations
 - Replace and rationalise the existing signage system with appropriate and consistent directional, identification and informational signs and maps at key locations to improve pedestrian legibility, orientation, site interpretation and enjoyment of the lake environment generally. Highlight starting points of tracks with signs or maps for optimal legibility

Strategy Action 11.4:
Organise foreshore clean-up activities for the local community

Strategy Action 11.1:
Continue to prohibit the use of recreational motorised watercraft in the lake

Strategy Action 11.2:
Investigate opportunities for a footpath through land belonging to Woolgoolga High School along the eastern foreshores of Woolgoolga Creek to provide a continuous public access route

Strategy Action 11.2:
Remove and revegetate unnecessary or duplicated path routes

Strategy Action 11.1:
Replace and enhance existing park furniture over the longer term by adopting a consistent theme and suite of fixtures and materials complementary with the natural setting

Strategy Action 11.1:
Support non-motorised water craft use such as kayaks by providing easier access and a dedicated soft launching area

Strategy Action 11.4:
Continue to provide appropriate rubbish disposal and removal facilities in high use foreshore areas

Strategy Action 11.3:
Prevent unnecessary car movement into the western side of Lake Road

Strategy Action 11.2:
Provide a continuous, universally accessible walking track along the southern shore of the lake and along one or both sides of Jarrett and Woolgoolga Creeks

Strategy Action 11.3:
Abandon proposals for tourism accommodation development specified in previous Plan of Management



LEGEND
 Crown land reserves



11.2 Details of Proposed Actions

Strategy Action 11.1

Maintain and improve facilities that support existing passive recreational activities at Woolgoolga Lakeside Reserve and along the foreshores of the Lakeside Caravan Park.

Background:

The Woolgoolga Lakeside Reserve occupies a prime location on the southern foreshores of the lake and offers a well-developed and highly popular recreation destination for the local and wider community. The site enjoys a large grassed open space with remnant shade trees and a protected northerly / westerly view over the lake. It also offers a long open foreshore with easy access for swimming and soft launching for canoes and kayaks. Use of motorised watercraft on the lake is prohibited ensuring that potential conflicts with other passive water based recreational users are avoided. Picnic facilities, barbeques, toilets, a playground, easy car access, parking and maintained open spaces cater to high number of visitors and family groups. The facilities and park furniture, while providing a good if basic level of comfort, have a tired appearance and do not follow a consistent theme.

Given the role and value of the picnic area as a community asset, a key objective of this strategy is to maintain and consolidate the existing function and capacity of the site as the main focus for family, water and land based recreational activity around the lake. Opportunities should also be explored to enhance the comfort and visual appeal of the site with higher standard facilities.

The following range of tasks is recommended to address the issues identified at the Woolgoolga Lakeside Reserve Area. Some of the tasks may relate to Crown Reserve No. 63076 for Public Recreation and Resting Place – managed by Council as the Reserve Trust Manager for the Woolgoolga Beach Reserve Trust. To facilitate the implementation of these tasks, a design for a new formalised water edge structure has been prepared (refer **Appendix B**).

Specific Tasks

The following generic and site specific tasks are recommended:

- Seek relevant licences with respect to the following works on Crown Lands.
- Maintain and support existing passive recreational uses within the reserve with a focus on family oriented water and land-based activities. Replace and enhance existing park furniture over the longer term by adopting a consistent theme and suite of new fixtures and materials that are robust, attractive and complementary with the natural visual character of the setting.
- Formalise access to the central and most popular section of the lake foreshore (as described and costed under **Strategy Action 3.5**. Refer to design proposal **Appendix B**).
- Maintain easy access and a dedicated soft launching area along the foreshore for non-motorised watercraft such as canoes and kayaks. Monitor use levels and formalise water access if necessary if use levels become unsustainable and damage to foreshore vegetation occurs. Continue to prohibit the use of motorised watercraft.
- Undertake periodic surveys to record and monitor use levels and satisfaction with recreational facilities and opportunities.
- Install an interpretive centre at the picnic area to enhance appreciation of the visual, cultural and environmental values of the lake and install low key signage at path junctions and at the start of walking tracks to facilitate site orientation and legibility.
- Install new planting and a defined border around all mown grass areas (as described and costed under **Strategy Action 3.4**).
- Modify the existing landscape plan for the reserve to incorporate the above actions (as described and costed under **Strategy Action 3.3**).

Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 - 5	<ul style="list-style-type: none"> ▪ Upgrade park furniture and signage: \$20,000 ▪ Visitor surveys: CHCC staff time 	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ Sport and Recreation Facility Grant program 	<ul style="list-style-type: none"> ▪ Visitor survey on a 2-yearly basis ▪ Routine checks by park management to ensure watercraft compliance

Strategy Action 11.2

Improve the path network around the foreshores and tributaries of the lake

Background:

Recreational walking, jogging and cycling are key activities around the lake. These activities are facilitated by a network of boardwalks, bridges and formed and unformed bush tracks of varying standard and surface finish (refer to **Illustration 11.1**).

Across the northern slopes of the lake, a haphazard array of simple tracks, paths and steps provide access to the northern shoreline and to various destinations to the west.

In the south, paths and bridges across Woolgoolga and Jarrett creeks provide important linkages to surrounding areas for nearby residents who have limited access options because of an absence of through streets. A bush track extending from the Lakeside Reserve to the Woolgoolga Creek pedestrian bridge to the west provides an attractive walking route through riparian vegetation and past a significant flying-fox colony and an attractive lakeside vantage point. Another unformed route from the reserve provides pedestrian access to the lake entrance and beach to the east. A cycle route formed by line marking provides a connection along Lake Road between the reserve and the town centre.

Sections of sealed paths create linkages with streets to create a continuous pedestrian / cycle route around the western edge of the lake. This important route links residential communities with key destinations such as the high school, sports ground, lakeside picnic area and the town centre in the south.

While there are numerous tracks within the reserve, they generally lack continuity and legibility. Some are difficult to find particularly where they begin some distance from nearby streets. A key objective of this strategy is to build on the existing path network to optimise the valuable recreational contribution it makes and to complement other recommendations to improve the visual and environmental attributes of the lake.

This strategy relates to a variety of Crown Reserve areas.

Specific Tasks

The following generic and site specific tasks are recommended:

- Prepare an overall plan that sets out the path network including existing and proposed new sections. Development of the plan should include the identification of a consistent design theme involving a palette of surface treatments and street furniture and construction standards. The system should aim to be universally accessible and integrate with existing cycle / footpath routes that surround or pass through the area.
- Seek relevant licences with respect to the following works on Crown Lands.
- Replace and rationalise the existing signage system with appropriate and consistent directional, identification and informational signs and maps at key locations to improve pedestrian legibility, orientation, site interpretation and enjoyment of the lake environment generally. Highlight starting points of tracks with signs or maps for optimal legibility.

<ul style="list-style-type: none"> ▪ Consolidate walking trails around the northern side of the lake and remove and revegetate unnecessary or duplicated routes. Upgrade, extend or replace tracks to create the most efficient, accessible system. ▪ Provide a continuous series of universally accessible walking tracks along the southern shore of the lake and along one or both sides of Jarrett and Woolgoolga Creeks. The defined edge proposed between mown land and riparian vegetation along the southern foreshore of Woolgoolga Lake adjacent to Sunset Lakes Estate (refer to Strategy Action 3.1) would ideally be replaced by a path in the future. The path would then act as the boundary between mown land and riparian vegetation along this section of foreshore. Incorporate boardwalks and low key surface treatments that respond appropriately to site conditions. Provide viewing platforms and rest stops with seating to optimise site attributes and to enhance the recreational experience of users. Connect tracks to existing access routes and streets while ensuring route selection has due regard for privacy into surrounding residences. Seek to establish new paths as a defined maintenance boundary between mown grass and riparian vegetation where applicable. ▪ Investigate opportunities to install a footpath through land belonging to Woolgoolga High School to provide a continuous public access route along the eastern foreshores of Woolgoolga Creek. ▪ Upgrade the pedestrian connection between the Woolgoolga Lakeside Reserve and the lake mouth to create a more legible public access route. Seek to establish new paths as a defined maintenance boundary between mown grass and riparian vegetation. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC Related Agencies: <ul style="list-style-type: none"> ▪ DPI – Catchments and Lands (Crown Lands); 	Years 5 – 10	<ul style="list-style-type: none"> ▪ Cycle path plan: CHCC staff. ▪ New signage system: \$15,000. ▪ Upgraded tracks - north side \$5,000. ▪ Upgraded tracks – south side: \$20,000. ▪ High school path: \$2,000. ▪ Lake mouth path: \$2,000. 	<ul style="list-style-type: none"> ▪ Caring for Our Country. ▪ Sport and Recreation Facility Grant program. ▪ CHCC Environmental Levy. 	Check for preventative and corrective maintenance requirements on an ongoing basis once path and sign systems are completed.

Strategy Action 11.3				
Modify existing and proposed uses along Lake Road to ensure that environmental values are protected.				
Background:				
<p>This strategy relates primarily to Crown Reserve No. 83057 for Future Public Requirements – managed by DPI – Catchments and Lands (Crown Lands) and to a lesser extent Crown Reserve No. 63076 for Public Recreation and Resting Place – managed by Council for Woolgoolga Beach Reserve Trust.</p> <p>The area bound by Lake Road and the eastern foreshores of Lake Woolgoolga consist of fragmented remnant vegetation, weed growth and grassed open space. It is readily accessed by vehicles and is used for supplementary car parking for the picnic areas on the eastern side of the road. This has caused minor damage to the grass surface giving the area an unkempt appearance. It is also understood that the Rainbow Bee-Eater has established roosting sites with the grassed areas despite a lack of protection from public and maintenance vehicles.</p> <p>A range of tourist development proposals were recommended for the area by the former draft <i>Woolgoolga Lake and Lake Reserve Plan of Management</i> (John Allen & Associates and Bruce Fidge & Associates, 1992). This included cabin, caravan park and backpacker accommodation of which none have been built.</p> <p>In reviewing previous and current uses of the area, it is now the preferred strategy to restore the natural values as a primary objective in order to enhance the environmental attributes of the reserve as a whole.</p>				
Specific Tasks				
<ul style="list-style-type: none"> ▪ Abandon previous development proposals specified in the <i>Woolgoolga Lake and Lake Reserve Plan of Management</i> (John Allen & Associates and Bruce Fidge & Associates, 1992a). ▪ Seek relevant licences with respect to the following works on Crown Lands. ▪ Create a barrier along Lake Road to prevent unnecessary car movement across the open spaces. Provide 90 degree car parking on grassed sections adjacent to Lake Road where necessary as an overflow for the formal car parks on the eastern side of the road. ▪ Remove weed and undertake a revegetation program to restore cleared areas. Identify and undertake appropriate management of existing grassed areas to maintain and protect nesting locations for the Rainbow Bee-Eater. Engage a local Bushcare group for follow-up maintenance of revegetated areas (refer to Strategy Action 8.3). 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ Lake Road Reserve Trust for works relating to Reserve 83057 ▪ Woolgoolga Beach Reserve Trust for works relating to Reserve 63076 Related Agencies: <ul style="list-style-type: none"> ▪ CHCC; ▪ DPI – Catchments 	<ul style="list-style-type: none"> ▪ Year 1: abandon previous development proposals specified in the <i>Woolgoolga Lake and Lake Reserve Plan of Management</i> ▪ Years 1 – 5: create a barrier along Lake Road to prevent unnecessary car movement 	<ul style="list-style-type: none"> ▪ Crown Lands / CHCC staff time ▪ \$5,000 	<ul style="list-style-type: none"> ▪ Caring for Our Country. ▪ CHCC Environmental Levy. ▪ NRCMA. 	The benchmark for this action is implementation of the barriers. Council to routinely check revegetated areas for weeds

and Lands (Crown Lands)	<ul style="list-style-type: none"> ▪ Years 1 – 5: restore cleared areas / manage Rainbow Bee-Eater nesting locations 	<ul style="list-style-type: none"> ▪ Included in above cost 		
<p>Strategy Action 11.4 Address Rubbish Around the Foreshores</p>				
<p>Background: The community consultation phase identified rubbish around the foreshore areas as an issue impacting on the recreational experience offered by Woolgoolga Lake.</p> <p>Woolgoolga Lake and Woolgoolga Creek are already registered 'clean up' sites on the Clean Up Australia website. Woolgoolga High School Student Environment Council is also involved in cleaning up around Woolgoolga Lake on Clean Up Australia day as part of their ongoing environmental projects.</p>				
<p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Continue to provide appropriate rubbish disposal and removal facilities in high use foreshore areas. ▪ Undertake targeted removal when rubbish is encountered during routine park maintenance. ▪ Liaise with Clean Up Australia site coordinators to ensure that the area is a focus of their activities and provide support as necessary to facilitate the best outcome from their annual event. ▪ Raise public awareness of the need for litter prevention by including discrete messages on signage systems. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Ongoing	CHCC staff time for liaison, maintenance and Clean Up Australia support	NSW Government Litter Prevention Program – grants managed by the Sustainability Programs Division of OEH	Liaise annually with Clean Up Australia site coordinators following Clean Up Australia day

Strategy 12 - Flying-Fox Camp

A Grey-headed Flying-fox (*Pteropus poliocephalus*) maternity camp referred to as the 'camp' occurs along the banks of Woolgoolga Lake. This species is listed as vulnerable under both the Australian Commonwealth Environment Protection and Biodiversity Conservation Act 1999 and the NSW Threatened Species Conservation Act 1995. The extent of the reserve area covers 6.8 ha, however the effective roost area has been reduced due to weed encroachment and degradation to approximately 1 ha (Our Living Coast 2010).

The camp is located on Crown Land and managed by Coffs Harbour City Council under the Woolgoolga Lake Park Reserve. The area containing the camp is located between the eastern bank of Woolgoolga Lake and Lake Road. The camp and surrounds are currently zoned Open Space 6a with a Low Density Residential 2a to the south and south west.



Concern has been expressed about the camp during the project consultation phase. Concerns have related to impacts of excrement on water quality, odours, and impacts on vegetation in the roosting area. Community comments also included support for maintaining the camp.

Council plans to develop a management strategy with the objective of maintaining the camp over the long-term while achieving an equitable balance between conservation and the social, cultural, aesthetic and environmental values shared by the community (Our Living Coast 2010).

Other objectives of the management strategy include restoring the area's value as Secondary Koala Habitat, increase the area's value as a wildlife corridor and link to the Regional Park, enhance the Woolgoolga Lake riparian and coastal values and providing for community's needs in terms of recreation, education and interpretation of these values to ensure the long-term management of the camp.

12.1 Summary of Proposed Actions

It is considered the objectives of Council proposed management strategy for the flying-fox camp are consistent with the objectives developed for the Woolgoolga Lake estuary. Therefore the CZMP supports Council's development of the Flying-fox management strategy. The only proposed action regarding the flying-fox camp is:

- ensuring consistency between the Flying-fox management strategy and any related CZMP actions.

12.1.1 Related Strategies

- **Strategy 3** Foreshores and Riparian Areas.
- **Strategy 8** Environmental Weeds.
- **Strategy 11** Recreational Facilities and Opportunities.

12.1.2 Objectives Addressed

- Restore terrestrial habitats of high ecological or conservation value.
- Maintain the flying-fox camp over the long-term while achieving an equitable balance between conservation and the social, cultural, aesthetic and environmental values shared by the community.
- Enhance, protect and restore natural values to foreshore areas.

12.2 Details of Proposed Actions

Strategy Action 12.1				
Ensure consistency between the Flying-fox management strategy and any related CZMP actions				
<p>Background:</p> <p>Council plans to develop a management strategy for the Flying-fox camp at Woolgoolga Lake. The objective of the management strategy is to maintain the camp over the long-term while achieving an equitable balance with the values shared by the community. Other objectives of the management strategy include restoring the area's value as Secondary Koala Habitat, increase the area's value as a wildlife corridor and link to the Regional Park, enhance the Woolgoolga Lake riparian and coastal values and providing for community's needs in terms of recreation, education and interpretation of these values to ensure the long-term management of the camp.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Ensure development of the Flying-fox management strategy considers any related CZMP actions (e.g. actions for Strategy 3, 8 and 11). Amend CZMP actions where appropriate to ensure consistency between the CZMP and Flying-fox management strategy. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	1 – 2 years	CHCC staff time for internal liaison.	Nil	Review draft document of Flying-fox management strategy to ensure consistency between the CZMP and Flying-fox management strategy

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: June 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



Strategy Action 12.1 - Ensure consistency between the Flying-fox management strategy and any related CZMP actions



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Strategy 13 - Visual Amenity

Woolgoolga Lake Reserve is recognised for its high scenic amenity and as a key natural asset to the local community. The scenic values of Woolgoolga Lake include:

- a continuous edge of natural vegetation around the majority of the lake foreshores, often extending well back and rising up adjoining slopes to produce an attractive natural skyline and backdrop to views across the lake;
- the surrounding ridges enclose and help to protect the lake, further enhancing the microclimate and visual experience to visitors; and
- the popular Woolgoolga Lakeside Reserve area beside the Lakeside Caravan Park provides open grassed spaces beneath remnant trees producing a highly attractive recreation area with panoramic views across the lake to the north and west.

This strategy aims to highlight the importance of the natural environment in achieving this amenity and in identifying ways to mitigate the visual impacts of surrounding residential development, infrastructure provision and maintenance practices to achieve a more sympathetic balance with the natural values.

13.1 Summary of Proposed Actions

Preserve and enhance the natural values of Woolgoolga Lake to maintain its high level of visual amenity by:

- removing car tyres along the southern bank adjoining the Lakeside Caravan Park and protect / reinstate riparian vegetation;
- review the method and type of edge reinforcement / erosion protection required along the northern shoreline and consider a more visually sympathetic solution when the existing timber wall requires replacement or upgrading
- investigate simple ways to mitigate the visual impact of the existing timber revetment wall along the northern shoreline (such as pocket planting of riparian vegetation immediately behind the wall or in front of the wall); and
- preserve the extent of continuous natural vegetation across the surrounding slopes and skyline of the lake to maintain the visual buffer to adjoining land uses such as the playing fields, RMS depot, cemetery and the southern residential fringe of Safety Beach. Restore native vegetation to impacted areas that have been unnecessarily cleared.

Previous strategy actions also contribute to preserving and enhancing the visual amenity of Woolgoolga Lake including:

- undertaking better management practices and restoring natural vegetation in poorly or inappropriately maintained areas within the Reserve (**Strategy 3** actions);
- installing new planting to mitigate the visual impact of built form in adjoining residential areas (**Strategy 3** actions);
- providing infrastructure and facilities that complement the natural appearance and values of the setting (**Strategy 11** actions);
- installing a consistent signage system (**Strategy Action 11.2**); and
- undertaking a more proactive litter prevention and removal program (**Strategy Action 11.4**).



13.1.1 Related Strategies

- **Strategy 3** Foreshores and Riparian Areas.
- **Strategy 11** Recreation Facilities and Opportunities.

13.1.2 Objectives Addressed

- Implement bank stabilisation and rehabilitation works in areas with important estuary values.
- Maintain and enhance existing passive water and land based recreational experiences and opportunities in a manner that complements and sustains the natural values of the estuary.
- Enhance, protect and restore natural values to foreshore areas.
- Optimise the attractive outlook across the lake and creeks from path routes, recreation areas and other destinations for public enjoyment.
- Undertake management practices and provide infrastructure and facilities that complement the natural appearance and values of the setting.

13.2 Details of Proposed Actions

Strategy Action 13.1	
Preserve and enhance the natural values of Lake Woolgoolga to maintain its high level of visual amenity.	
Background:	
<p>The natural environment of Woolgoolga Lake and its setting produce a high level of visual amenity that is enjoyed by a large number of visitors and the local residents. A key reason for the attractiveness of the setting is the continuity and dominance of the natural features. On the southern foreshores of the lake, however, there is a lack of natural vegetation to mitigate the visual impact of built form associated with the nearby residential neighbourhood. Elsewhere, weed growth, poor maintenance practices, rubbish deposition and provision of unattractive and poorly located infrastructure have also contributed to the loss of visual amenity. The objective of this management strategy is to maintain the dominance of the natural environment throughout the reserve and to restore or enhance areas where these values have been degraded.</p>	
Specific Tasks	
<ul style="list-style-type: none"> ▪ Seek relevant licences with respect to the following works on Crown Lands. ▪ Remove car tyres along the southern bank adjoining the Lakeside Caravan Park and protect / reinstate riparian vegetation to strengthen the banks and accept the effects of dynamic natural processes that may result in fluctuations in erosion and accretion of the foreshore banks. This action is to be undertaken in combination with Strategy Action 3.4 involving establishing a defined edge between mown land and riparian vegetation along the embankment and re-establishing riparian vegetation. This strategy relates to Crown Reserve No. 63076 for Public Recreation and Resting Place – managed by Council as the Reserve Trust Manager for the Woolgoolga Beach Reserve Trust. ▪ Review the method and type of edge reinforcement required along the northern shoreline and consider a more visually sympathetic solution when the existing timber wall requires replacement or upgrading. Investigate simple ways to mitigate the visual impact of this treatment such as pocket planting of riparian vegetation over the interim period. This strategy relates 	 

<p>to Crown Reserve No. 70416 for Public Recreation Management – managed by Council as the Reserve Trust Manager for the Woolgoolga Beach Reserve Trust.</p> <ul style="list-style-type: none"> ▪ Install new / supplementary street trees using locally indigenous species within the residential communities fronting the lake to mitigate the existing dominance of built form across the skyline (as described and costed under Strategy Action 3.2). ▪ Using locally indigenous species install new foreshore vegetation in carefully considered locations along the foreshores and surrounding residential areas adjacent to the southern edge of the lake (as described and costed under Strategy Action 3.1 and 3.2). Also provide low key site support and infrastructure where appropriate such as water-edge platforms to optimise views across the lake (as described and costed under Strategy Action 3.1). ▪ Preserve the extent of continuous natural vegetation across the surrounding slopes and skyline of the lake to maintain the visual buffer to adjoining land uses such as the playing fields, RTA depot, cemetery and the southern residential fringe of Safety Beach. Restore native vegetation to impacted or areas that have been unnecessarily cleared. ▪ Enhance the visual, cultural and environmental appreciation of the lake and its surrounding area by installing a coordinated system of interpretive signs at key locations along pedestrian access routes and at existing foreshore destinations and vantage points (as described and costed under Strategy Action 11.2). ▪ Replace and enhance existing park furniture within Woolgoolga Lakeside Reserve over the longer term by adopting a consistent theme and suite of new fixtures and materials (as described and costed under Strategy Action 11.1). ▪ Install new or replacement locally indigenous trees throughout the Lakeside Reserve picnic area as necessary to ensure that the visual character and dominance of existing trees is maintained (as described and costed under Strategy Action 3.4). ▪ Undertake measures to improve litter prevention and removal (as described under Strategy Action 11.4) 				
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Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC (CHCC as Reserve Trust Manager for car tyre removal)	1 - 2 years	<ul style="list-style-type: none"> ▪ Car tyre removal: \$2,000 assuming CHCC staff time ▪ Replace / modify timber wall: \$5,000 assuming CHCC staff time 	CHCC operating budget	Implementation of this action

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: August 2012
Source of base data: Coffs Harbour City Council




Strategy Action 13.1:
Preserve the extent of continuous natural vegetation across the surrounding slopes and skyline of the lake to maintain the visual buffer to adjoining land uses such as the playing fields, RTA depot, cemetery and the southern residential fringe of Safety Beach

Strategy Action 13.1:
Investigate simple ways to mitigate the visual impact of the existing treatment such as pocket planting of riparian vegetation over the interim period. Review the method of erosion protection when the existing timber wall requires replacement or upgrading and consider a more visually sympathetic solution

Strategy Action 13.1:
Remove car tyres and protect / reinstate riparian vegetation to strengthen the banks (undertaken in combination with Action 3.4)

LEGEND

 Crown land reserves



Strategy 14 - Dredging

Anecdotal evidence suggests Woolgoolga Lake was deeper in some locations in the past (around the 1970's), particularly in the mid to lower reaches. Community consultation has highlighted a perceived loss of recreational opportunity due to decreased waterway depth relative to this period.

Historical aerial photography indicates that water depths in 1943 were similar to the period from the 1990's to present. The aerial photography indicates deeper water depths in the 1960's and 1970's. This is considered to be due to very large flooding events in the 1960's and 1970's in combination with large ocean swell events which had the effect of removing a significant amount of marine derived sediment in the lower reaches of the lake. Aerial photographs in subsequent years show the gradual build-up / replenishment of this marine sand and subsequent reduced water depths in the vicinity of the lake picnic area / lake entrance.

Fluctuations in the amount of marine sediment in the estuary and consequent fluctuations in water depths are a natural trend. The major source of sedimentation in the estuary is from marine derived sands which are naturally pushed into the estuary through the entrance by tidal flows assisted by ocean currents and waves. Secondary sources include inputs from the broader catchment from erosion.

Infilling of the estuary by marine derived sands is a natural long-term process that is not easily reversed. Intervention works such as dredging are expensive and generally only achieve short-term benefits in respect to removal of sediment. In addition, dredging can have significant impacts on estuary processes, health, ecology and water quality, for example:

- dredging of marine delta shoals creates an increased sediment demand for infilling of the entrance which would result in a net depletion of sand on Woolgoolga Beach; and
- dredging of the deep mud basin in the lake can modify natural sediment processes and associated benthic metabolism and chemical processes thus degrading water quality and exacerbating eutrophication (Haines, 2006).

Therefore, this estuary management study does not recommend dredging on the basis of the following considerations:

- long-term fluctuations in water depths associated with infilling of the estuary by marine derived sands is a natural process that has occurred prior to the 1970's (water depths in 1943 were similar to present water depths based on aerial photography);
- dredging is expensive and generally only achieves short-term benefits in respect to removal of sediment;
- dredging can have significant impacts on water quality, estuary processes, health, and ecology;
- the lake is part of the Solitary Islands Marine Park and is listed as "Habitat Protection Zone" which has the objective of protecting habitats and reducing high impact activities (e.g. dredging); and
- an approval process involving NSW government agencies is required before dredging is undertaken and it is considered unlikely that dredging would be approved for Woolgoolga Lake for the primary purpose of increasing water depths for improved swimming amenity.

14.1 Summary of Proposed Actions

For reasons described above, no dredging activities are proposed under this Coastal Zone Management Plan for the Woolgoolga Lake estuary.

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Strategy 15 - Residues from the 1989 Dieldrin/Aldrin Spill

After a fish kill in Woolgoolga Lake in 1989 samples of dead fish revealed high levels of Dieldrin and Aldrin. Sediment samples indicated that a quantity of Dieldrin and Aldrin had been carried into the lake down a drain and the findings of follow up sampling resulted in the prosecution of a local pest control operator. Further sampling, 2 months later showed that Dieldrin levels had not dropped significantly. High levels of Dieldrin and Aldrin were also found in an oyster and a water bird from Woolgoolga Lake.

Water quality and sediment sampling undertaken in 1991 found only trace levels of Dieldrin and Aldrin in sediment and no detectable levels in water (Allen & Fidge 1992). Fish and oysters collected and analysed at the same time also had low levels.

15.1 Summary of Proposed Actions

In consideration of the 1991 findings, the elapsed period of over 20 years, the half-life of Dieldrin / Aldrin being about 2 – 8 years in soil, and the dispersal of sediment from flooding events in the elapsed period, it is considered there is potentially no remaining issue associated with the 1989 Dieldrin / Aldrin spill. However, as a precautionary measure it has been recommended that this issue is considered in the development of a water quality sampling program under **Strategy 10**. No further actions are proposed.

15.1.1 Related Strategies

- **Strategy 2** Stormwater Management and Catchment Pollutants
- **Strategy 10** Water Quality Monitoring

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Acronyms

AHD	Australian Height Datum
ANZECC	Australia and New Zealand Environment Conservation Council
APZ	Asset Protection Zone
ASS	Acid sulfate soils
CAP	Catchment Action Plan
CCA	Comprehensive Coastal Assessment
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CMSS	Catchment Management Support System
DO	Dissolved Oxygen
DPI	NSW Department of Primary Industries
EMS	Estuary Management Study
ICOLL	Intermittently Closed and Open Lake and Lagoon
LGA	Local Government Area
MER	Monitoring Evaluating and Reporting
MHL	Manly Hydraulics Laboratory
MPA	Marine Parks Authority
NRCMA	Northern Rivers Catchment Management Authority
NRIPAS	Northern Rivers Invasive Plants Action Strategy 2009-2013
OEH	Office of Environment and Heritage, NSW Department of Premier & Cabinet
OEH – PWG	Office of Environment & Heritage – Parks & Wildlife Group
SIMP	Solitary Islands Marine Park
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
WSUD	Water Sensitive Urban Design

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Appendix A

Entrance Management Policy Woolgoolga Lake Estuary

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Entrance Management Policy

Woolgoolga Lake Estuary

Draft for Public Exhibition

Prepared for: Coffs Harbour City Council
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Introduction

1.1 Reason for this Policy

The entrance to the Woolgoolga Lake estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Many ICOLL's are manually or artificially opened to the ocean by authorities to 'drain' the estuary for a range of reasons, often to reduce the impacts of flooding around the estuary foreshores. However, artificially opening ICOLL's can impact on estuary health. Therefore a policy is required to outline to Council if and when the entrance to Woolgoolga Lake estuary should be artificially opened.

1.2 The Purpose of this Policy

The purpose of this policy is to provide Council with criteria for initiating an artificial opening event and a procedure for artificial opening of the entrance of Woolgoolga Lake estuary.

1.3 Policy Statement

The Woolgoolga Lake Entrance Management Policy aims to:

- minimise interference with the natural opening and closing regime for Woolgoolga Lake estuary;
- minimise flooding of properties from elevated water levels in the estuary;
- minimise flooding of the local sewerage system from elevated water levels in the estuary;
- provide a procedure to address extreme water quality issues in the estuary;
- detail trigger levels for artificial opening of the estuary entrance;
- detail procedures and responsibilities for artificial opening of the estuary entrance; and
- details procedures for monitoring following an artificial opening event.

This policy will be implemented by Coffs Harbour City Council in consultation with the appropriate NSW Government agencies.

1.4 Area to Which this Policy Applies

The area covered by this policy is shown in **Illustration 1.1**. This policy applies to the catchment of the estuary which comprises the waterway, foreshores and land adjacent to the estuary up to the tidal limit of the tributary creeks and the extent of the drainage catchment directly contributing to the estuary waterways. The area relevant to this policy also includes the proposed access route along Woolgoolga Beach for excavator access to the estuary entrance.

1.5 Policy Context

This policy has been prepared as part of the Coastal Zone Management Plan (CZMP) for Woolgoolga Lake estuary. CZMP's for estuaries are prepared in accordance with Part 4A of the *Coastal Protection Act 1979* and the *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010). These guidelines require CZMP's for ICOLL's to include an entrance management policy.

A range of NSW legislation and policies are relevant to estuary management and the establishment of any entrance management policy and subsequent artificial opening procedures.

There may be a range of statutory approvals / licensing requirements that need to be sought in order to undertake entrance management activities, for example artificial opening. A range of approvals may be required due to potentially different land tenures, zonings and statutory provisions. These provisions may include Crown Lands licence under the NSW Crown Lands Act 1989, concurrence from NSW Fisheries for dredge and reclamation work on defined water land under the NSW Fisheries Management Act 1994, or other approvals and licences under the National Parks and Wildlife Act 1974 or the Marine Parks Act 1997.

In addition, the Environmental Planning and Assessment Act 1979 establishes the framework for development control and assessment in NSW. Certain activities may require approval under this Act and associated State Environmental Planning Policies (SEPP) (e.g. SEPP (Infrastructure) 2007). Certain works or activities may either require development consent or be exempt from requiring consent. In the case where works or activities may be exempt from requiring consent, a Review of Environmental Factors (along with all other relevant approvals / licences) would be required under Part 5 of the EP&A Act before works / activities can be carried out. This is addressed more fully in **Section 3** of this policy.

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GeoLINK
 environmental management and design

Woolgoolga Lake Entrance Management Policy
 1616534

Area to Which Policy Applies

Illustration 1.1

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Background

2.1 Entrance Management Issues

The key issues for entrance management are:

- flooding of the local sewerage system; and
- flooding of surrounding properties.

Secondary issues relate to some community desire for artificial opening of the entrance to 'flush' the lake to improve water quality and reduce sedimentation in the lake. These secondary issues are discussed further in **Section 2.1.4**.

2.1.1 Flood Levels

The highest recorded flood level in Woolgoolga Lake was reported as 2.1 m AHD in 1974 (Bewsher Consulting, 1989).

Flood levels for Woolgoolga Lake are dependent on the flood storage capacity of the lake, outlet conditions and ocean water levels. A 2012 flood study for Woolgoolga Lake (BMT, WBM, 2012) estimated the following peak 1% Annual Exceedance Probability (AEP) event flood levels (ie 1 in 100 year event) based on a peak ocean level of 2.4 m AHD and a berm height of 1.5 m AHD:

- 2.6 m AHD for the lake entrance; and
- 2.7 m AHD at the upstream end of the lake.

The entrance berm geometry has the most significant impact on the modelled flood levels in Woolgoolga Lake and the surrounding floodplain. A catchment derived flood event occurring when the entrance is closed will provide a much higher flood level in the lake than a similar one occurring with an open entrance (BMT, WBM, 2012:81-83). The impact of adopting a 1.5m berm over a 1.0m berm is around a 0.4m increase in flood level within Woolgoolga Lake and a 0.3m increase at the Jarrett Creek confluence. The impact of adopting a 1.5m berm over an open entrance condition is around a 1.0m increase in flood level within Woolgoolga Lake and a 0.6m increase at the Jarrett Creek confluence (BMT, WBM, 2012:92).

The 2012 flood study for Woolgoolga Lake considered potential impacts of future climate change for the 1% AEP design event. The most significant impact for Woolgoolga Lake will be from the impact of the predicted increase in berm height, which is in line with the 0.4m and 0.9m sea level rise for the 2050 and 2100 planning horizons (BMT, WBM, 2012:89).

Table 2.1 Flood Level Estimates – Woolgoolga Lake

	<i>Flood Levels for the Lake Gauge at the Upstream End of the Lake (m AHD)¹</i>		
	<i>Immediate²</i>	<i>2050³</i>	<i>2100⁴</i>
1% AEP design event	2.9	3.2	3.7

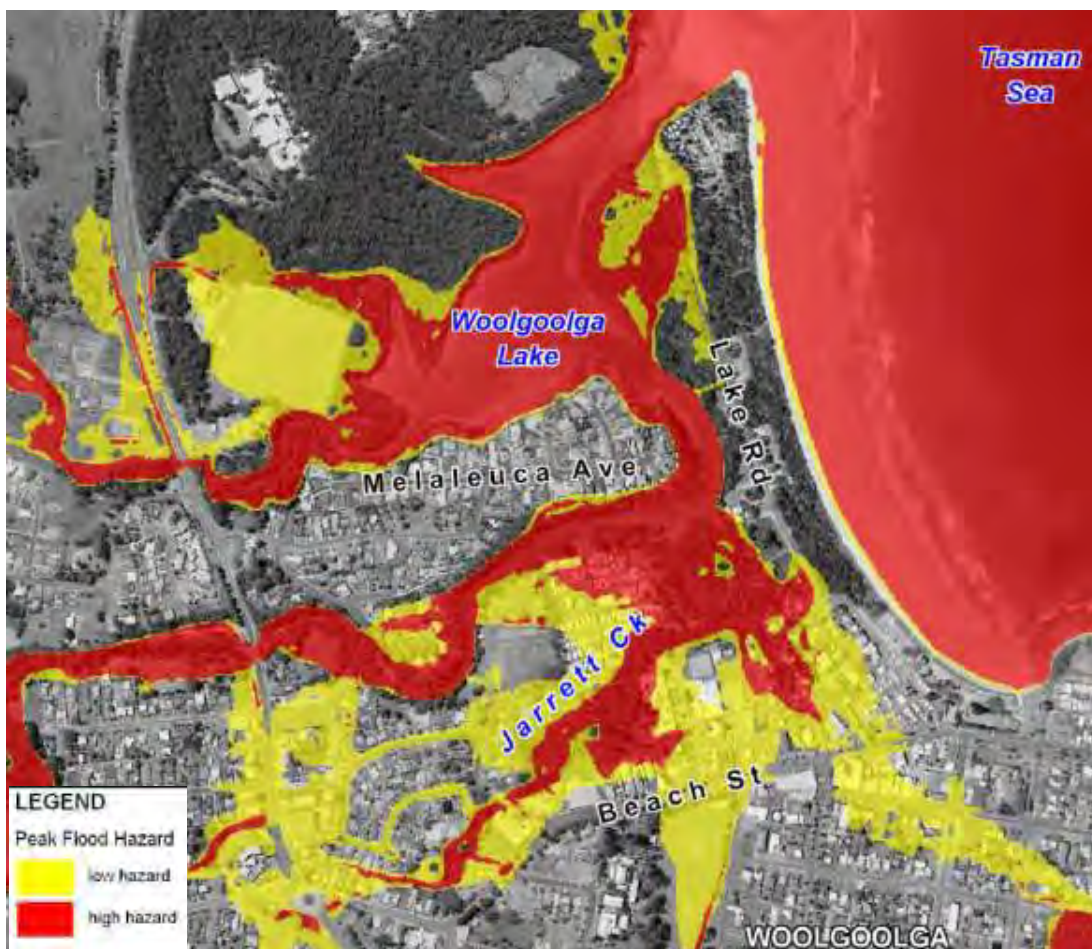
Source: Table 8-6 in BMT, WBM, 2012

2.1.2 Flooding of the Sewerage System

Council's previous informal policy of opening the lake entrance was based on preventing flooding of the adjoining sewerage system. Council's policy was to open the entrance when lake water levels reached an established flood mark of 1.8 m AHD. This is the level of the overflow pipe from Sewage Pump Station No.1 (PS 1) in Ganderton Street. At lake water levels greater than 1.8 m AHD, water will flood PS 1 causing water to enter the sewerage system causing excess pumping and potentially leading to sewage entering the lake system via Jarrett Creek. There is another low-lying sewage pump station (PS 16) on the southern foreshore of the lake, however this pump station is higher than PS 1 and does not currently dictate artificial opening of the entrance. Refer to **Illustration 2.1** in regard to the location of these pump stations.

2.1.3 Flooding of Properties

Contour information indicates the ground level of lower-lying properties adjoining the estuary is in the range of 2.0 - 2.5 m AHD. The flood level estimates in **Table 2.1** indicate properties are at risk of flooding in the present 1% AEP event. There will be an increased number of properties at risk of flooding as a result of sea level rise. The lower contour levels around the lake are shown in **Illustration 2.2** to provide an indication of properties at risk of flooding in major events. The modelled flood hazards for the 1%AEP event from the 2012 flood study are shown in **Plate 2.1**.



Source: Figure A-12 in BMT, WBM, 2012

Plate 2.1 Woolgoolga Flood Study – 1% AEP Modelled Peak Flood Hazards

2.1.4 Artificial Opening for Flushing the Estuary

A proportion of community participants in the consultation phase of the CZMP for Woolgoolga Lake estuary indicated a desire for an entrance opening policy for the purpose of:

- 'flushing' the lake to improve water quality; and
- reducing sediment in the lake.

2.1.4.1 Flushing to Improve Water Quality

Artificially opening estuary entrances is often carried out as a 'quick fix' to redress water quality problems stemming from other causes such as inadequate stormwater treatment from urban areas or inadequate erosion control measures in the catchment. Best practice for estuary management is based on addressing the source of the water quality issues rather than treating the symptoms by artificially opening entrances to 'flush' an estuary. The CZMP for Woolgoolga Lake estuary includes strategies to address the source of current water quality issues.

Water quality data examined in the Estuary Processes Study for Woolgoolga Lake (GeoLINK *et al.*, 2011) indicates the water quality of Woolgoolga Lake is generally in good condition with a high natural variance which is characteristic of ICOLLs. Therefore, there is no need for flushing of the estuary to improve water quality under 'normal' conditions. Nevertheless, there may be instances where artificial opening is justified to address extreme water quality issues such as a spill of contaminants into the waterway. This is addressed in **Section 2.5**.

2.1.4.2 Flushing to Reduce Sediment Levels

The major source of sedimentation in the estuary is from marine sands which are naturally pushed into the estuary through the entrance by tidal flows assisted by tidal and ocean currents and waves. Fluctuations in the amount of marine sediment in the estuary and consequent fluctuations in water depths are a natural trend. Secondary sediment sources include inputs from the broader catchment including from bank erosion and erosion associated with catchment land management practices.

The Estuary Processes Study for Woolgoolga Lake (GeoLINK *et al.*, 2011) indicates artificial opening of the lake entrance will not have any significant impact on reducing sedimentation in the lake or removing the shoals of marine sand from the entrance. Data indicates that only very large flooding events (eg. the 1974 event), potentially in combination with large ocean swell events, will remove significant quantities of marine sand from the entrance. Artificial opening will only result in minor scouring near the entrance. The effect of this would be short-lived with relatively quick in-filling with marine derived sands. Therefore, this policy does not recommend artificial opening of the entrance for the purpose of reducing sediment levels in the lake.

2.2 Water Level Monitoring

Water levels in the estuary are automatically monitored and recorded by Manly Hydraulics Laboratory (MHL) ("Woolgoolga Lake" station) and reported online. The water level recorder is located near the footbridge in Woolgoolga Creek, approximately 250 m upstream of the confluence of the creek and the lake as shown in **Illustration 1.1**. The instrument records the water level every 15 minutes.

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Location of Sewage Pump Stations

Illustration 2.1

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Lower Contour Levels Around Woolgoolga Lake



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Illustration 2.2

2.3 Natural Breakout Water Levels

Under natural conditions, ICOLL entrances open over a relatively wide range of water levels termed the 'natural breakout range'.

An occasional artificial opening of the entrance within the natural breakout range is not likely to have a significant environmental impact since it falls within the expected natural variation. However, over the longer term, numerous artificial openings especially at a comparatively low water level are likely to have a significant environmental impact since the natural frequency and duration of opening and closing to the ocean will be significantly altered.

Lake water level records for Woolgoolga Lake for the period of 1982 to 1988 indicate a natural breakout range of 1.2 to 1.8 m AHD. This was a period with varying rainfall years from very dry to very wet with some average years. Lake water level records for the period of 2007 to 2011 (a high rainfall period) indicate a similar 'natural breakout range' of 1.2 to 1.6 m AHD.

Table 2.1 summaries the water levels experienced in the lake during non-flood periods and for major flood events. The table includes estimates of future water levels based on the simple addition of predicted sea level rise.

Table 2.2 Lake Water Levels for Non-Flood and Flood Periods – Existing and Future

	<i>Existing¹ (2011)</i>	<i>2050²</i>	<i>2100³</i>
Non-Flood Periods			
Average water level (m AHD)	0.7	1.1	1.6
Maximum water level (m AHD)	1.8	2.2	2.7
Minimum water level (m AHD)	0.2	0.6	1.1
90 th percentile water level ⁴ (m AHD)	1.1	1.5	2.0
Natural breakout range ⁵ (m AHD)	1.2 – 1.8	1.6 – 2.2 ⁶	2.1 – 2.7 ⁶
Flood Events			
1 in 100 Year Flood (at upstream end of lake)	2.9 ⁷	3.2 ⁷	3.7 ⁷

- Notes: 1. Based on 1982 – 1988 data, 2004 data and 2007 – 2011 data in Estuary Processes Study (GeoLINK *et al*, 2011);
 2. Existing water level plus 0.4m sea level rise;
 3. Existing water level plus 0.9m sea level rise
 4. The water level greater than 90 percent of all recorded water levels
 5. Water levels at which a closed entrance naturally opens
 6. Estimates only – based on the assumption that opening mechanism remains unchanged and water levels will increase by the same amount as sea level rise
 7. Source: Table 8-6 in BMT, WBM, 2012

2.3.1 Rate of Water Level Rise During Flooding

The maximum rate of water level rise in the lake following a rainfall event has been estimated from an analysis of hourly water level records for the period of 2007 to 2011 (a high rainfall period). The analysis provided the following generalisations or indication of maximum rate of water level rise:

- 0.3 m rise in water level over 12 hours associated with approximately 120 mm of rainfall; and
- 0.6 m rise in water level over 24 hours associated with approximately 100 mm of rainfall; and
- 0.9 m rise in water level over 48 hours associated with approximately 100 mm of rainfall.

2.4 Trigger Water Levels

2.4.1 Opening Trigger Level

Based on the details in **Sections 2.1.2** and **2.1.3**, the lower desired water level in the lake to avoid flooding of the sewerage system and properties is 1.8 m AHD. This level is greater than or at the upper limit of the natural breakout range (1.2 – 1.8 m AHD). Artificially opening the entrance at this level will be generally infrequent and will not have any significant impact on the natural opening and closing regime of Woolgoolga Lake and therefore unlikely to have a significant environmental impact on the estuary. Therefore, a lake water level of **1.8 m AHD** is recommended as an artificial opening trigger water level.

The opening trigger water level may need to be adjusted in the future in response to: sea level rise; augmentation of the sewerage system; or other factors.

2.4.2 Alert Trigger Level

In consideration of the rate of rise of water levels in the lake (**Section 2.3.1**) it is recommended that an alert trigger level of **1.25 m AHD** (with a closed entrance) is used to initially alert Council to monitor the potential for significant increases in water levels. This should provide at least 24 hours of warning prior to the lake reaching a level of 1.8 m AHD in the event of significant rainfall.

It is noted that 2007 - 2011 water level data indicates that a level of 1.25 m AHD was reached on average 9 times a year however approximately 75% of these occurrences were associated with an open entrance condition and elevated water levels from high tides. Therefore, if the alert was only sent when the entrance was closed it would occur approximately 2 times per year based on the 2007 - 2011 water level data.

The alert trigger water level may need to be adjusted in the future in response to sea level rise or other factors.

2.5 Other Triggers for Artificial Opening

Artificial opening may be required to address extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the lake. However, it is not considered practical to include triggers to address a broad range of potential water quality scenarios. A range of factors would need to be considered during a water quality crisis, such as:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue;
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the lake.

This policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. It is recommended that any water quality crisis is assessed on an individual basis. If artificial opening is considered an appropriate option to address a water quality crisis, then this policy should be referred to in undertaking the opening procedure.

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Approvals

3.1 Statutory Provisions

The area of Woolgoolga Lake and any proposed entrance management works would be located within the Coffs Harbour LGA. The actual water body of Woolgoolga Lake is not zoned, but identified as "Creeks" under the Coffs Harbour Local Environmental Plan (CHLEP) 2000. Land immediately adjacent to and surrounding the defined water body of Woolgoolga Lake is zoned as 6A Open Space and Public Recreation under the CHLEP 2000.

Specifically, for the purpose of flooding mitigation works, Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out on any land and precludes them from requiring development consent. Clause 50 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land.*
- (2) *A reference in this clause to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with flood mitigation work:*
- (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *environmental management works.*

Although flood mitigation works would be permitted without consent on any land, the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council would be required to prepare a REF for proposed artificial opening of Woolgoolga Lake. The REF would outline the nature and extent of the proposal, what would be the trigger and determining factors for proceeding with artificial opening and identify and address any potential environmental effects which may result from such works. Hence the REF would also include mitigation measures and safeguards for the protection of the environment during artificial opening works. The REF would need to be consistent with the adopted CZMP and entrance management policy for Woolgoolga Lake.

In conjunction with preparation of the REF, Council would be required to consult with and seek any relevant licences and or concurrence from other state government agencies. These would include:

- Crown Lands under the Crown Lands Act 1989;
- Department of Primary Industries - Fisheries under the Fisheries Management Act 1994;
- Marine Parks Authority under the Marine Parks Act 1997;
- NSW Office of Water under the Water Management Act 2000; and
- Office of Environment and Heritage (National Parks and Wildlife) under the National Parks and Wildlife Act 1974.

3.1.1 Crown Lands Act 1989

Due to the artificial opening works affecting the waterway of Woolgoolga Lake and the coastline, it is likely that such works would affect Crown Land. The Crown Lands Act 1989 prescribes certain activities for which a licence under the Crown Lands Act 1989 from the Department of Crown Lands is required. The Act states the following:

Division 4

49 Licences for removal of certain minerals

(1) A licence to remove gravel, sand, stone, shells or other substances, being minerals within the meaning of the Mining Act 1992 or the Offshore Minerals Act 1999, may not be granted except with the approval of the Minister administering the Act concerned.

(2) The Minister administering the Mining Act 1992 or the Minister administering the Offshore Minerals Act 1999, as the case requires may waive compliance with the requirements of this section in such circumstances or cases, and to such extent, as the Minister thinks fit.

(3) A licence to remove gravel, sand, loam, stone, clay, shells or other prescribed material (not being minerals within the meaning of the Mining Act 1992 or the Offshore Minerals Act 1999) may be granted over Crown land even if it is held under a lease granted under this Act or referred to in the Crown Lands (Continued Tenures) Act 1989.

During artificial entrance opening, gravel, sand, stone, clay, shells are likely to be removed / disturbed on Crown Land; hence a license is required under the Crown Lands Act 1989.

3.1.2 Fisheries Management Act 1994

The objectives of the Fisheries Management Act 1994 are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. The provisions of Division 3, Part 7 of the Act are likely to be relevant to any works associated with the artificial opening of Woolgoolga Lake. The provisions relate to the protection of aquatic habitat. Although flood mitigation works would be precluded from requiring consent under ISEPP, the provisions of the Fisheries Management Act 1994 are still applicable and as part of the REF process concurrence from the Department of Primary Industries (Fisheries) would be required for certain activities. **Table 3.1** outlines the relevant provisions of the Act that would apply to the artificial opening of Woolgoolga Lake.

Table 3.1 Activities requiring concurrence under the Fisheries Management Act 1994

Fisheries Management Act 1994	Sections 198-202	Concurrence is required from the Minister, Department of Primary Industries (Fisheries) for dredge and reclamation works on defined water land. The nature of artificial opening would constitute dredge works and also potentially reclamation works in watered land. Hence a permit and concurrence from s required prior to commencement of any works.
	Sections 219-220	Concurrence is required when barriers to the movement of fish including water course crossings are to be constructed or modified. Any proposed artificial opening is unlikely to create a barrier to the movement of fish. However such specifics would need to be confirmed within the REF.
	Sections 204-205	Any artificial opening works would likely be restricted to the sand berm. Any works must not affect mangroves or other protected marine vegetation. If marine vegetation would be harmed by flood mitigation works a permit must be sought from the Minister before works commence. Clause 205 (2) states that <i>A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part.</i> It is unlikely that any such vegetation would be affected by works associated with the artificial opening of Woolgoolga Lake, however the REF must confirm this.

	Schedules 4, 4A, 5 and 6	<p>The REF prepared for works associated with artificial opening would need to consider any presence of local threatened aquatic habitat for flora or fauna. Thus Key Threatening Processes (KTPs) would need to be considered in preparation of the REF. The following KTPs may be relevant and required consideration:</p> <ul style="list-style-type: none"> ▪ <i>Degradation of native riparian vegetation along NSW water courses.</i> ▪ <i>Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.</i>
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3.1.3 Marine Parks Act 1997

As Woolgoolga Lake forms park of the Solitary Islands Marine Park, Council would be required to obtain a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 in order to undertake any works on land affected by the Marine Park and any associated zoning. Preparation of the REF would need to consider these factors and seek the relevant concurrence / permit.

3.1.4 Water Management Act 2000

A controlled activity approval under the Water Management Act 2000 (WM Act) is required for certain types of developments and activities that are carried out in or near a river, lake or estuary (water land). Under the WM Act, a controlled activity means:

- the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
- the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
- the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- the carrying out of any other activity that affects the quantity or flow of water in a water source.

Artificial opening of Woolgoolga Lake would constitute a controlled activity under the WM Act. However under the Water Management (General) Regulation 2011, Clause 38 Controlled activities—public authorities, states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.*

Although Coffs Harbour City Council would be exempt from requiring a Controlled Activity Approval, Clause 37, *Condition applying to all exemptions under this Subdivision*, of the Regulations states: *An exemption conferred under this Subdivision is subject to the condition that the person by whom the relevant controlled activity is carried out must comply with applicable requirements (if any) of the Minister that are published in the Gazette, or notified in writing to the person, for the purposes of this clause and that are for the protection of:*

- (a) *the waterfront land on which the activity is carried out, or*
- (b) *any river, lake or estuary to which that land has frontage.*

3.1.5 National Parks and Wildlife Act 1974

The Woolgoolga Lake system falls within the Coffs Coast Regional Park. The park was created through a partnership of Council and the National Parks and Wildlife Service (now within OEH). The National Parks and Wildlife Act 1974 applies if the park is a reserve made under the Act. The Park's management is guided by a Trust Board. Preparation of an REF for artificial opening works would need to determine whether or not the park is a reserve under the Act and hence consultation / concurrence are required with OEH / National Parks and Wildlife Service. Consultation with the Trust Board would be required whether or not the park is affected by the Act. The REF would also need to consider any management plan that has been prepared for the park.

3.2 Summary of Potential Approvals

Artificial opening of the entrance for the purpose of flood mitigation is permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed artificial opening of the entrance to Woolgoolga Lake estuary. The REF needs to be consistent with the adopted CZMP and entrance management policy for Woolgoolga Lake estuary.

Preparation of the REF will involve consultation with relevant state government agencies. This will confirm the necessary approvals and licences required for artificial opening of the entrance. Preliminary assessment indicates the following approvals and licences may be necessary:

- a license from the Department of Crown Lands under the Crown Lands Act 1989;
- a permit and concurrence from the Minister, Department of Department of Primary Industries (Fisheries) under the Fisheries Management Act 1994 pursuant to Sections 198-202 for dredge and reclamation works on defined water land (the nature of artificial opening would constitute dredge works and also potentially reclamation works); and
- a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 as Woolgoolga Lake forms park of the Solitary Islands Marine Park.

The Woolgoolga Lake system falls within the Coffs Coast Regional Park, which was created through a partnership of Council and the National Parks and Wildlife Service. Consultation with the National Parks and Wildlife Service and Trust Board is required to determine if any approvals are required under the National Parks and Wildlife Act 1974.

It is noted that a Controlled Activity Approval under the Water Management Act 2000 is not required due to the Water Management (General) Regulation 2011, Clause 38 Controlled activities - public authorities, which states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.* However, Council is still required to follow any applicable guidelines of NSW Office of Water under the Water Management Act 2000.

Artificial Opening Procedure

4.1 Decision Making Process

The logic of the decision making process relates to avoiding flooding of the local sewerage system, and thereby avoiding flooding of private property which are located at higher elevations. At lake water levels greater than 1.8 m AHD, water will flood Sewage Pump Station No.1 in Ganderton Street causing excess pumping and potentially leading to sewage entering the lake system via Jarrett Creek. Private properties are located at elevations greater than 2.0 m AHD.

The general decision making process is shown in the flow chart in **Illustration 4.1** and involves:

- an alert is issued when the entrance is closed and lake water level reaches **1.25 m AHD**. If rainfall forecasts indicate that significant water level increases are likely then the process proceeds into the 'Standby' phase;
- the process proceeds from the 'Standby' phase into the 'site assessment' phase if the lake water level reaches **1.40 m AHD** (and the entrance remains closed);
- the process proceeds into the 'deployment' phase when the lake water level reaches **1.60 m AHD** (and the entrance remains closed) or if Council's designated officer considers it appropriate based on the site assessment;
- artificial opening works are undertaken when the lake water level reaches **1.80 m AHD** or if Council's designated officer considers it appropriate to commence artificial opening works based on the prevailing conditions.

4.1.1 Alert Phase

The alert level of 1.25 m AHD will be based on water level data automatically monitored at 15 minute intervals by Manly Hydraulics Laboratory (MHL) at Woolgoolga Lake station at the footbridge in Woolgoolga Creek (refer to **Illustration 1.1**). An alert will be automatically sent to Council if the level of 1.25 m AHD is reached and the water level records indicate the entrance condition is closed.

Following the 1.25 m AHD alert, Council will monitor rainfall forecasts to predict if water levels are likely to rise significantly. If significant rainfall / water level rise is considered likely then Council will initiate 'standby' phase.

4.1.2 Standby Phase

The "standby" phase will involve:

- Council making preparations for potential deployment of personnel / machinery for artificial opening of the entrance;
- Council alerting relevant state government agencies of the potential for an artificial opening event; and
- Council monitoring rainfall forecasts and water level alerts.

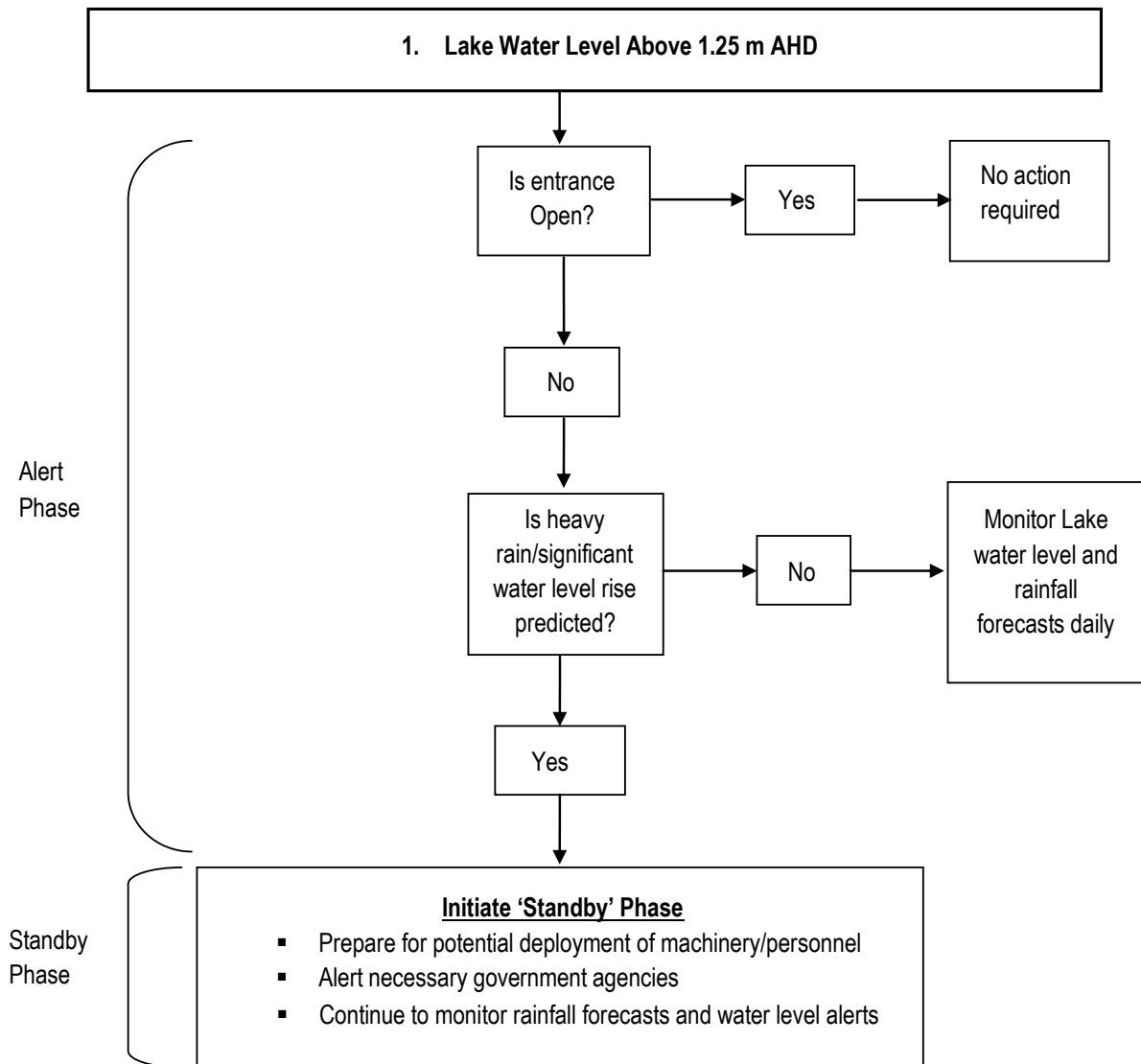


Illustration 4.1 Artificial Opening Decision Making Flowchart – Alert Phase and Standby Phase

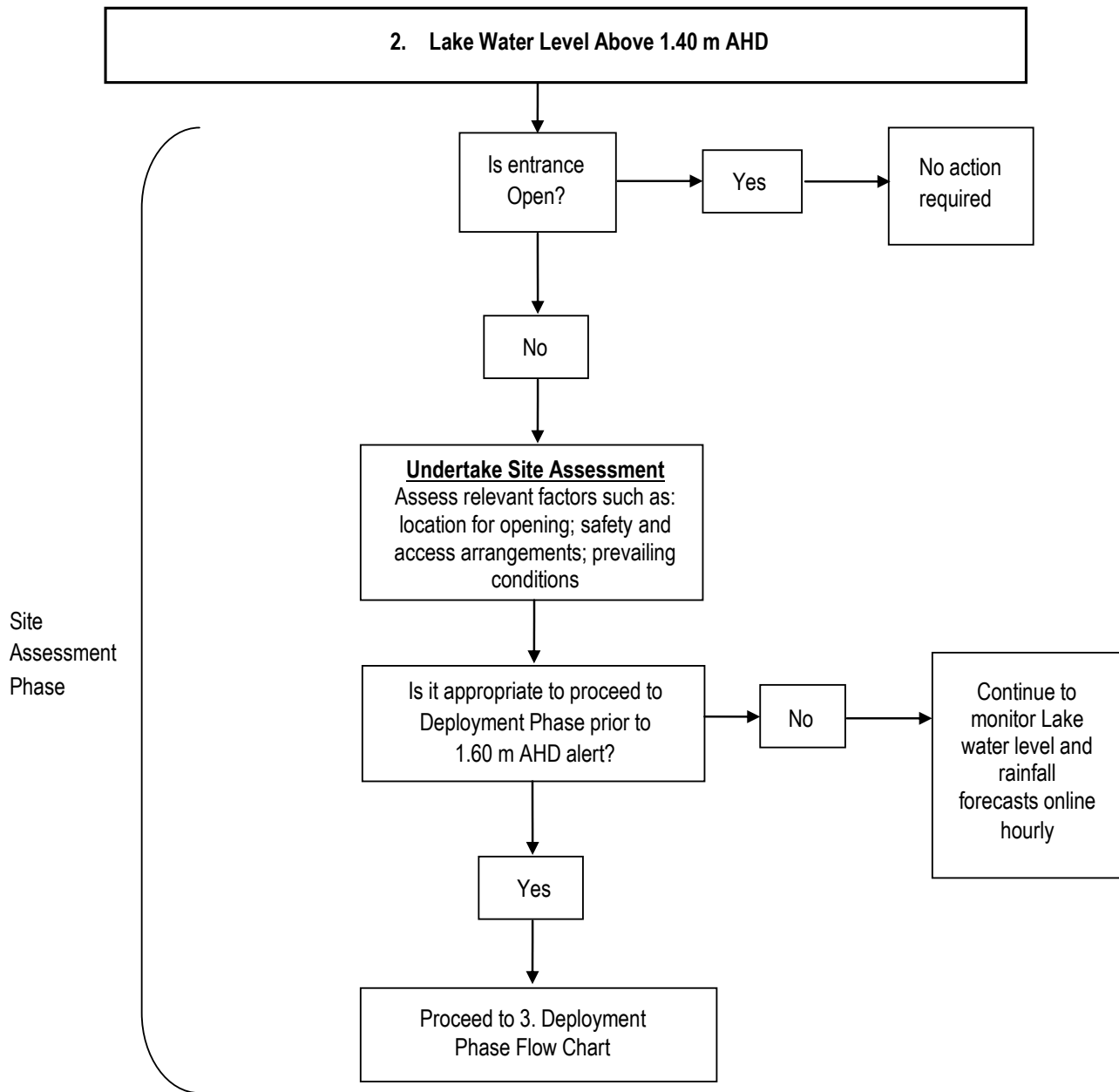


Illustration 4.2 Artificial Opening Decision Making Flowchart – Site Assessment Phase

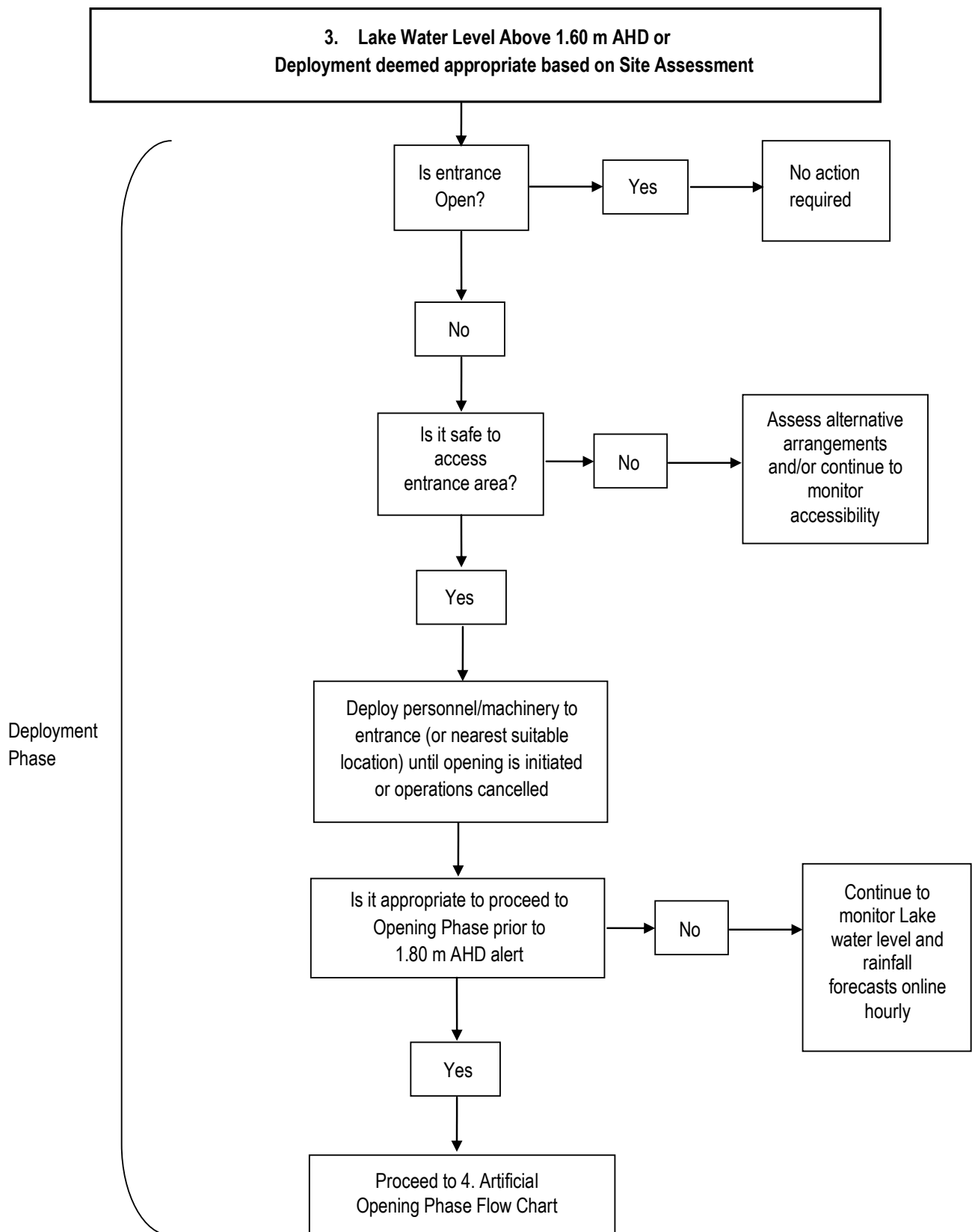


Illustration 4.3 Artificial Opening Decision Making Flowchart – Deployment Phase

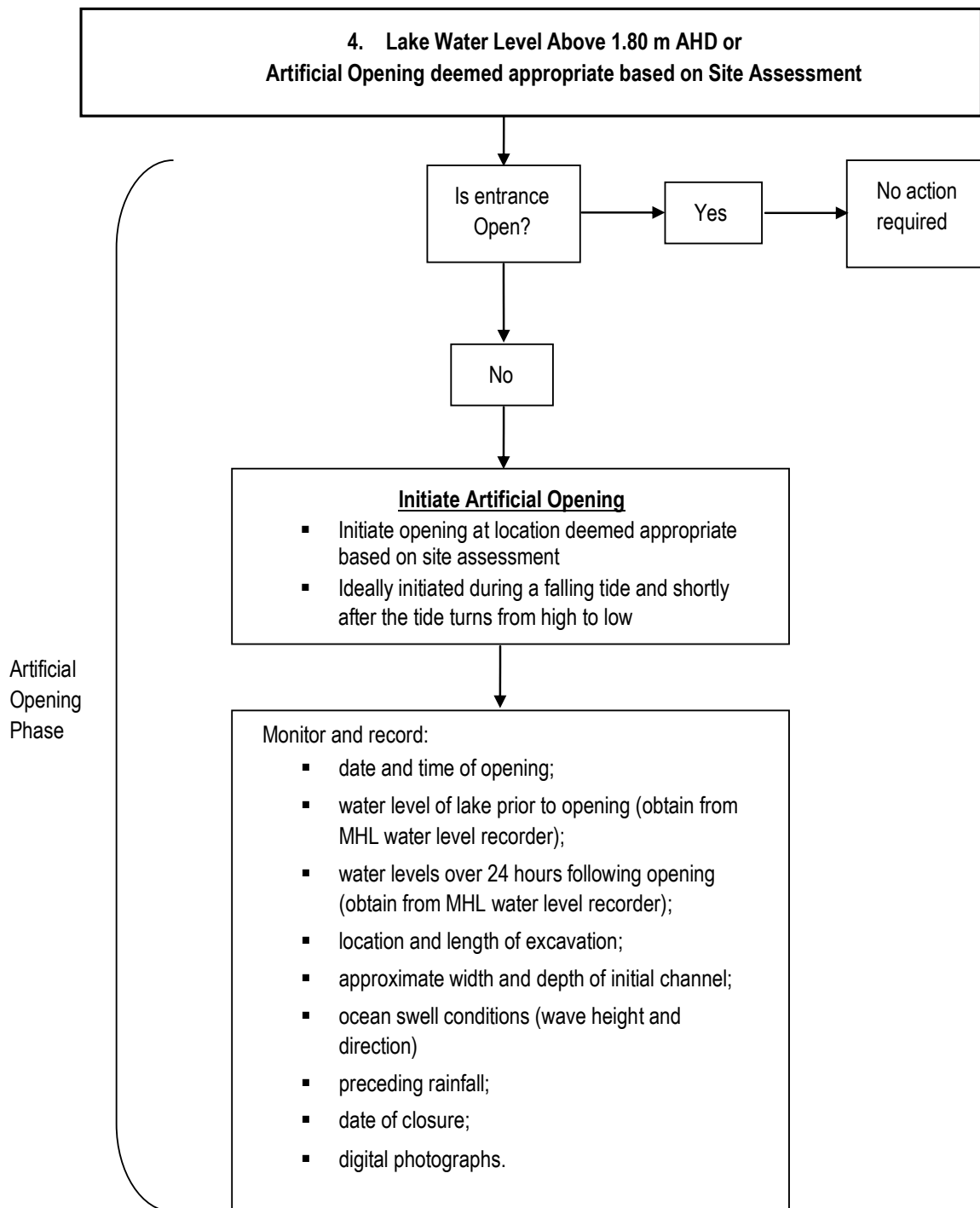


Illustration 4.4 Artificial Opening Decision Making Flowchart – Artificial Opening Phase

4.1.3 Site Assessment Phase

The process proceeds into the 'site assessment' phase if a second alert is issued by MHL when the lake water level reaches **1.40 m AHD** (and the entrance remains closed). During this phase Council's designated officer will undertake a site inspection to assess relevant factors such as: the appropriate location for the artificial opening; safety and access arrangements; and the prevailing conditions. The purpose of the assessment is to help inform the decision and logistics associated with artificially opening the entrance.

4.1.4 Deployment Phase

The process proceeds into the 'deployment' phase if a third alert is issued by MHL when the lake water level reaches **1.60 m AHD** (and the entrance remains closed) or if Council's designated officer considers it appropriate based on the site assessment.

During this phase Council's personnel and machinery will be deployed to the entrance if the site assessment considers it appropriate and safe. The recommended access route will be used unless the site assessment indicates an alternative route.

Council's personnel and machinery will remain at the entrance (or the nearest location deemed suitable under the prevailing conditions) until such time that artificial opening works are initiated or the operation is cancelled by Council's designated officer.

4.1.5 Artificial Opening Phase

Artificial opening works are undertaken if a fourth alert is issued when the lake water level reaches **1.80 m AHD** or if Council's designated officer considers it appropriate to commence artificial opening works based on the prevailing conditions..

Ideally, the artificial opening should be initiated during a falling tide and shortly after the tide turns from high to low (if possible around a spring tide when tidal fluctuations are larger).

The opening is to be initiated at the location identified by Council's designated officer.

4.2 Responsibilities for Artificial Opening

Coffs Harbour City Council is responsible for artificial opening of the entrance.

4.3 Monitoring

When mechanical openings have been carried out, monitoring of the entrance should be undertaken to determine the efficiency of the opening. For each artificial opening event, the following data will be recorded:

- date and time of opening;
- water level of lake prior to opening (obtain from MHL water level recorder);
- water levels over 24 hours following opening (obtain from MHL water level recorder);
- location and length of excavation;
- approximate width and depth of initial channel;
- ocean swell conditions (wave height and direction)
- preceding rainfall;
- date of closure; and
- digital photographs.

Policy Updates

5.1 Review and Update of this Policy

This Policy and the associated REF should be reviewed every five years or in response to:

- outcomes of the flood study for Woolgoolga Lake commissioned in 2012;
- augmentations to components of the local sewerage system that are impacted by flood levels;
- legislation changes; and
- any other significant factors relevant to artificial opening of the entrance of Woolgoolga Lake estuary.

Review of the policy will include analysis of all monitoring data collected over that period to ensure that predictions, assumptions and trigger levels outlined in the current policy and REF are correct or appropriate. This will include a review of changes to climate change and sea level rise predictions and consequent impacts to this policy.

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Acronyms

AHD	Australian Height Datum
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CHLEP	Coffs Harbour Local Environmental Plan
CZMP	Coastal Zone Management Plan
ICOLL	Intermittently Closed and Open Lake and Lagoon
ISEPP	State Environmental Planning Policy (Infrastructure), 2007
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory
PS	Pump Station
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy

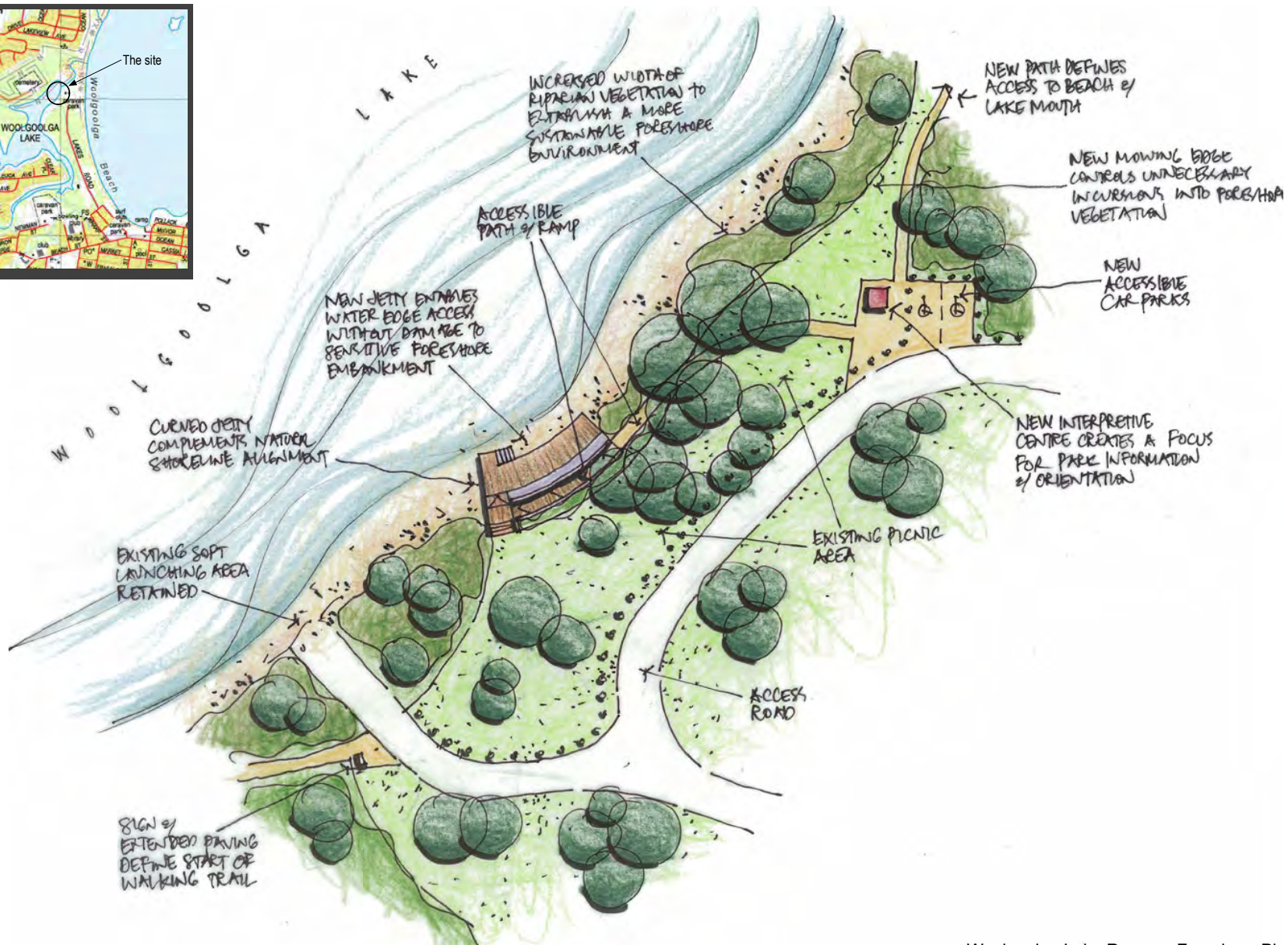


Appendix B

Woolgoolga Lake Reserve Foreshores Upgrade - Design Development

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Information shown is for illustrative purposes only



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Appendix C

Funding Sources

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
<p>Various – jointly administered by Northern Rivers Catchment Management Authority (NRCMA)</p>	<ul style="list-style-type: none"> ▪ Various – jointly administered by NRCMA 	<ul style="list-style-type: none"> ▪ Community capacity targets. These include targets with respect to the awareness, knowledge and skills of the community in relation to Natural Resource Management, and the levels of engagement of the community. These are specifically: <ul style="list-style-type: none"> – CCB1, Awareness knowledge and skills; – CCB2, Community engagement; and – CCB3, Community support. ▪ Land use planning targets. The relevant land use planning targets relate to aboriginal cultural integration in the planning process, environmental assets and significant farmland protection, landuse conflict within and adjacent to key environmental and farming assets and the integration of natural resource assets into planning. They are specifically; <ul style="list-style-type: none"> – LUP1, Aboriginal cultural integration; – LUP2, Environmental assets/rural production areas; – LUP3, Land use conflict and key natural resources; and – LUP4, Natural resource integration. ▪ Biodiversity targets. These targets relate to the area of land under secure conservation management, habitat connectivity, the mitigation of threats to biodiversity, threatened species management, sustainable management of terrestrial and aquatic ecosystems and habitat rehabilitation and revegetation. The targets are; <ul style="list-style-type: none"> – B1, Secure conservation management; – B2, Habitat connectivity; – B3, Biodiversity threat mitigation; – B4, Threatened species; – B5, Biodiversity management and enhancement; and – B6, Habitat rehabilitation and revegetation. 	<p>Funding (General): http://www.northern.cma.nsw.gov.au/get-involved/funding</p> <p>Current Funding Opportunities: http://www.northern.cma.nsw.gov.au/get-involved/funding</p>

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		<ul style="list-style-type: none"> ▪ Water targets. These targets relate to the integrated management of urban water cycles and community education about and monitoring of water resources. The targets are: <ul style="list-style-type: none"> - W1, River structure riparian vegetation and fish passage; - W2, Urban water cycle management; - W3, Water information and education; and - W4, Aquifer health and river flow. ▪ Coastal targets. The relevant coastal targets relate to the management and assessment of coastal lakes and estuaries. The targets are: <ul style="list-style-type: none"> - C1, Coastline; and - C2, Estuaries and coastal lakes. ▪ Marine targets. The relevant marine targets relate to management practices that reduce threats to and impacts on the marine environment. The targets are: <ul style="list-style-type: none"> - M1, Marine research and planning; - M2, Best practice; - M3, Marine protected areas; and - M4, Improved marine environment management practices. ▪ Soil and land resource targets. The most relevant of the soil and land targets relates to the area of high risk acid sulfate soils under active management. The complete list of targets is: <ul style="list-style-type: none"> - L1, Soil health; - L2, Acid sulphate soils; and - L3, Soil conservation/remediation. 	

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Caring for Our Country	Jointly administered by the Australian Government: <ul style="list-style-type: none"> ▪ Department of Agriculture, Fisheries and Forestry; and ▪ Department of Sustainability, Environment, Water, Population and Communities 	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to achieve an environment that is healthy, better protected, well-managed, resilient and provides essential ecosystem services in a changing climate. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ the National Reserve System; ▪ biodiversity and natural icons; ▪ coastal environments and critical aquatic habitats; ▪ sustainable farm practices; ▪ natural resource management in northern and remote Australia; and ▪ community skills, knowledge and engagement. 	http://www.nrm.gov.au/index.html
Estuary Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to provide support to councils to improve the health of NSW estuaries; and ▪ understand the potential risks from climate change. <p>Support provided to councils under these programs includes financial assistance to:</p> <ul style="list-style-type: none"> ▪ prepare estuary management plans and supporting studies; and ▪ carry out projects to improve estuary health. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ updating estuary plans to consider climate change impacts, including sea level rise; ▪ estuary health monitoring and improvement; and ▪ focusing on high-hazard coastal areas and stressed estuaries. <p>Grant offers are subject to availability of funds for each financial year and State-wide priorities. Funding of up to 50% of a project's costs will normally be offered for successful grant applications.</p>	http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Coastal Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to provide support to local councils to manage the risks from coastal hazards such as coastal erosion; and ▪ and to restore degraded coastal habitats. <p>Support provided to councils under these programs includes financial assistance to:</p> <ul style="list-style-type: none"> ▪ prepare coastline, and coastal zone management plans and supporting studies; ▪ carry out projects to reduce risks associated with coastal hazards and improve coastal environments. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ updating coastal hazard studies to incorporate sea-level rise benchmarks; and ▪ focusing on high-hazard coastal areas and stressed estuaries. <p>Grant offers are subject to availability of funds for each financial year and State-wide priorities. Funding of up to 50% of a project's costs will normally be offered for successful grant applications.</p>	http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm
Floodplain Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to reduce the impacts of flooding and flood liability on communities; and ▪ to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible. <p>Priorities:</p> <p>Provides financial support to councils and eligible public land managers to:</p> <ul style="list-style-type: none"> ▪ make informed decisions on managing flood risk by preparing floodplain risk management plans (and associated background studies) under the floodplain risk management process; ▪ implement floodplain risk management plans to reduce flood risk to both existing and future development, and reduce losses through a range of property, flood and response modification measures as outlined in the manual; and 	http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		<ul style="list-style-type: none"> ▪ provide essential information to the State Emergency Service to enable the effective preparation and implementation of local flood plans to deal with flood emergency response. <p>Assistance under the program is normally offered by the State Government providing \$2 for every \$1 provided by the council.</p>	
Environmental Trust Grants	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to encourage and support restoration and rehabilitation projects; ▪ to promote research into environmental problems of any kind; ▪ to promote environmental education in both the public and private sectors; ▪ to fund the acquisition of land for the national parks estate; ▪ to fund the declaration of areas for marine parks and for related purposes; ▪ to promote waste avoidance, resource recovery and waste management (including funding enforcement and regulation and local government programs); ▪ to fund environmental community groups; and ▪ to fund the purchase of water entitlements for the purpose of increasing environmental flows for the State's rivers and restoring or rehabilitating major wetlands. <p>Relevant Programs:</p> <ul style="list-style-type: none"> ▪ the urban sustainability program funds projects carried out by local councils in partnership with the community that protect and restore the urban environment; ▪ the lead environmental community groups program provides administrative funds for environmental organisations that work with their communities to conserve the environment; ▪ the environmental restoration and rehabilitation program funds projects that restore or rehabilitate degraded areas, or protect important ecosystems and habitats, prevent or minimise future environmental damage and enhance the quality of specific environmental resources; ▪ the environmental education program supports projects that increase commitment to protecting the environment and promoting sustainable behaviour; ▪ the environmental research program funds projects managed by educational 	<p>http://www.environment.nsw.gov.au/grants/envtrust.htm</p>

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		<p>institutions and government agencies that research local solutions to environmental problems and ways of operating that are less harmful to the environment;</p> <ul style="list-style-type: none"> ▪ the eco schools program funds schools so they can involve their students and the community in developing and implementing environmental management projects; and ▪ the protecting our places program supports projects that restore or rehabilitate Aboriginal land or land that is culturally significant to Aboriginal people, or that educate Aboriginal and other communities about the environment. 	
Grants to Voluntary Environment Heritage Organisations (GVEHO)	Australian Government: Department of Sustainability, Environment, Water, Population and Communities	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ help eligible community based environment and heritage organisations to value, conserve and protect Australia's natural environment and historic heritage by assisting with their administrative funding. 	http://www.environment.gov.au/about/programs/gveho/index.html
		<p>Priorities:</p> <ul style="list-style-type: none"> ▪ funds provided may be used to assist with salaries and salary on-costs for executive and administrative staff; office accommodation rental; electricity, gas, phone and other similar charges; essential office supplies and equipment; staff and volunteer training; photocopying and printing costs; and travel costs incurred on behalf of the organisation. 	
NSW Recreational Fishing Trusts	NSW Department of Primary Industries	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ projects that improve recreational fishing in NSW; ▪ anyone can apply for funding from the Recreational Fishing Trusts, including fishing clubs and organisations, universities, councils, community groups, individuals and so on. Joint applications are also encouraged; and ▪ funding applications must relate to the improvement of recreational fishing. 	http://www.dpi.nsw.gov.au/fisheries/recreational/licence-fee/apply-for-funds
		<p>Priorities:</p> <ul style="list-style-type: none"> ▪ recreational fisheries enhancement; ▪ angler education and information; ▪ research on recreational fishing; ▪ recreational fisheries access and facilities; and ▪ recreational fisheries sustainability. 	

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
NSW Maritime Infrastructure Program: Better Boating Program Regional Infrastructure Grants	NSW Transport Maritime	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ the Better Boating Program provides waterways infrastructure for the benefit of the boating community and the marine sector on New South Wales waterways; and ▪ the BBP provides individual grant contributions to proponents such as Local Government, State agencies, boating organisations and community groups for the development of public boating infrastructure. <p>Priorities: Consideration for BBP funding will only be given to those projects that are:</p> <ul style="list-style-type: none"> ▪ principally infrastructure works of a lasting nature; ▪ intended to greatly improve current amenities (or addresss the lack thereof); ▪ located in a readily accessible public area with unrestricted public access; ▪ for use of or available to, a broad cross-section of the public boating community; ▪ situated either on public land or land owned by the Local Council, the Crown or NSW Maritime; ▪ able to be commenced within 6 months of the approval of the grant and be completed within 18 months from this approval date. It should be noted that any funding grants not utilised within that period may be withdrawn; ▪ supported in writing by key stakeholders, including the Local Council; and ▪ able to meet the Program's criteria for assessment and are submitted by the nominated closing date. 	http://www.maritime.nsw.gov.au/mpd/infra_program.html
Raising National Water Standards Program	Australian Government: National Water Commission	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ support for projects that are improving Australia's national capacity to measure, monitor and manage our water resources. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ funds are directed at activities across three strategic investment areas: <ul style="list-style-type: none"> - advancing the implementation of the National Water Initiative; - improving integrated water management across Australia; and - improving knowledge and understanding of our water resources. ▪ more than 175 Raising National Water Standards projects have been funded under the 	http://www.nwc.gov.au/www/html/347-introduction-to-rnws.asp

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		following themes: <ul style="list-style-type: none"> - water accounting; - emerging water markets; - water planning and management; - knowledge and capacity building; - irrigation and other rural water; - water-dependent ecosystems; - integrated urban water management; - groundwater; - northern rivers; - national assessment of water resources; and - Northern Australia water futures assessment. 	
Country Towns Water Supply and Sewage Program	NSW Department of Primary Industries Office of Water	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ a major government reform program that provides management, technical and financial support to local water utilities (LWUs) in the provision of water supply and sewerage services to country towns in NSW. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ management assistance through the Best-Practice Management of Water Supply and Sewerage Guidelines; ▪ technical assistance through: <ul style="list-style-type: none"> - regular inspections and advice on water and sewage treatment works operational problems; - conducting water supply and sewerage operator training seminars/ courses; - pre commissioning inspections of Fluoridation Plants and technical assistance to NSW Health to enable councils to comply with requirements under the Fluoridation of Public Water Supplies Act 1957 and in certification of fluoridation officers; - ongoing LWUs dam safety inspections and mentoring/ training of operators; - ongoing LWUs liquid trade waste discharge approvals; 	http://www.water.nsw.gov.au/Urban-water/Country-town-water/default.aspx

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		<ul style="list-style-type: none"> - conducting regional trade waste regulation courses; and - providing help desk services. ▪ financial assistance through grants to local water utilities towards the capital cost of works to address the backlog in water supply and sewerage infrastructure. 	
<p>Job Services Australia – New Enterprise Incentive Scheme (NEIS)</p>	<p>Australian Government: Department of Education, Employment and Workplace Relations</p>	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to give young people, aged 17 to 20 years, quality training and experience through structured and supervised projects that focus on areas where natural environmental conservation work and cultural heritage restoration is required; ▪ to contribute to high priority conservation projects, to promote environmental, conservation and natural heritage outcomes and through this benefit the community and the environment and; ▪ to contribute to NEIS participants: <ul style="list-style-type: none"> - personal development, including teamwork and leadership skills; - skill development and training through activities that are structured and sequential in their learning outcomes; - strengthened connections with the community through relationships, participation and contribution to the community; and - improved career and employment prospects through accredited training and on-the-project training. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ DEEWR provides funding for NEIS teams to work on projects which focus on areas where environmental and heritage restoration and conservation are needed; ▪ participants in the NEIS programme work in teams from a central or regional location and may undertake projects in remote locations; ▪ each project has a community focus and is developed in consultation with community representatives; and ▪ participants undertake accredited training which enable them to complete project tasks, and increases their capacity to move into employment or further training at the end of their placement. 	<p>http://www.deewr.gov.au/Employment/JSA/EmploymentServices/Pages/NEIS.aspx</p>



Appendix D

Summary of Estuary Processes Study

Woolgoolga Lake is an Intermittently Closed and Open Lakes and Lagoon (ICOLL). The estuary has areas of high environmental, recreational and aesthetic value. A key focus of recreational activity occurs at the public picnic area adjacent to the Woolgoolga Lakeside Holiday Park near the estuary entrance.

The estuary catchment area to the tidal limit is 343 ha, and the water body area is 37.6 ha. The total catchment (including drainage catchment upstream of the tidal limit) covers an area of 2,185 ha. State Forest area encompasses a large proportion of the upper limits of the catchment. Banana plantations and blueberry farms cover a significant proportion of the upper slopes in the mid-catchment.

The main creeks flowing to the estuary are Woolgoolga Creek and Poundyard Creek. Other tributaries include South Woolgoolga Creek, Cemetery Creek and High School Creek.

The estuary is part of the Solitary Islands Marine Park and zoned as a Habitat Protection Zone up to the tidal limit of the tributary creeks. A portion of the vegetated area adjoining the northern shore of the lake is located in the Coffs Coast Regional Park.

The key findings and recommendations of the *Data Compilation and Estuary Processes Study – Darkum Creek, Woolgoolga Lake and Willis Creek* (GeoLINK et al., 2011) is summarised below for Woolgoolga Lake.

D.1 Hydrodynamics

D.1.1 Hydrodynamic States and Entrance Behaviour

Woolgoolga Lake is generally classified as an ‘intermittently open’ system. Water level data for the period of 2007 to 2011 indicates the lake is predominantly open during high rainfall years. During this period the entrance was open for approximately 66% of the time. The number of entrance openings over a 5 year period from 1982 to 1988 was 17 (an average of 3 to 4 entrance openings per year) of which Council initiated nine. This latter period included a range of varying rainfall years from very dry to very wet with some average rainfall years.

Opening of the entrance has been initiated by Council in the past as a flood control measure. Council’s informal policy is to open the lake entrance when the lake water level reaches an established flood mark of 1.8 m AHD at the Council depot in Ganderton Street, Woolgoolga. The last opening initiated by Council was in 2007.

When the entrance is open, water levels in the lake can vary by 0.5 to 0.8 m over a full tidal cycle which will promote vertical and horizontal mixing between marine and estuary waters. A closed entrance results in perched water levels in the lake with water levels approximately 0.25 to 0.5 m higher than when the entrance is open. The maximum water level in the lake is typically in the range of 1.1 to 1.5 m AHD immediately prior to the entrance opening ‘naturally’. Water levels in the lake are likely to increase by the same amount as sea level rise increases as a result of climate change. A summary of existing and future water levels for the lake is shown overleaf in **Table D.1**.

Reference to deeper water levels in the lake in the 1970’s is discussed in **Section D.2.2**.

Table D.1 Lake Water Levels for Non-Flood Periods – Existing and Future

	<i>Existing¹ (2011)</i>	2050	2100
Average water level (m AHD)	0.7	1.1	1.6
Maximum water level (m AHD)	1.5	1.9	2.4
Minimum water level (m AHD)	0.2	0.6	1.1
90 th percentile water level ² (m AHD)	1.1	1.5	2.0

Notes: 1. Averaged from 2004 data and 2007 – 2011 data in Estuary Processes Study (GeoLINK et al, 2011);

2. The water level greater than 90 percent of all recorded water levels;

D.1.2 Coastal Processes and Inundation

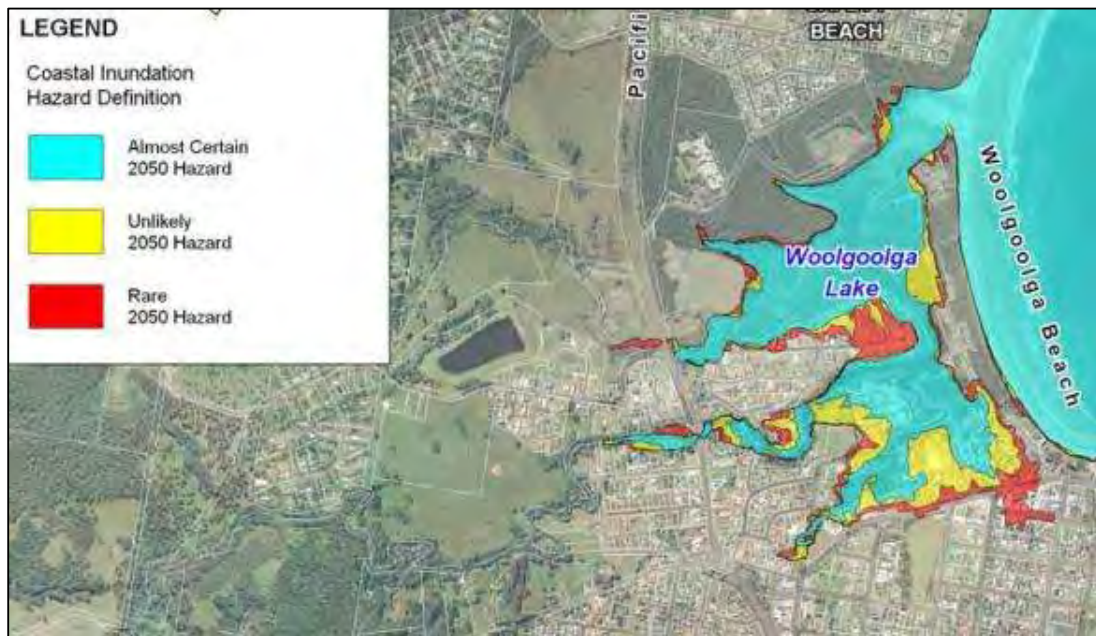
The long term shoreline recession on Woolgoolga Beach from coastal processes will result in some erosion of the north-eastern section of Lakeside Caravan Park and erosion of the reserve in the vicinity of the existing timber walls/rock revetment wall opposite the Woolgoolga Lake entrance – refer to **Plate D.1**.



Source: BMT WBM (2010b)

Plate D.1 Beach Erosion and Shoreline Recession Mapping for the Year 2050

Flooding along the margins of the lake as a result of elevated ocean levels during storms will be exacerbated by sea level rise – refer to **Plate D.2**. Modelling indicates increased inundation of Sunset Lakes Estate along the southern shores of the lake, increased inundation of Woolgoolga Sunset Caravan Park and areas adjoining Woolgoolga Creek, and inundation north of Beach Street in Woolgoolga.



Source: BMT WBM (2010b)

Plate D.2 Coastal Inundation Mapping for the Year 2050

Increased inundation of developed areas surrounding Woolgoolga Lake as a result of sea level rise will limit the effectiveness of existing low-lying stormwater treatment measures.

D.2 Geomorphology and Sediment Dynamics

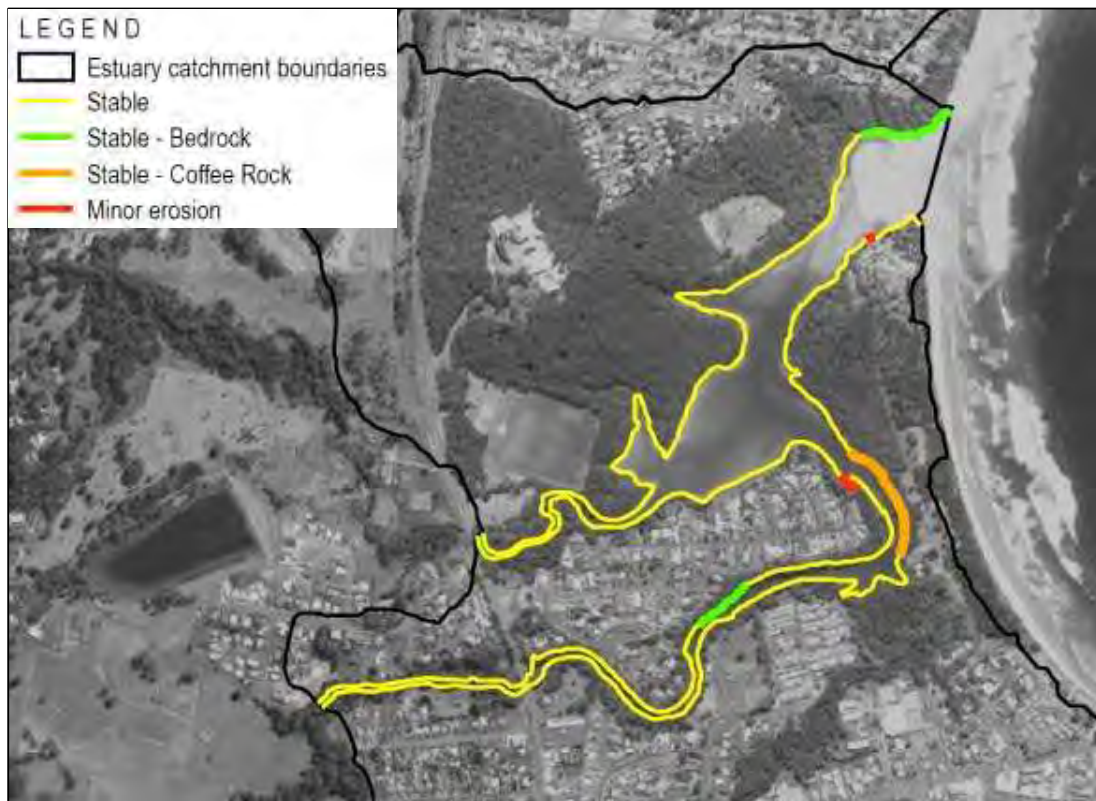
D.2.1 Bank Erosion

Bank erosion is not a significant issue in the Woolgoolga Lake estuary with only 5% of estuary banks subject to minor erosion and no moderate or severe erosion reaches identified – refer to **Plate D.3**. Several areas of past erosion have been remediated using predominantly rock revetment or mixed timber walls/rock revetment (e.g. north bank near Woolgoolga Creek entrance), or tyre walls.

D.2.2 Sedimentation

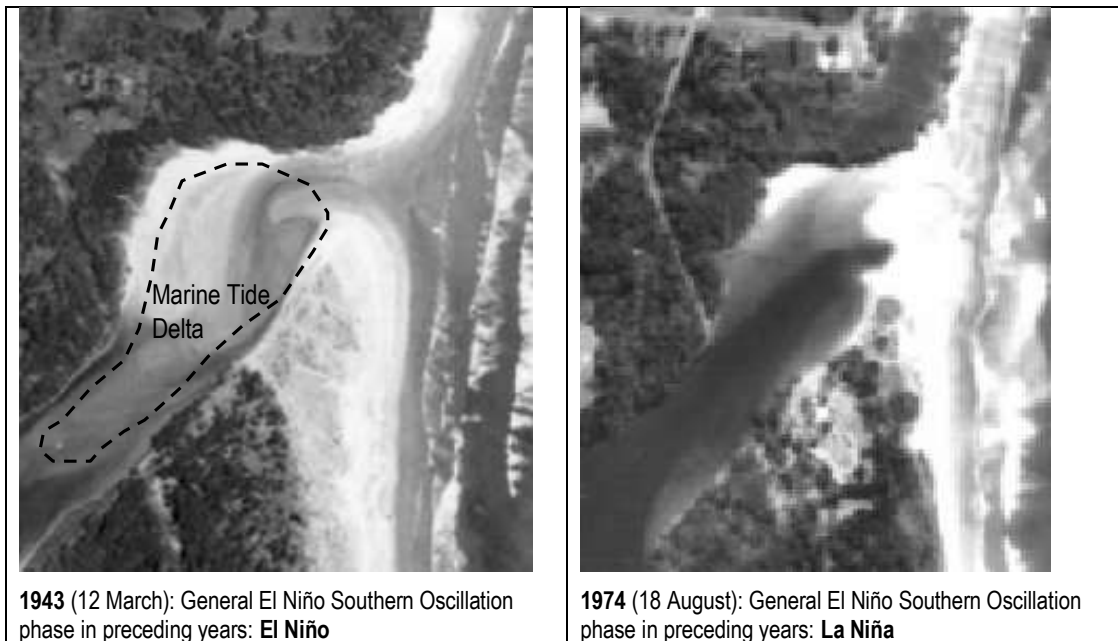
Aerial photography indicates the marine tide delta near the estuary entrance varies significantly in association with major flooding / rainfall events. Community experience of deeper water levels in Woolgoolga Lake in the 1970's relates to natural variations in the accumulation of marine sediment in the estuary. Erosion and transport of marine sediments out of an estuary is related to flood size and duration. The years 1964 and 1974 show a distinct reduction in the extent of the marine tide delta and a relatively deep estuary entrance area in comparison to other years (refer to **Plate D.4** to **Plate D.5**). This is attributed to: the exceptionally large rainfall events experienced prior to the photographs; the generally 'wet' years during this period; and potentially the large wave conditions and severe coastal erosion experienced in 1974. The rainfall events experienced during this period include:

- A flood in April 1962 - the second largest flood on record for Woolgoolga Lake;
- 305 mm of rainfall in one day in April 1963 (the third largest daily rainfall total on record for Woolgoolga);
- 196 mm of rainfall in one day in March 1964 (the 14th largest daily rainfall total on record); and
- A flood in March 1974 - the largest flood on record for Woolgoolga Lake. The rainfall during this flood included 146 mm, 306 mm and 138 mm on three successive days.



Source: GeoLINK et al. (2011)

Plate D.3 Bank Erosion Severity (mapped January 2011)



1943 (12 March): General El Niño Southern Oscillation phase in preceding years: **El Niño**

1974 (18 August): General El Niño Southern Oscillation phase in preceding years: **La Niña**

Plate D.4 Entrance Conditions – Aerial Photographs –1943 and 1974



1994 (17 May): General El Niño Southern Oscillation phase in preceding years: **El Niño**

2009 (May): General El Niño Southern Oscillation phase in preceding years: **La Niña**

Plate D.5 Entrance Conditions – Aerial Photographs – 1994 and 2009

D.3 Water Quality Processes

Physico-chemical water quality data for Woolgoolga Lake shows a high degree of variability, a common and defining feature of ICOLLs.

Median turbidity readings exceed ANZECC (2000) guidelines and OEH MER guidelines, however the default guidelines may not be readily applicable to shallow ICOLLs such as Woolgoolga Lake where re-suspension of sediment occurs as a result tidal fluctuations and wind-driven currents.

Limited chemical water quality data indicates Woolgoolga Lake is slightly nitrogen enriched but is not phosphorus enriched. Nutrient and sediment modelling of the estuary catchment indicates that:

- forestry operations in the upper catchment area are the main contributor of nitrogen and sediment;
- horticultural land uses contribute most of the phosphorus; and
- residential land-use is also a significant contributor of sediments and nutrients.

Faecal indicator organism samples indicate the waters of Woolgoolga Lake (for the period sampled) are generally safe for primary contact recreation. Chlorophyll-a concentrations indicate that Woolgoolga Lake has a slightly elevated trophic status.

D.4 Ecological Processes

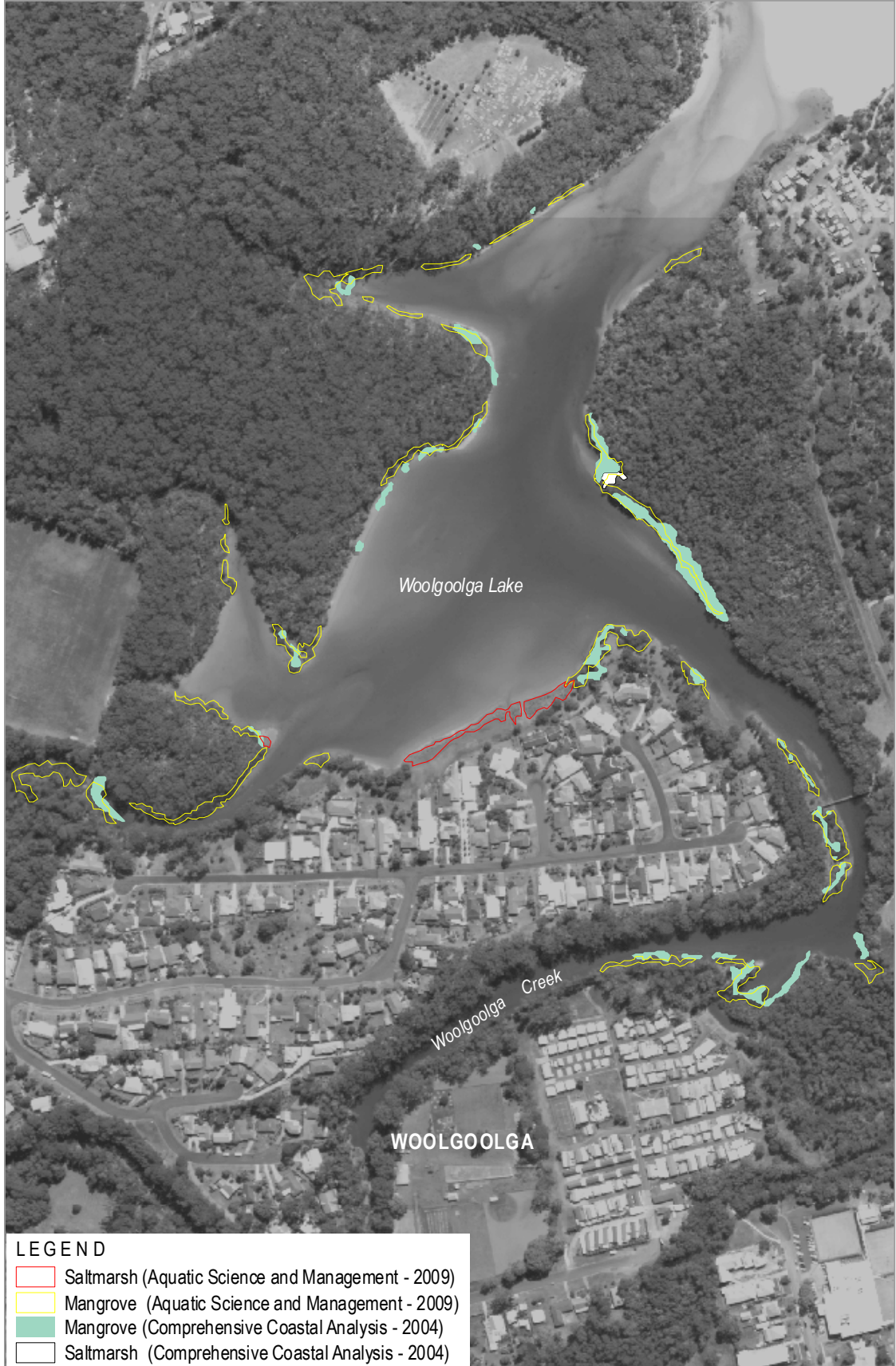
D.4.1 Estuarine Habitat

Benthic habitat is a mixture of sand, mud and gravel bars. Mangroves are the dominant vegetative habitat type in Woolgoolga Lake, and the extent of mangroves has increased – refer to **Illustration D.1**.

The area of saltmarsh at Woolgoolga Lake between the southern shores and Sunset Lakes Estate is likely to be 'squeezed' and potentially lost with higher water levels resulting from sea level rise as there is nowhere for the salt marsh to retreat / re-establish.

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: July 2011
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



LEGEND

- Saltmarsh (Aquatic Science and Management - 2009)
- Mangrove (Aquatic Science and Management - 2009)
- Mangrove (Comprehensive Coastal Analysis - 2004)
- Saltmarsh (Comprehensive Coastal Analysis - 2004)



Data Compilation and Estuary Processes Study
 1616534

**Estuarine Habitat Mapping Undertaken as part of this Study
 Compared with Williams *et al* (2006) - Woolgoolga Lake**

Illustration 7.6

D.4.2 Aquatic Fauna

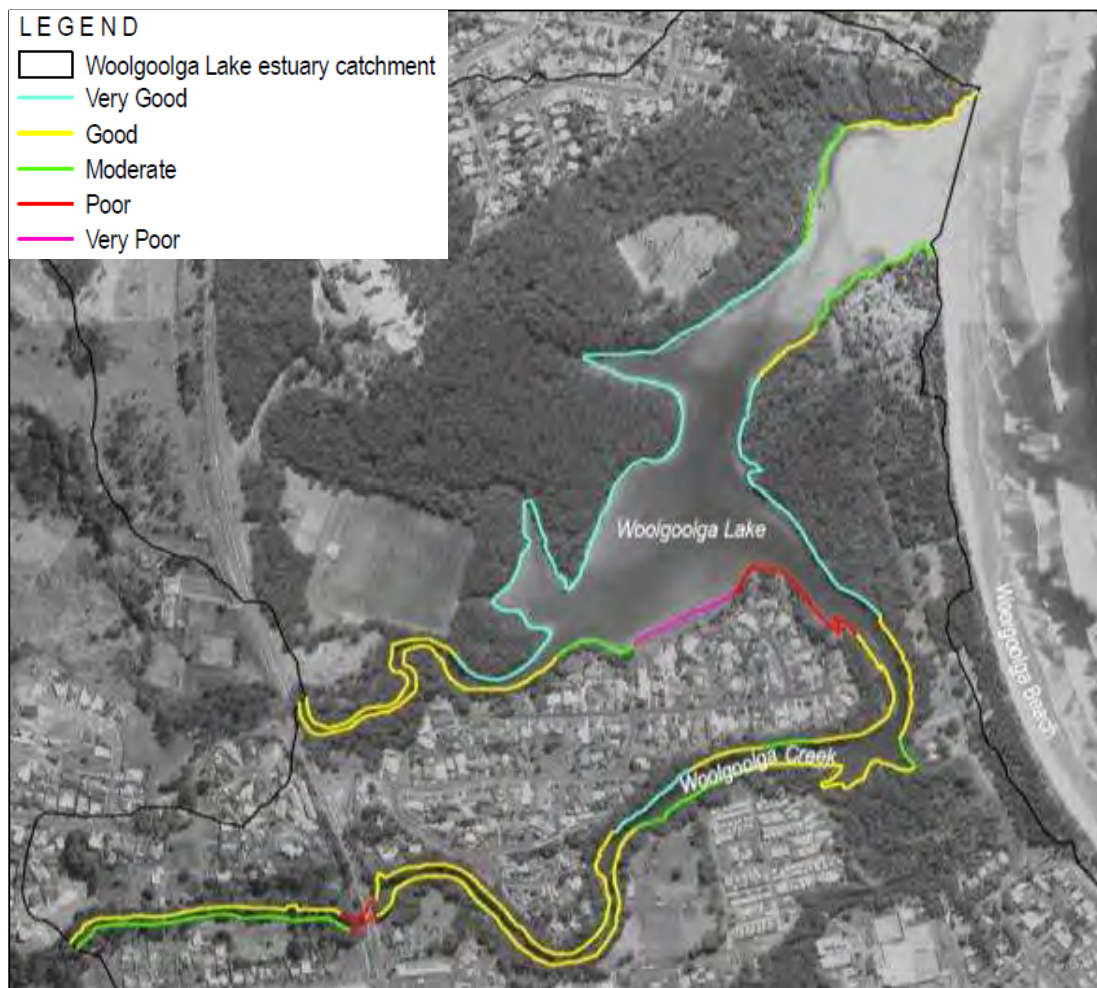
Macroinvertebrate fauna were sampled and analysed. The results indicated that the central regions of the waterway contain the most diverse and abundant benthic macroinvertebrate fauna. A survey of fish species was undertaken with relatively few animals from a small number of taxa collected. No threatened aquatic species have been individually reported from Woolgoolga Lake.

D.4.3 Woolgoolga Lake Flying Fox Camp

A Grey-headed Flying-fox maternity camp occurs along the eastern banks of Woolgoolga Lake. This species is listed as vulnerable. Council plans on developing a long-term Flying-fox Management Strategy for the camp.

D.4.4 Riparian Vegetation

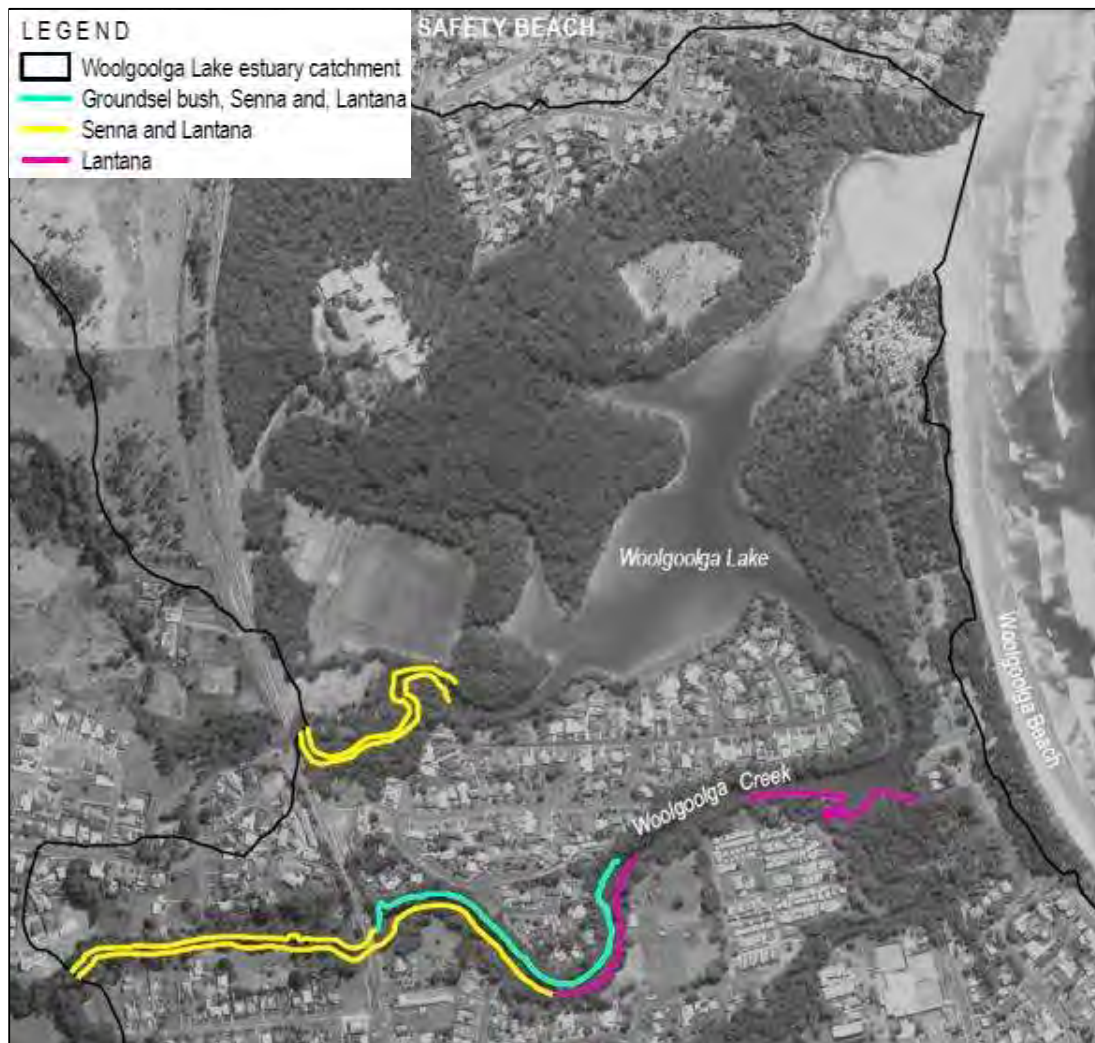
Riparian vegetation in the study area is predominately in moderate to good condition (96% of mapped estuary banks) – refer to **Plate D.6**. Only 3% of banks had riparian vegetation in poor to very poor condition and these reaches were confined to the southern bank of Woolgoolga Lake where it is clear of riparian vegetation with the exception of fringing saltmarsh which is impacted by mowing practices. An analysis of aerial photography shows the site was cleared prior to the 1940's. However, since the 1980's when residential development accelerated the native vegetation has not been allowed to regenerate as a result of mowing practices.



Source: GeoLINK et al. (2011)

Plate D.6 Riparian Vegetation Condition (mapped January 2011)

The distributions of major weeds along the estuary have been mapped – refer to **Plate D.7**. Four of the mapped invasive weed species are listed as Priority B or C in coastal or riparian landscapes under the Northern Rivers Invasive Weed Strategy 2009-2013.



Source: GeoLINK et al. (2011)

Plate D.7 **Distribution of Priority B and Priority C Invasive Weed Species (mapped January 2011)**

D.4.5 Estuary Health

In general, the health of Woolgoolga Lake is average:

- water quality is generally acceptable for recreational use and for the protection of aquatic ecosystems;
- saltmarsh is scarce and poorly managed. Mangroves appear to be recruiting to the system, a positive indication. Seagrass appears to have disappeared from the system in the past decade, though the original extent is unknown. Weeds and other disturbances to riparian vegetation are common;
- fish and macroinvertebrate populations are scarce and lack diversity;
- fish kills have been related to pesticide spills; and
- algal blooms and pest invasions do not appear to be an issue.

D.5 Climate Change and Sea Level Rise

Climate change is projected to include an increased frequency of hot days, increased intensity and frequency of extreme daily rainfall events and droughts, changes to sea levels and changes in the occurrence of intense storm events. Climate change projections at the local scale for the Coffs Harbour area are described in a report by BMT WBM (2010a). The climate change projections for the Coffs Harbour area (relative to the 1977 to 2007 period) include the following:

- evaporation: decreases in summer and spring and increases in autumn and winter;
- temperature: decreases in average temperatures for summer, autumn and spring and increases in winter;
- Extreme Hot Days: significant increases in the annual number of extreme hot days;
- Average Rainfall: increases in annual totals and seasonal totals except for decreases in autumn totals for the Coffs Harbour area;
- High Rainfall Events: increases in frequency of high rainfall events in summer and autumn;
- Sea Level Rise: 0.4 m increase in mean sea level by 2050 and 0.9 m increase by 2100 (relative to 1990 mean sea levels); and
- Wave Climate: future wave climate will be similar to the present or within the variability of the existing wave climate. However, the Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2010b) investigated the possibility of a permanent shift from the existing south easterly wave climate to a more easterly wave climate with average wave height remaining the same.

D.5.1 Climate Change and Sea Level Rise Impacts on Estuary Processes

General estuary processes that will be impacted by climate change include (after Haines, 2006 and 2008; Mackenzie et al., 2009):

- coastal processes and interactions with estuary entrances: e.g. a landward and upward shift in entrance channels in response to sea level rise;
- hydrodynamics: changes in water level and altered tidal prisms due to changes to entrance conditions; impacts of altered rainfall and evaporation patterns. Predicted sea level rise may result in higher water levels within the estuary and potentially an increase in typical water depths;
- sediment dynamics: changes to ingress of marine sediment due to changes to entrance conditions and changes to sediment derived from catchment runoff in response to an increase in high rainfall events;
- water quality: changes to water temperature and sediment dynamics and subsequent changes to chemical and physical processes in the estuary; and
- ecology: the impacts of increased water levels and altered hydrodynamics, sediment dynamics and water quality on ecological processes.

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Appendix E

Summary of Community Uses Assessment

Community consultation aims to discover community aspirations and gain stakeholder input to the Project to ensure that the Estuary Management Plan is accepted by the community as a coherent, practical and achievable plan.

E.1 Previous Consultation

The outcomes from the public participation for the 1991 Woolgoolga Lake Plan of Management reflect the issues of concern that have arisen under the current project. The 1991 main issues of concern include: erosion at the mouth of the lake; dredging of marine sand deposits near the mouth; removal of sediments within the lake near Sunset Lakes Estate to improve recreational use of the lake; reduction in bushfire hazard; restoration and protection of the eroding northern bank near the lake entrance; formalisation of walking tracks in bushland areas; water quality monitoring; stormwater treatment; increased signage for public access points; and rehabilitation of eroded and weed infested areas.

E.2 Initial Community Workshop

A community workshop was held at Woolgoolga Community Centre on 14 September 2010. The purpose of the Initial Community Workshop was to gain input on community values, issues and objectives for the three estuaries. Approximately 30 people attended the workshop.

Council and the consultant team (GeoLINK / GECO Environmental / Aquatic Science and Management) provided an introduction on the Estuary Management Plan process. The attendees then formed five groups to discuss and compile a list of key issues and goals for the estuaries. Following the group work a representative from each group summarised their key issues and goals. A final question time was undertaken before the workshop concluded.

The key focus of the attendees was generally Woolgoolga Lake, however some specific comments relating to Darkum Creek were provided. The main issues arising from the workshop related to the need for improved water quality and reduced sedimentation in Woolgoolga Lake and an entrance management protocol to assist these two issues.

The various goals and issues developed by the group work are summarised below. The comments below refer to Woolgoolga Lake except where noted otherwise.

E.2.1 Goals:

- improved water quality for Woolgoolga Lake;
- increased water depths in Woolgoolga Lake for improved recreation (swimming and boating);
- a protocol for opening the entrance to Woolgoolga Lake to improve water quality and assist with preventing sedimentation in the lake;
- maintenance of a stable sand spit on the south side of the Woolgoolga Lake entrance;
- dredging was recommended by some groups to address the sedimentation issues in Woolgoolga Lake;
- a return to a past condition of Woolgoolga Lake when it was considered deep and clean and allowed a range of recreational activities – swimming, boating;
- removal of the training wall on the north side of the Woolgoolga Lake entrance was suggested by one group to establish a 'more natural' amenity and function;
- foreshore management;
- water quality monitoring;
- improved fish breeding;
- improved signage and walkway access to the lake foreshore;
- improved passive recreation facilities e.g. picnic facilities; and
- a telephone 'hotline' to advise Council of problems associated with Woolgoolga Lake.

E.2.2 Issues:

- sedimentation in Woolgoolga Lake resulting in reduced water depth and thereby impacting on recreational use of the lake;
- poor water quality in Woolgoolga Lake;
- erosion of the sand spit on the south side of the Woolgoolga Lake entrance was a concern for a number of groups;
- diminishing fish stock in Woolgoolga Lake;
- urban drainage systems causing flooding issues;
- damage to existing walkways and lack of maintenance of the walkways;
- previous channel works to Poundyard Creek having a negative impact on Woolgoolga Lake;
- address water quality issues associated with runoff from rural lands and urban areas (nutrients, herbicides, pesticides, sediment and organic matter);
- fire management was expressed as a concern by one group;
- seepage into Woolgoolga Lake from the cemetery on the northern foreshore; and
- concern was expressed by some attendees regarding pollution from Flying-fox excrement.

Some concerns were also expressed in relation to the estuary management planning process in regard to:

- public availability (and ease of access) of documentation; and
- scepticism as to whether management plan actions will be undertaken and the timeframe of actions.

E.3 Community Survey

A community survey was undertaken over a two month period from April to May 2011, encompassing a school holiday period to provide opportunity to capture input from the widest possible catchment of users. The surveys were located at Council offices, local outlets in the estuary catchments such as caravan parks, newsagents and post offices. In addition, a web survey was made available through the website.

The survey data is summarised below. The total number of completed surveys received was 50.

1. Where are respondents from?

Sixty percent of respondents were from the Woolgoolga area, 22 % from Safety Beach and 16 % from elsewhere in the Coffs Harbour Council area. One respondent was from outside the Coffs Harbour Council area at the time of completing the survey.

2. How often do you visit use Woolgoolga Estuary?

All respondents indicated they visit or use Woolgoolga Lake. Respondents visiting the Woolgoolga Lake on a daily basis made up 38% of the total respondents, with a few times a week and a few times a year the next highest responses at 18% and 20% respectively. 4% of respondents rarely or never visit the Woolgoolga Lake.

3. Indicate how you use the estuary:

Survey results indicate the main use of the Woolgoolga Lake is walking, with 86% of total respondents identifying this use. Respondents identifying swimming, picnicking, dog walking, fishing and bird-watching were similar in number, from 36-46%. Boating was listed by 14% of respondents as a use. 8% of respondents listed other uses including kayaking.

4. Indicate your level of concern for the following estuary-related issues:

The estuary issues of most concern, identified by 66 to 68% of respondents were:

- water quality issues associated with runoff from agricultural lands and urban areas;
- increasing levels of sedimentation in Woolgoolga Lake; and
- sand build-up in the entrance to Woolgoolga Lake causing blocking of outflows and high flood levels.

The estuary issue of least concern, identified by 38% of respondents, was inadequate public access around Woolgoolga Lake foreshores / creeks.

5. Indicate the importance you place on the following estuary related goals:

The estuary goals of most importance, identified by 76-82% of respondents were:

- improved water quality;
- improved aquatic habitat within the lake and creeks to support fish stocks, crustaceans, etc; and
- improved runoff control in urban areas of the catchment.

6. Artificial opening of the Woolgoolga Lake Entrance:

Sixty-four percent of respondents indicated they would support artificial opening of the Woolgoolga Lake entrance. 18% of respondents do not support artificial opening with a further 16% undecided.

7. Use of motor boats in the estuary:

76% of respondents indicated they do not support the use of motor boats. 26% of respondents indicated that they would support the use of motor boats in Woolgoolga Lake estuary, with canoes with a mini outboard motor considered the most suitable.

8. Flying Fox colony at Woolgoolga Lake

52% indicated that they were not concerned about the flying fox colony at Woolgoolga Lake.

E.4 Stakeholder Consultation

The organisations listed below were consulted to obtain initial input to the study:

- NSW Department of Environment, Climate Change and Water
- NSW Department of Environment, Climate Change and Water – Environmental Protection Authority
- NSW Department of Environment, Climate Change and Water – Parks and Wildlife Group
- Solitary Islands Marine Park Authority
- Primary Industries (Fisheries) – Industry and Investment NSW
- Northern Rivers Catchment Management Authority - Coffs Harbour
- Department of Planning - Grafton
- NSW Department of Water
- Land and Property Management Authority
- NSW Maritime
- Roads and Traffic Authority
- Coffs Coast Tourism Association
- Local Aboriginal Land Council – Coffs Harbour
- Gumbular-Julipi Elders Council, c/o Coffs Harbour Local Aboriginal Land Council
- Woolgoolga Surf Life Saving Club
- Coffs Harbour Historical Society and Museum Inc.
- Landcare
- Woolgoolga Chamber of Commerce Industry & Tourism Inc

- Let's Save Woolgoolga Lake
- Coffs Harbour City Council
- Garby Elders
- Jim Stevens
- Woolgoolga Returned Services Golf Club

Input received from various organisations has been incorporated into the assessment of the relevant issues in the EMS. The issues are summarised below.

Table E.1 Consultation Correspondence

Stakeholder
<p>Department of Planning (DoP)</p> <p>The DoP refers to the following documents for consideration in preparing the CZMP:</p> <ul style="list-style-type: none"> ▪ Mid North Coast Regional Strategy; and ▪ SEPP 71 – Coastal Protection.
<p>The DoP raises the issue of future sea level changes and its consideration in planning for coastal areas. The DoP refers to the following documents and guidelines for consideration in preparing the CZMP:</p> <ul style="list-style-type: none"> ▪ NSW Sea Level Rise Policy Statement; ▪ NSW Coastal Planning Guideline: Adapting to Sea Level Rise; ▪ Coastal Risk Management; and ▪ Flood Risk Management.

E.5 Final Community Workshop – Development of Strategies

A community workshop was held at Woolgoolga Community Centre on 13 October 2011 for the three estuaries (Darkum Creek, Woolgoolga Lake, and Willis Creek). The purpose of the workshop was to gain community input into the development of management strategies to ensure appropriate strategies have been developed, and to assist with identifying priorities. Approximately 30 people attended the workshop.

Council and the consultant team (GeoLINK / GECO Environmental / Aquatic Science and Management) provided an introduction on the key issues for the estuaries. The attendees then formed six groups to develop a list of key management strategies targeting the key issues for the estuaries. The output of the six groups are summarised in the following table. Following the group work a representative from each group summarised their strategies and reasoning. A final question time was undertaken before the workshop concluded.

The key focus of the attendees was generally Woolgoolga Lake, however some strategies such as catchment pollutant strategies related to all three estuaries. The main strategies generally aligned and supported the strategies that were being developed by the consultant team. The main strategies developed by the six groups are included:

- catchment pollutant strategies particularly with respect to rural runoff;
- management of environmental weeds and protection of riparian areas;
- urban stormwater management;
- sewerage overflows;
- dredging of the entrance;
- maintaining and enhancing existing walking trails; and
- prevent new development in areas affected by increased water / flood levels from sea level rise.

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Table E.2 Management Strategies Developed in Community Workshop on 13 October 2011

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Stormwater and Catchment Inputs	<ul style="list-style-type: none"> ▪ Education and address policing / fining ▪ Erosion due to building and bad farming practices (eg. Blueberry / bananas) ▪ Sewerage inspections ▪ Dog excrement: place "poo bags" at head of walking tracks and police this / fines ▪ Council and NPWS to enforce "Animals Act". 	<ul style="list-style-type: none"> ▪ Eliminate or reduce top soil erosion / runoff from entering Poundyard Creek from construction and rural activities eg. blueberries 	<ul style="list-style-type: none"> ▪ Ongoing monitoring of water quality from all waterways and action taken to correct any silt or chemical imbalances ▪ In rural areas ensure a minimum buffer zone of 22 m along all waterways to trap sediment runoff 	<ul style="list-style-type: none"> ▪ Address the issue of erosion from orchards ▪ Campaign awareness for residents in the catchment (rural and urban) 	<ul style="list-style-type: none"> ▪ Buffer zones to 30 m along waterways ▪ Construct nitrogen traps / filter zones ▪ Address litter from children ▪ Inspection of sewerage especially Poundyard Ck 	<ul style="list-style-type: none"> ▪ Stormwater treatment devices implemented on all outlets and regularly serviced ▪ Water quality monitoring ▪ Audit agricultural practices ▪ Fish sampling for water quality monitoring
Impacts to foreshores	<ul style="list-style-type: none"> ▪ Seek funding for protection of riparian areas ▪ Support for volunteer groups for removal of rubbish and regeneration activities ▪ Council implement / supplies facilities (eg. common green skip bins) for landowners / caravan parks to remove green waste to prevent illegal dumping ▪ Wooden barriers / bollards and planting to define boundary to prevent mowing encroachment to native bushland 	<ul style="list-style-type: none"> ▪ Removal of noxious weeds eg. mile-a-minute and morning glory 	<ul style="list-style-type: none"> ▪ Educate residents and council workers on detrimental effects of mowing and other foreshore gardening activities on native riparian vegetation ▪ Develop and implement a management plan to keep lantana and other environmental weeds out of the foreshore areas ▪ Develop and implement an erosion management strategy 	<ul style="list-style-type: none"> ▪ Bollard the western end of the Woolgoolga Lake picnic area to eliminate vehicle access and a sign erected to prohibit cars, bikes onto the lake foreshores ▪ Campaign to control noxious weeds on the edges of Woolgoolga Lake ▪ A campaign to eliminate the camphor laurel problem that is developing along these creeks in the upper reaches 	<ul style="list-style-type: none"> ▪ Address illegal mowing, tree removal, and use of fertilisers ▪ Requires more landcare, neighbourhood and weed management groups ▪ Bush regeneration at TAFE ▪ Re-establish buffer zones ▪ Council get rid of green bins and place mulch around trees ▪ Promote / educate community regarding composting / worm 	<ul style="list-style-type: none"> ▪ Address weeds – lantana, asparagus fern (CMA, School, Community) – continue spraying; ▪ Mangroves – implement colonisation study (CMA, schools).

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
				<ul style="list-style-type: none"> ▪ Keep natural, no rock walls, no retaining walls, no sandbags 	farms	
Flooding	Council to revise: <ul style="list-style-type: none"> ▪ stormwater planning ▪ level of outlets for sewerage or relocating outlets ▪ relocation of housing at risk from flooding 	<ul style="list-style-type: none"> ▪ Address sewerage pumping stations overflow in heavy rains ▪ Keep stormwater drains cleared 	<ul style="list-style-type: none"> ▪ Rebuild and vegetate southern dune peninsula (near Caravan Park) by pumping sand from sedimentation area. This should improve any flooding problems in Woolgoolga Lake 	<ul style="list-style-type: none"> ▪ Have to maintain vegetation corridors within the catchment to slow run-off and reduce intensity of flooding, particularly when setting up new developments ▪ To alleviate the flooding of foreshore, removing the silt from the estuary mouth (dredging and sand pumping) Council should setup regular maintenance of clearing sand build-up by way of earth moving equipment after dune erosion. Push the sand back onto the southern dune entrance and beachfront ▪ Stop removing branches and tree trunks from waterways 	<ul style="list-style-type: none"> ▪ Odour issues from pump station at end of Young Street ▪ Convert kerb and guttering to dish drains and local grasses and plants ▪ Install retention basin and sedimentation traps ▪ Promote stormwater infiltration devices on properties 	<ul style="list-style-type: none"> ▪ Manually open Woolgoolga Lake mouth in storm events ▪ Public notification (paper) of water quality following flood events.

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Sedimentation	<ul style="list-style-type: none"> ▪ Holding ponds higher up the catchment ▪ Do not remove or install large logs (natural damming) to slow water flow, catch sediment and provide fish / aquatic habitat. 	<ul style="list-style-type: none"> ▪ Dredging to remove sediment from bottom of lake 	Refer to Flooding comments.	<ul style="list-style-type: none"> ▪ Reinstate the natural northern lake entrance by removing the retaining wall ▪ Bulldoze the sand; ▪ Dredge the entrance to remove sand ▪ Return to contour planting in agriculture on the catchment hills (eg. blueberry farms) 	<ul style="list-style-type: none"> ▪ Re-establish riparian vegetation using neighbourhood group eg Sunset Lakes ▪ Utilise sediment traps and biological solutions to address sediment runoff ▪ Increase riparian buffer near sports oval by reclaiming 10 – 20 m on east of oval ▪ Increase riparian buffer along Darkum Creek within Golf Course 	<ul style="list-style-type: none"> ▪ Runoff and marine silts are considered the issue ▪ Water depth varies depending on mouth status ▪ Dredging is considered to be temporary relief (optic cable maybe impacted by dredging)
Recreation	<ul style="list-style-type: none"> ▪ Prevent 4WD entry / damage to environment ▪ No new walking tracks to be put in ▪ Maintain and enhance existing walking tracks so that public stay on tracks ▪ NPWS to prevent and police / fine 4WD's on beach 	<ul style="list-style-type: none"> ▪ No further trail networks are needed ▪ Bank erosion at the picnic area of the lake needs to be addressed 	<ul style="list-style-type: none"> ▪ Existing trail networks which are retained should be converted to boardwalks to prevent erosion ▪ Where trail (where boardwalks) are set back from waterways, then the land between can be developed as a catchment / erosion control zone for runoffs to ease siltation and erosion 	<ul style="list-style-type: none"> ▪ Walking trails on the cemetery side of the lake need fixing as it is washed out and dangerous ▪ Very important to keep and expand the walking trails so residents and visitors can enjoy the waterways 	<ul style="list-style-type: none"> ▪ Close off unnecessary trails ▪ Make clear signage – interpretation ▪ Retain only necessary well-walked trails ▪ Stop 4WDs / motorbikes on trails 	<ul style="list-style-type: none"> ▪ Pathways – adequate quantity but quality poor (fix steps / drainage – north shore, Safety Beach) ▪ Upgrade to “in-ground”, permanent well-constructed eg Port Macquarie Headland Walk.

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
			<ul style="list-style-type: none"> Educational signage at key points of each waterway on the importance of these as a natural environment. 			
Climate Change and sea level rise	<ul style="list-style-type: none"> No new developments in flood prone areas as designated by Coffs Coastal Zone Management Plan Protection (by zoning) of existing native riparian habitat 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Council to identify and publicise those properties which will be affected by climate change and flooding events and develop and implement property prevention measures 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Make retreat areas for animals and plants Households to use water retention strategies No new development in river / lake / sea level rise areas. 	<ul style="list-style-type: none"> No comment
Other	<ul style="list-style-type: none"> More active policing / fining of regulations by NPWS and Council Use signs and education avenues eg. in schools, social media, tv and papers Container legislation – 10c for return of bottles and cans to prevent litter 	<ul style="list-style-type: none"> The poor condition of Woolgoolga Lake Bridge is considered an eyesore 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Community Dune Care Groups should have to seek approval from Council and community before performing strategies and so-called improvements to the lake and foreshores, in particular pruning has been done which leaves a lot to be desired Ugly shade-cloth fences on beach front etc unnecessary and for long periods. 	<ul style="list-style-type: none"> Teach people to look at rivers for health, deterioration and regeneration, street education All new development to be required to be 40% under indigenous vegetation 	<ul style="list-style-type: none"> No superfluous signage – if a must, eco-friendly and reduce (maintain) education signs to a minimum



Appendix F

Summary of Development of Management Objectives and Issues

F.1 Values

F.1.1 Local and Regional

The natural settings of the estuaries and coast within the Mid North Coast area are a feature that attracts visitors and locals to the area. Woolgoolga Lake and its tributaries are in keeping with this natural setting, form part of the network of bushland settings along the coast and estuaries and are of local and broader significance due to their proximity to residential communities of Woolgoolga and Safety Beach.

Key values of the estuary include its natural setting and recreational opportunities including the public picnic area adjacent to the Woolgoolga Lakeside Holiday Park and the walking and cycling track network. The sites attributes create a highly attractive and popular recreation destination for the local and wider community.

F.1.2 Cultural Heritage

Aboriginal, European and Sikh cultural heritage values are significant for the Woolgoolga area.

The Woolgoolga area was (and continues to be) inhabited by the Gumbayngirr people prior to European Settlement. Records show that artefact finds and earth mound / shell middens, a possible burial site and a camp site are located within the within the Woolgoolga Lake catchment.

Europeans moved into the area from the 1870s. Records indicate that there are cultural items of significance within the study area associated with the timber harvest industry that established in the early days of European settlement.

The cultural values of these Aboriginal and European sites within the Woolgoolga Lake catchment area require sensitive consideration and preservation.

F.1.3 Recreational Values

The close proximity of residential communities and the variety of natural settings around Woolgoolga Lake combine to create a broad range of passive land and water based recreational opportunities that optimise the scenic potential of the area.

A key focus of recreational activity occurs at the public picnic area adjacent to the Woolgoolga Lakeside Holiday Park. The sites attributes create a highly attractive and popular recreation destination for the local and wider community. The area has a long open foreshore that allows easy, soft water entry for swimming and canoe / kayak launching. Picnic facilities, barbecues, toilets, a playground and maintained open spaces cater to high number of visitors and family groups. Some minor damage to the foreshore environment is evident around the edge of the lake where access for water-based recreation has exposed or compacted the ground and inhibited vegetation recovery.

The predominant activity elsewhere around the lake is recreational walking, jogging and cycling which are facilitated by a network of boardwalks, bridges and bush tracks of varying standard that extend around the lake periphery and provide access to key destinations at the water's edge.

F.1.4 Scenic Values

There are a number of scenic values of Woolgoolga Lake and its tributaries:

- the majority of the foreshores around the lake comprise a continuous edge of natural vegetation, often extending well back from the foreshores and rising up adjoining slopes producing an attractive natural skyline and backdrop to views across the lake;
- the surrounding ridges enclose and help to protect the lake, further enhancing the microclimate and visual experience to visitors; and
- one of the most popular public reserves occupies the southern edge of the lake near the Woolgoolga Lakeside Holiday Park. Here, open grassed spaces beneath remnant trees produce a highly attractive recreation area with panoramic views across the lake to the north and west.

F.1.5 Hydrodynamic Values

A key issue raised through community consultation relates to the depth of Woolgoolga Lake and its subsequent impact on recreational use of the estuary.

Consultation indicated that the community aspirations for Woolgoolga Lake include.

- improved water quality for Woolgoolga Lake;
- increased water depths in Woolgoolga Lake for improved recreation (swimming and boating);
- a protocol for opening the entrance to Woolgoolga Lake to improve water quality and assist with preventing sedimentation in the lake (an opening strategy for Darkum Creek was also suggested by one group);
- a return to a past condition of Woolgoolga Lake when it was considered deep and clean and allowed a range of recreational activities.

F.1.6 Water Quality Values

Despite showing high levels of variability common to ICOLLs, when assessed against the ANZECC (2000) guidelines the water of Woolgoolga Lake is generally acceptable for the protection of aquatic ecosystems. The main exception to this pattern is that the TN concentration is generally above the ANZECC (2000) guideline trigger value. In addition to this, the waters of Woolgoolga Lake in the area around the caravan park have been shown to be suitable for primary contact recreation such as swimming for 9 of the 13 months that sampling was undertaken.

The entrance to Woolgoolga Lake is frequently open to tidal exchange. As a result of this, flushing times are likely to be relatively low throughout the system, maintaining good water quality.

To the knowledge of the author there have been no algal blooms recorded from Woolgoolga Lake and the only reported fish kill was associated with an isolated chemical spill.

F.1.7 Ecological Values

There are a number of ecological characteristics of the Woolgoolga Lake estuary that can be considered values. These include the following:

- approximately 1ha of mangrove habitat distributed around the lake that is largely in good condition and actively recruiting in many areas. Mangroves are an important primary producer driving the overall productivity of the system, provide structural habitat for fish and invertebrates and stabilise banks and sediment;
- a mostly intact and healthy riparian vegetation, that filters overland flows, stabilises banks, provides structural habitat for fish and contributes to the overall productivity of the estuary;
- fish and invertebrates that provide a resource for recreational fishers. Commonly targeted species include flathead, bream and mudcrabs;
- a large population of saddle tree oyster (*Isognomon ephippium*) that provides structural habitat, stabilises bottom sediments and filter the water;
- snags in the ecological zones referred to as the upper and lower creeks that provide habitat for fish, help to slow flows and reduce erosion;
- intertidal sand and mud banks that provide foraging habitat for wading birds (some of which are protected under international treaties and Australian legislation) and a substrate for primary producers that drive the food webs of the estuary;
- a pleasant and attractive environment created by the combination of the above features; and
- a maternity camp of the vulnerable species Grey-headed Flying-fox occurs along the banks of Woolgoolga Lake. In order to protect, restore and manage the camp CHCC as part of the Our Living Coast program, plan on developing a Flying-fox Management Strategy to achieve an equitable balance between conservation and the social, cultural, aesthetic and environmental values shared by the community (Our Living Coast 2010).

F.2 Management Objectives

F.2.1 Entrance Conditions and Hydrodynamics Objectives

F.2.1.1 Develop a Formal Entrance Management Policy

Woolgoolga Lake is an 'intermittently open' system. The entrance opens and closes to the ocean naturally in a constant but irregular cycle depending on fluvial, tidal and wave processes. Artificial opening of the entrance has been initiated by Council in the past as a flood control measure. Council has an informal policy of opening the lake entrance when the lake water level reaches an established flood mark indicating the adjoining sewerage system is at risk of being flooded. The last opening initiated by Council was in 2007.

CEMAC identified the need for a formal entrance management policy for Woolgoolga Lake which is to include matter such as criteria for artificial opening. Additionally, the OEH Guidelines for Preparing Coastal Zone Management Plans (DECCW, 2010) requires Estuary Management Plans for ICOLL's to include an entrance management policy.

F.2.1.2 Minimise Interference with Natural Entrance Opening / Closing Processes

Artificial opening of ICOLL's can have significant negative impacts on water quality, fish and other ecological communities. Under natural conditions, ICOLL entrances open over a relatively wide range of water levels termed the 'natural breakout range'. Lake water level records for the period of 1982 to 1988 (a period with varying rainfall years from very dry to very wet with some average years) indicate a 'natural breakout range' of 1.2 to 1.8 m AHD – the lake water levels at which a closed entrance naturally opens. Lake water level records for the period of 2007 to 2011 (a high rainfall period) indicate a similar 'natural breakout range' of 1.2 to 1.6 m AHD.

An occasional artificial opening of the entrance within the 'natural breakout range' is not likely to have a significant environmental impact since it falls within the expected natural variation. However, over the longer term, numerous artificial openings especially at a comparatively low water level are likely to have a significant environmental impact since the natural frequency and duration of opening and closing to the ocean will be significantly altered. In the short term, more frequent openings can lead to increased exposure and death of aquatic vegetation and increased risk of low dissolved oxygen and incidence of fish kills. Over the long term, more frequent openings will lead to shifts in the structure and distribution of fringing riparian vegetation communities and public health considerations including smells / odours and poor water quality.

Therefore the objective is to maintain a natural opening / closing regime for the lake entrance. Interference (artificial opening of the entrance) would only be employed for critical situations such as to mitigate and reduce the impacts of flooding on properties and infrastructure adjoining the lake. Artificial opening would ideally be initiated within the 'natural breakout range'.



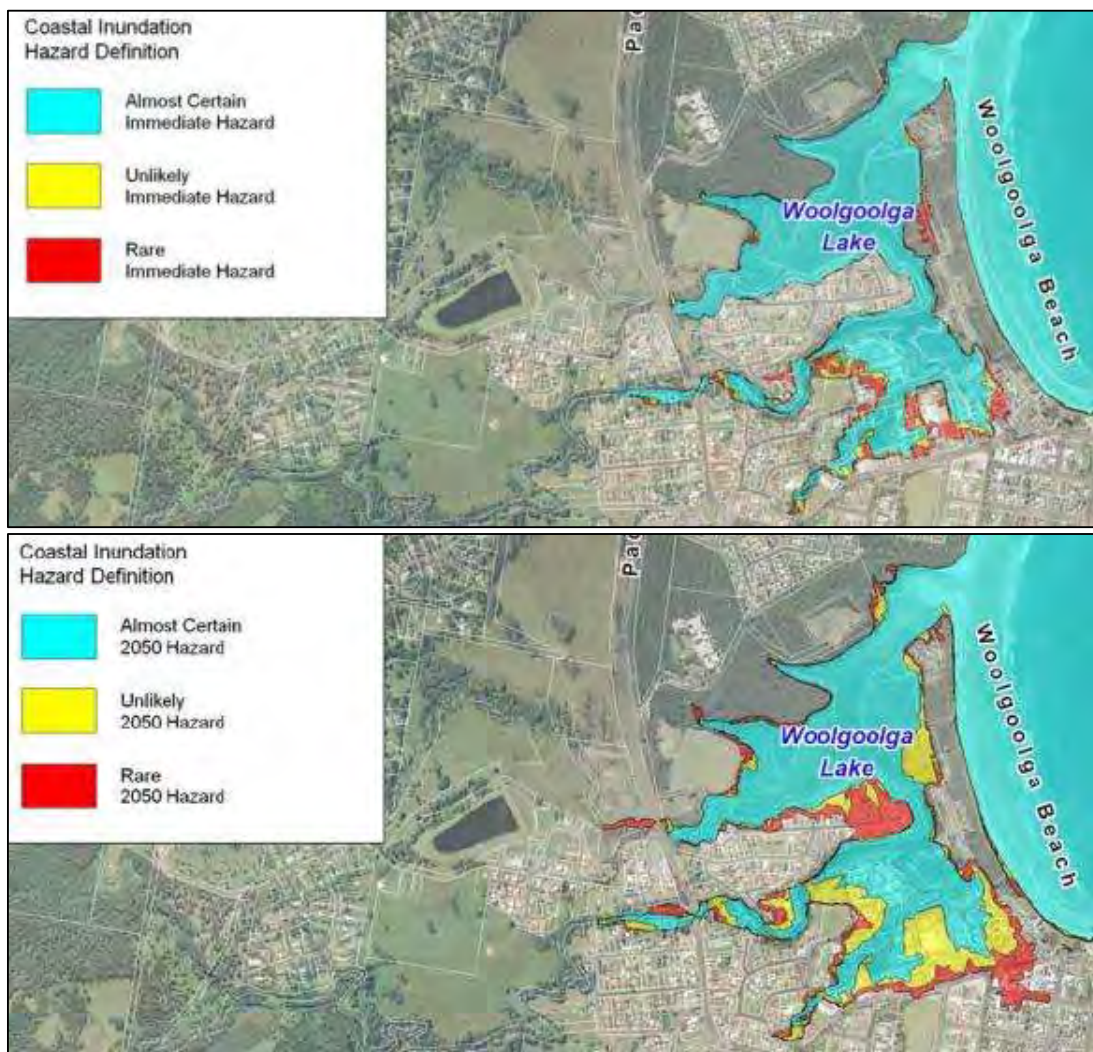
Image: Artificial opening of Burrill Lake. Photo by R. Massie
Source: NSW Government (undated)

F.2.1.3 Minimise Flooding of Properties and Infrastructure

Some properties and infrastructure adjoining Woolgoolga Lake are at risk of flooding including residential areas of Sunset Lakes Estate along the southern shores of the lake, Woolgoolga Sunset Caravan Park and areas adjoining Woolgoolga Creek and Jarrett Creek – refer to the upper map of **Plate F.1**. Sewage pump stations adjoining the lake and its creek are also impacted by flooding with water entering the pump stations and potentially leading to sewage entering the lake system – refer to **Section F.2.1.1** for further details.

Flooding of properties and infrastructure along the margins of the lake will be exacerbated by sea level rise for flood events influence by elevated ocean levels - refer to the lower map of **Plate F.1**. Artificial opening of the lake entrance has the potential to reduce flood levels in the lake for certain flood events. It is important to note that for large flood events, flood levels in the lake have been shown to be independent of any artificial entrance opening works. This is due to the effect of the elevated ocean water levels which would 'over-ride' any impact of an open entrance.

There are a variety of strategies to minimise or avoid flooding of properties and infrastructure around the lake including: appropriate development controls for future development in flood prone areas; artificial opening of the lake entrance where appropriate; flood-proofing infrastructure; etc.



Source: BMT WBM (2010b)

Plate F.1 Coastal Inundation Mapping for the Immediate and 2050 Planning Horizons

F.2.2 Bank Stability and Sedimentation Objectives

F.2.2.1 Determine priorities for the implementation of appropriately designed bank stabilisation and rehabilitation works in areas with important estuary values.

Bank erosion is not a significant issue in the Woolgoolga Lake estuary (GeoLINK et al., 2011). Only 1% of banks surveyed (approximately 80 m total) had minor erosion and there was no moderate or severe erosion recorded. The relatively stable nature of this system is primarily due to the low energy environment of the estuary, the cohesive nature of the bank materials, and the mostly well-vegetated estuary banks. Nevertheless, the presence of remedial bank protection works on the north bank of the lake entrance and on the southern bank picnic area foreshore demonstrate that active management is required to maintain bank stability in the lower reaches of Woolgoolga Lake. The intention of this objective is to develop bank remediation plans for areas of minor bank erosion that intersect with areas of importance from a recreational, estuarine health, or estuarine ecology perspective.

F.2.3 Ecological, Habitat and Biodiversity Objectives

F.2.3.1 Improve the Condition and Extent of Aquatic Habitats

The Northern Rivers Catchment Management Authority (NRCMA) Catchment Action Plan (CAP) lists rehabilitation of aquatic habitats among its goals. Analysis of estuarine habitat extent in Woolgoolga Lake indicates that seagrass has disappeared in recent years and that some saltmarsh and mangrove habitats show signs of disturbance.

F.2.3.2 Restore terrestrial habitats of high ecological or conservation value by removing threats and through targeted rehabilitation (e.g. riparian vegetation, endangered ecological communities such as Coastal Saltmarsh, Freshwater Wetlands, etc)

Restoration of riparian vegetation is also listed among the goals of the NRCMA CAP. A variety of terrestrial habitats of high conservation value have been identified within the Woolgoolga Lake estuary. A major threat to the integrity and viability of these habitats is weed invasion, and to a lesser extent clearing or suppression of natural regeneration. This management objective is aimed at the rehabilitation of sites with high ecological or conservation value where degradation through weed infestation or other impacts has occurred.

F.2.3.3 Flying-Fox Camp

In regard to the Grey-headed Flying-fox maternity camp on the eastern bank of Woolgoolga Lake, Council plans to develop a management strategy with the objective of maintaining the camp over the long-term while ameliorating concerns within the community. Other objectives of the management strategy include restoring the area's value as Secondary Koala Habitat, enhance the Woolgoolga Lake riparian and coastal values and providing for community's needs in terms of recreation, education and interpretation of these values to ensure the long-term management of the camp.

F.2.3.4 Increase Fish Stocks

Recreational fishing is a common use of the Woolgoolga Lake estuary. Increasing fish stocks was raised as a goal during community consultation.

F.2.3.5 Monitor and Improve the Health of the Woolgoolga Lake Estuary

The Estuary Processes Study (GeoLINK et al., 2011) describes the overall health of the Woolgoolga Lake estuary system as average. Improvements in the health of the estuary could be achieved by better management of water quality, removal of weeds from the riparian zone and improvement of the condition and extent of saltmarsh vegetation. This management objective generally relates to achieving all other specific management objectives for the estuary.

F.2.3.6 Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise

Some negative ecological impacts are likely to result under current climate change and sea level rise scenarios. These may include changes in the distribution and extent of mangrove and saltmarsh colonies and reductions in the overall productivity of the estuary. Effective planning for future changes to help to mitigate negative impacts may include strategies such as establishment of buffer areas between development and the lake edge to enable 'retreat' of riparian vegetation as lake levels rise over the longer term.

F.2.4 Water Quality Objectives*F.2.4.1 Improved Water Quality*

The NRCMA CAP lists an improvement in the condition of coastal zone natural resources as one of its targets. This was also identified as a goal during community consultation. Whilst analyses of water quality data against existing guidelines have not uncovered major issues there are a number of ways in which the water quality of Woolgoolga Lake could be improved. These include:

- reduce nutrient and sediment inputs from the catchment through better land, stormwater and wastewater management; and
- reduce the risk of sewage entering the waterway as a result of flooding of sewerage infrastructure.

F.2.4.2 Improve the monitoring of water quality

This is one of the goals identified during community consultation and is also a wish of the Coastal Estuary Management Advisory Committee (CEMAC). A suggested water quality monitoring program that meets NSW government reporting obligations will be delivered as part of the Estuary Management Plan.

F.2.5 Recreational Use and Access Objectives

Woolgoolga Lake occupies a predominantly natural setting although urban development has encroached around the southern foreshores and dominates the catchment areas of Woolgoolga and Jarrett creeks. The close proximity of residential communities and the variety of natural settings combine to create a broad range of passive land and water based recreational opportunities that optimise the scenic potential of the area. The following objectives are aimed at maintaining and enhancing the natural setting and existing recreational opportunities.

F.2.5.1 Maintain and enhance the existing passive water and land based recreational experiences and opportunities in a manner that complements and sustains the natural values of the lake and its tributaries.

F.2.5.2 Encourage low key recreational activities that are compatible with each other and the natural environment.

F.2.5.3 Enhance, protect and restore natural values to foreshore areas.

This latter objective is aimed at restoring the natural amenity of foreshore areas that have been degraded or prevented from regenerating through poor or conflicting maintenance practices such as mowing of riparian habitats.

F.2.6 Views and Visual Character Objectives

The majority of the foreshores around the lake comprise a continuous edge of natural vegetation. This often extends well back from the foreshores and rise up adjoining slopes to produce an attractive natural skyline and backdrop to views across the lake. The surrounding ridges also enclose and help to protect the lake, further enhancing the microclimate and visual experience to visitors. The following objectives are aimed at maintaining and enhancing these characteristics.

F.2.6.1 Preserve and enhance the natural appearance of the lake particularly along the southern foreshores adjacent to existing residential development.

This objective relates to a previous objective in Section F.1.5.3.

F.2.6.2 Optimise the attractive outlook across the lake and creeks from path routes, recreation areas and other destinations for public enjoyment.

F.2.6.3 Undertake management practices and provide infrastructure and facilities that complement the natural appearance and values of the setting.

F.3 Management Issues

F.3.1 Entrance Conditions and Hydrodynamics Issues

F.3.1.1 Entrance Management to Address Water Quality, Sedimentation and Flooding

Effect of Closed Entrance on Water Quality

A significant proportion of community participants in the consultation phase have indicated a desire for an entrance opening protocol for the purpose of ‘flushing’ the lake to improve water quality. An entrance opening protocol will be developed as part of the Estuary Management Plan. However, the protocol will need to take account of the potential negative impacts of artificially opening the entrance, as described in **Section F.1.1.2**, including negative impacts on water quality, fish and other ecological communities. Artificially opening estuary entrances is often carried out as a ‘quick fix’ to redress water quality problems stemming from other causes such as inadequate stormwater treatment from urban areas or inadequate erosion control measures in the catchment (refer to Section F.1.4.1). Best practice for estuary management is based on addressing the source of the water quality issues rather than treating the symptoms by artificially opening entrances to ‘flush’ an estuary. It should also be noted that water quality data indicates that Woolgoolga Lake is generally in good condition with a high natural variance which is characteristic of ICOLLs. Nevertheless, in addition to flood mitigation purposes, there may be instances where artificial opening is justified to address extreme water quality issues.

Effect of Closed Entrance on Sedimentation in the Lake

A significant proportion of community participants in the consultation phase have also indicated a desire for an entrance opening protocol to minimise sedimentation in the lake. The Processes Study (GeoLINK et al, 2011) indicates artificial opening of the lake entrance will not have any significant impact on reducing sedimentation in the lake or removing the shoals of marine sand from the entrance. Data indicates that only very large flooding events (e.g. 1974 event), potentially in combination with large ocean swell events, will remove significant quantities of marine sand from the entrance. Artificial opening will only result in minor scouring near the entrance. The effect of this would be short-lived with relatively quick in-filling with marine derived sands. This is addressed further in to **Section F.2.2.2**.

Flooding of Properties and Infrastructure

Artificial opening of the entrance has been initiated by Council in the past as a flood control measure. The initiation of entrance opening involves direct excavation of a narrow ‘starter’ channel. Council’s informal policy is to open the lake entrance when the lake water level reaches an established flood mark which is set at 1.8 m AHD. This is the level of the overflow pipe from Sewage Pump Station No.1 (PS 1) in Ganderton Street. At lake water levels greater than 1.8 m AHD, water will flood PS 1 causing water to enter the sewerage system (and cause excess pumping) and potentially lead to sewage entering the lake system via Jarrett Creek. There is another low-lying sewage pump station (PS 16) on the southern foreshore of the lake, however this pump station is higher than PS 1 and does not currently dictate artificial opening of the entrance.

The highest recorded flood level in Woolgoolga Lake was reported as 2.1 m AHD in 1974 (Bewsher Consulting, 1989). **Table F.1** summaries the water levels experienced in the lake during non-flood periods and for major flood events.

Table F.1 Lake Water Levels for Non-Flood and Flood Periods – Existing and Future

	<i>Existing¹ (2011)</i>	<i>2050²</i>	<i>2100³</i>
Non-Flood Periods			
Average water level (m AHD)	0.7	1.1	1.6
Maximum water level (m AHD)	1.5	1.9	2.4
Minimum water level (m AHD)	0.2	0.6	1.1
90 th percentile water level ⁴ (m AHD)	1.1	1.5	2.0
Natural breakout range ⁵ (m AHD)	1.2 – 1.8	1.6 – 2.2	2.1 – 2.7

	Existing¹ (2011)	2050²	2100³
Flood Events			
1 in 100 Year Flood	2.6	3.0	3.5
Probable Maximum Flood	2.7	3.1	3.6

- Notes: 1. Averaged from 2004 data and 2007 – 2011 data in Estuary Processes Study (GeoLINK *et al*, 2011);
 2. Existing water level plus 0.4m sea level rise;
 3. Existing water level plus 0.9m sea level rise
 4. The water level greater than 90 percent of all recorded water levels
 5. Water levels at which a closed entrance naturally opens

Water levels in the lake are likely to increase by the same amount as sea level rise increases caused by climate change. Future water levels and flood levels considering the impact of sea level rise are summarised in **Table F.1**.

It is important to note the above flood levels for major events are independent of any artificial entrance opening works. This is due to the effect of the elevated ocean water levels which would ‘over-ride’ any impact of an open entrance. However, floods which occur at low ocean water levels would be limited by artificial opening of the lake entrance.

F.3.2 Bank Stability and Sedimentation Issues

F.3.2.1 Bank Erosion of Picnic Area Foreshores

Mapping of bank erosion has been completed. No severely eroding or moderately eroding sites were identified. However, minor erosion was recorded in the vicinity of the Lakeside Picnic Area foreshore. The site is adjacent to an area of high recreational use, which in part would be contributing to the issue. As such any remedial actions planned would need to consider the recreational values of the site. An assessment of this site and a determination as to whether remedial action is required will be undertaken as part of the Estuary Management Plan. This issue is addressed in combination with **Section F.2.5.2** regarding upgrading and management of existing recreational facilities.

F.3.2.2 Dredging – the need to address effects of sedimentation including a perceived loss of recreational opportunity due to decreased waterway depth

Anecdotal evidence suggests that the estuary was deeper in some locations in the past (around the 1970’s), particularly in the mid to lower reaches. Community consultation has highlighted a perceived loss of recreational opportunity due to decreased waterway depth relative to this period.

Due to a lack of historical bathymetric data, changes in the depth of the estuary and lake cannot be quantified. However, historical aerial photography indicates that water depths in 1943 were similar to the period from the 1990’s to present. The aerial photography indicates deeper water depths in the 1960’s and 1970’s. This is considered to be due to very large flooding events in combination with large ocean swell events during this period which had the effect of removing a significant amount of marine derived sediment near the entrance. Aerial photographs in subsequent years show the gradual build-up / replenishment of this marine sand and subsequent reduced water depths in the vicinity of the lake picnic area / lake entrance.

Fluctuations in the amount of marine sediment in the estuary and consequent fluctuations in water depths are a natural trend. The major source of sedimentation in the estuary is from marine derived sands which are naturally pushed into the estuary through the entrance by tidal flows assisted by tidal and ocean currents and wind and ocean waves. Secondary sources include inputs from the broader catchment including from bank erosion and as a result of sheet, rill and gully erosion associated with catchment land management practices.

Infilling of the estuary by marine derived sands is a natural long-term process that is not easily reversed. Intervention works such as dredging are expensive and generally only achieve short-term benefits in respect to removal of sediment. In addition, dredging can have significant impacts on estuary processes, health, ecology and water quality, for example:

- dredging of marine delta shoals creates an increased sediment demand for infilling of the entrance which would result in a net depletion of sand on Woolgoolga Beach; and

- dredging of the deep mud basin in the lake can modify natural sediment processes and associated benthic metabolism and chemical processes thus degrading water quality and exacerbating eutrophication (Haines, 2006).

Therefore, this estuary management study does not recommend dredging on the basis of the following considerations:

- long-term fluctuations in water depths associated with infilling of the estuary by marine derived sands is a natural process that has occurred prior to the 1970's (water depths in 1943 were similar to present water depths based on aerial photography);
- dredging is expensive and generally only achieves short-term benefits in respect to removal of sediment;
- dredging can have significant impacts on water quality, estuary processes, health, and ecology;
- the lake is part of the Solitary Islands Marine Park and is listed as 'Habitat Protection Zone' which has the objective of protecting habitats and reducing high impact activities (e.g. dredging); and
- an approval process involving NSW government agencies is required before dredging is undertaken and it is considered unlikely that dredging would be approved for Woolgoolga Lake for the primary purpose of increasing water depths for improved swimming amenity.

F.3.3 Ecological, Habitat and Biodiversity Issues

F.3.3.1 Loss of Aquatic Habitats

A decline in the area and condition of seagrass beds, mangroves, saltmarsh and sedge heath communities was identified by CEMAC as possible issues concerning Woolgoolga Lake. Detailed mapping analysis of aquatic habitats shows that seagrass has disappeared from Woolgoolga Lake in recent years. The factors causing the decline in the area of seagrass are uncertain, though factors commonly associated with seagrass loss that may be present in Woolgoolga Lake include:

- high suspended sediment loads in catchment runoff;
- natural fluctuations in the area of seagrass common to ICOLLS; and
- natural fluctuations in the position of the marine tidal delta.

F.3.3.2 Loss of riparian vegetation on the southern lake foreshore.

The riparian vegetation of the Woolgoolga Creek and Lake estuary is predominantly in moderate to very good condition (GeoLINK et al, 2011). Only a small area of vegetation in very poor condition was identified, occurring on the southern foreshore of Woolgoolga Lake, immediately adjacent to the residential area of Sunset Lakes Estate. Although the site has the appearance of having been cleared to facilitate resident's views, an analysis of air photography dating back to 1943 shows that the site was cleared prior to the 1940's. However, the native vegetation has been allowed to regenerate along most of the reach, except in this area, since the 1980's when residential development accelerated. Generally, it is an objective of estuary management to maintain a continuous swathe of native vegetation along the foreshore and banks to maintain the estuary health, ecology, bank stability and aesthetics. Encouraging native riparian vegetation including saltmarsh habitats to regenerate at this site would further this objective. This issue is addressed under **Section F.2.5.1**.



Plate F.2 Southern Foreshore of Woolgoolga Lake

F.3.3.3 Environmental weeds degrading native riparian vegetation communities in mid to upper reaches of Woolgoolga and Poundyard Creeks.

Weed mapping undertaken in January 2011 identified the presence of environmental weeds in the upper reaches of Woolgoolga and Poundyard Creeks (GeoLINK et al., 2011). The main species identified included groundsel bush, senna, camphor laurel, and pink lantana. Environmental weeds degrade the native riparian vegetation, reducing its ecological value and in some cases potentially impacting upon bank stability and other estuary values including recreational amenity and aesthetics. Weed control is a long-term and costly management action and so it is recommended that areas with important estuary values be targeted as a priority. Reaches of high priority for weed control will be determined as part of the Estuary Management Plan.

F.3.3.4 Diminishing Fish Stocks

At the community meeting diminishing fish stocks were raised as an issue. Fish sampling undertaken as part of the Estuary Management Study (EMS) detected a lower diversity of fish species than previous studies, though the methods used and timing of the study may not have been comparable.

F.3.3.5 Flying-Fox Camp

Concern has been expressed about the flying-fox camp along the banks of Woolgoolga Lake during the project consultation phase. Concerns have related to impacts of excrement on water quality, odours, and impacts on vegetation in the roosting area. Community comments also included support for retaining the camp. Council plans on developing a management strategy for the long-term management of the camp which will include vegetation management and direct amelioration of concerns within the community.

F.3.3.6 Impacts of Climate Change on Estuary Ecology

Some negative ecological impacts are likely to result under current climate change and sea level rise scenarios. These may include changes in the distribution and extent of mangrove and saltmarsh colonies, reductions in the overall productivity of the estuary and a reduction in feeding and nesting areas for wading birds.

F.3.4 Water Quality Issues

F.3.4.1 Elevated Turbidity, Total Nitrogen and Chlorophyll-a Values

Poor water quality was identified during community meetings as a perceived issue and also by CEMAC as a potential issue. However, analysis of existing water quality data indicates that for the majority of the time, (9 out of 13 months of Beachwatch data collection) the waters of Woolgoolga Lake are suitable for primary contact recreation. Analysis of other water quality data indicates that the waters of Woolgoolga Lake are within ANZECC (2000) guidelines for the protection of aquatic ecosystems by all measures except turbidity and total nitrogen concentration, but that they exceed DECCW guideline values for chlorophyll-a concentration and turbidity in lagoons. In summary, whilst the water quality is generally acceptable for current uses, careful management of land use and runoff in the catchment could result in improvements. Additional motivation for improvements in water quality lies in the stated goals of the NRCMA CAP, and the fact that the waters of Woolgoolga Lake are part of the Solitary Islands Marine Park.

Turbidity

Poor water quality was identified during community meetings as a perceived issue and also by CEMAC as a potential issue. However, analysis of existing water quality data indicates that for the majority of the time, (9 out of 13 months of Beachwatch data collection) the waters of Woolgoolga Lake are suitable for primary contact recreation. Analysis of other water quality data indicates that the waters of Woolgoolga Lake are within ANZECC (2000) guidelines for the protection of aquatic ecosystems by all measures except turbidity and total nitrogen concentration, but that they exceed DECCW guideline values for chlorophyll-a concentration and turbidity in lagoons. In summary, whilst the water quality is generally acceptable for current uses, careful management of land use and runoff in the catchment could result in improvements. Additional motivation for improvements in water quality lies in the stated goals of the NRCMA CAP, and the fact that the waters of Woolgoolga Lake are part of the Solitary Islands Marine Park.

The assembled water quality data for Woolgoolga Lake triggers ANZECC (2000) and DECCW interim guidelines for the protection of aquatic ecosystems for turbidity. The specific cause of elevated turbidity levels in Woolgoolga Lake is uncertain, though the following factors may be contributing:

- wind re-suspension of fine sediments on the bottom – this is considered likely, due to the wide shallow nature of the main body of the lake, though a single water quality profiling undertaken in 2004 showed limited mixing during closed conditions (see GeoLINK 2011a);
- re-suspension of fine sediments on the bottom due to tidal flow; and
- elevated suspended sediment loads in catchment runoff.

The median turbidity value is only slightly above the ANZECC (2000) guideline value for estuaries.

Nitrogen

Analysis of the existing water quality data against ANZECC (2000) guidelines indicates that Woolgoolga Lake is also nitrogen enriched on a regular basis. Whilst the ANZECC (2000) guidelines are the best currently available measuring stick for water quality they have not been developed specifically for ICOLLs like Woolgoolga Lake and can result in misleading conclusions.

Chlorophyll-a

Elevated nitrogen concentrations are an indirect threat to an ecosystem. The main problem associated with elevated nitrogen concentrations is that under specific conditions they may lead to algal blooms. Chlorophyll-a concentrations are measured as an indicator of the status of algal populations. Whilst the median chlorophyll-a concentration for Woolgoolga Lake is within ANZECC (2000) guideline values, it is greater than the DECCW guideline value for lagoons. The authors have not been made aware of a history of algal blooms in Woolgoolga Lake but the combination of slightly elevated total nitrogen and chlorophyll-a concentrations constitutes an issue.

F.3.4.2 Stormwater Management and Pollutant Inputs from the Catchment

During community consultation water quality issues associated with runoff from rural and urban lands were raised as a perceived issue. Nutrients, sediments, pesticides and herbicides, and organic matter were all seen as potential contaminants in runoff. A basic modeling exercise was undertaken as part of the Estuary Processes Study using the Catchment Management Support System (CMSS). The CMSS is a method of calculating nutrient and sediment budgets based upon landuse types and their distribution within a catchment

Forestry Operations

The CMSS indicated that the greatest contribution of sediments and nitrogen potentially comes from forestry operations in the upper catchment due to the large proportion (approximately one third) of the catchment under this landuse. This highlights the importance of erosion and sediment controls during forestry operations.

Rural Landuse

The CMSS indicated phosphorus input to the lake was largely attributed horticultural land uses. This highlights the importance of erosion and sediment controls for the main agricultural practices in the catchment

(e.g. banana and blueberry cultivation) and wastewater controls for intensive horticultural practices such as excess fertigation from greenhouse cucumber production.

Urban Development

Urban development comprises over half of the immediate estuary catchment area of Woolgoolga Lake. There is also a potential long-term urban expansion area west of the existing highway should population targets be achieved sooner than currently predicted.

New development areas have the potential to reduce the quality of catchment runoff during and after the construction phase. It is important that controls placed on new developments are sufficient and enforced to ensure no negative net impact upon water quality. It is equally important that stormwater management (treatment and detention) improvements are pursued in existing urban areas. This may include retrofitting of existing drainage systems to improve treatment and detention as opportunities arise in association with redevelopment. However, it is noted that some older drainage systems based on grassed swales as opposed to kerb and gutter, such as older areas of Safety Beach, provide effective treatment of runoff.

Old on-site sewage management systems (septic systems) on rural and rural-residential properties also have potential to deliver excess nutrients and pathogens to the estuary system.

Pacific Highway Upgrade

An additional and immediate development within the greater catchment area is the construction of the Woolgoolga bypass. It is important that water quality runoff from the construction of this major development is subject to strict controls and does not result in adverse impacts to water quality.

F.3.4.3 Sewage Input During Times of High Water Levels

During times of very high water levels in Woolgoolga Lake (>1.8m AHD) there have been pollution events associated with overflows from sewage pump stations that have led to sewage entering the water. This matter is addressed in a previous issue relating to flooding of infrastructure – refer to **Section F.2.1.1**.

F.3.4.4 Water Quality Impacts Associated with Climate Change and Sea Level Rise

It is difficult to predict precisely how forecast climate change and sea level rise may impact upon water quality in Woolgoolga Lake. It is likely, however, that some existing issues might become more pronounced under climate change and sea level rise scenarios, particularly issues relating to catchment inputs.

In respect to the impacts of sea level rise on stormwater management, there are a number of low-lying stormwater treatment systems that will be impacted along the southern foreshore of the lake adjoining Sunset Lakes Estate. These are mini-wetland treatment systems which will be impacted as a result of being largely submersed with higher lake levels resulting from sea level rise. These mini-wetland treatment systems are estimated to have an invert level of approximately 1.5 m AHD. Based on the lake water levels shown previously in **Table F.1**, these systems will be frequently submerged in the future during high tide events when the lake entrance is open. This will render the systems ineffective for treatment during these submerged periods. It may also result in entrapped pollutants being released into the lake system. Therefore, to maintain effective stormwater treatment of the respective drainage catchments, retrofitting of the systems or installation of replacement systems at more appropriate locations requires consideration.

F.3.4.5 Residues from the 1989 Dieldrin/Aldrin Spill

To date, no follow up information has been gathered to describe the status of sediment, water or biota with respect to the pollution event in 1989.

F.3.4.6 Water Quality Impacts from the Flying Fox Camp

This was raised as a potential issue during community consultation. This matter will be addressed under a previous issue addressing the camp – refer to **Section F.2.3.5**.

F.3.4.7 Lack of Continuity and Detail in Existing Water Quality Data

The conclusions that have been drawn about nutrient and sediment concentrations and trophic status are based upon a limited dataset. In general the available water quality data for Woolgoolga Lake could be described as lacking in continuity and detail.

F.3.5 Recreational Use and Access Issues*F.3.5.1 Poorly managed recreational activities and other practices have the potential to impact on riparian vegetation and thereby degrade the recreational experience of the lake*

As indicated in **Section F.2.3.2**, a small area of vegetation in very poor condition occurs on the southern foreshore of Woolgoolga Lake, immediately adjacent to a residential area. Management practices such as mowing continues to impact on the regeneration of native riparian vegetation in areas previously cleared. Modifying current management practices to encourage native riparian vegetation to regenerate at this site would further objectives associated with improving estuarine habitat and improving the natural amenity of the lake for recreational purposes.

Similarly, understorey vegetation has been cleared to create / maintain a fire buffer along a strip of the bushland reserve in the north of the lake adjacent to the residential area of Safety Beach. The ground cover of grass is routinely mown or slashed with potential encroachment beyond the necessary fire buffer into natural vegetation.

At the Lakeside Picnic Area and Caravan Park there are a number of factors impacting on riparian vegetation and bank erosion that could be significantly improved with appropriate measures:

- concentrated pedestrian access onto a 'sandy beach area' at the main picnic area has impacted on vegetation cover on the banks and exacerbated bank erosion. Strategies are required to mitigate the impact of pedestrian access across the bank in specific locations (compatible with the recreational use of the picnic area) and preventing access across the bank in other more sensitive location to enable reestablishment of riparian vegetation and thereby reinforcing against bank erosion; and
- unmanaged mowing practices adjacent to the caravan park along the bank between the picnic area and the lake entrance is impacting on the riparian vegetation. Installation of a defined edge is required between riparian vegetation and mowed areas to help protect and reestablishment a sufficient riparian border while defining a walkway along this section. This will then assist in reinforcing the bank against erosion.

Uncontrolled and inappropriate pedestrian access through other riparian areas also has the potential to damage natural values and degrade the recreational experience to visitors.

F.3.5.2 Existing recreational facilities and opportunities require upgrading and management to enhance and protect the recreational experience offered by Woolgoolga Lake

The desirable assets of Woolgoolga Lake (high scenic amenity, close proximity to the township, and the range of passive land and water based recreational opportunities) provide an incentive and pressure for expanded tourism development of the foreshores. However inappropriate development has the potential to detract from the assets and amenity of the lake. This issue relates to the objectives of protecting the natural values of the lake.

Recreational walking, jogging and cycling are key activities around the lake. These activities are facilitated by a network of boardwalks, bridges and bush tracks of varying standard around the lake periphery. There is a lack of a continuous walking trail network that is clearly defined and provides optimal access into and through the area such as around the southern / western periphery of the lake and Woolgoolga Creek. The paths are particularly important for the residential community in the remote southern neighbourhoods of the lake where the restricted street layout offers minimal access options.

Similarly, there is a lack of appropriate directional and interpretive signage to complement the network of boardwalks, bridges and bush tracks around the lake periphery.

Rubbish around the foreshore areas was identified as an issue during community consultation that also relates to maintaining the recreational experience offered by Woolgoolga Lake.

F.3.6 Views and Visual Character Issues

Woolgoolga Lake is a relatively large water body that includes creeks and water courses that extend into a variety of catchments including urban, natural, and highly modified rural environments. Issues pertaining to views and visual character include:

F.3.6.1 *Maintenance of existing views and solar access by residents along the southern foreshores of the lake conflicts with the retention of foreshore vegetation*

This issue relates to the issues described in **Section F.2.3.2** and **F.2.5.1** - regarding modifying current management practices to encourage native riparian vegetation to regenerate along the southern foreshores of the lake. The design and/or management of revegetation will require careful consideration and consultation to mitigate conflicts with regard to shading of winter sun and impacts on views for landholders adjoining the southern foreshores of the lake. This issue is addressed under **Section F.2.5.1**.

F.3.6.2 *Loss of visual amenity resulting from weed growth, poor maintenance practices, rubbish deposition and provision of unattractive and poorly located infrastructure*

The above matters have the potential to impact on the visual amenity experienced around Woolgoolga Lake foreshores. This issue requires a range of strategies which are partly dealt with in previous issues relating to weed growth (**Section F.2.3.2**), undesirable impacts on existing riparian vegetation (**Section F.2.5.1**), and rubbish (**Section F.2.5.2**).

The issue of unattractive and poorly located infrastructure refers to issues such as past practices of bank erosion protection that are visually unsympathetic to the setting.

F.2.6.3 *Limited opportunity to appreciate the intimate visual character of the tributaries in the upper catchment areas of the lake.*

This issue is associated with limited public access along the foreshores of Woolgoolga Creek, South Woolgoolga Creek, Jarrett Creek. This issue relates to a lack of a continuous walking trail network (**Section F.2.5.2**) to provide optimal access around the periphery of the lake and creeks. Accordingly, this issue is addressed under **Section F.2.5.2**.

F.4 Ranked List of Issues

Table F.2 shows the ranked management issues in terms of their priority for management over the next five years. Five years is the expected planning timeframe for the Estuary Management Plan before it undergoes review and adjustment. The ranking has been based on the scoring system below. The scoring attributed to each management option is shown in **Table F.2**.

Priorities have been allocated to management objectives based on a matrix assessment that considers:

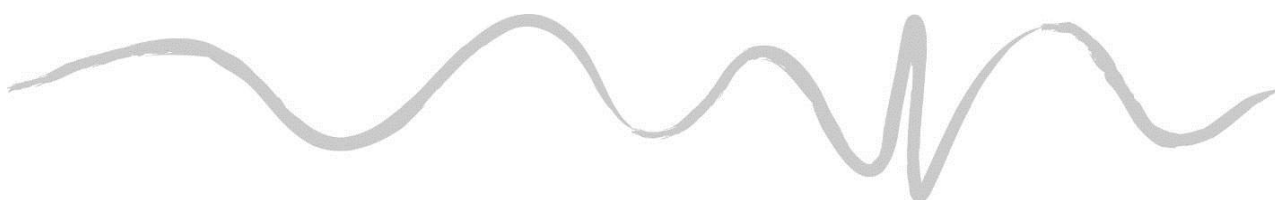
- the degree to which the management objectives will impact on estuary issues:
(scoring: low = 1, moderate = 3, high = 5);
- timeframe over which the impacts are likely to occur:
(scoring: short (< 3 years) = 1, medium (5-8 years) = 3, long (>10 years) = 5);
- extent of the estuary addressed by the management objective:
(scoring: lower estuary = 1, middle estuary = 1, upper estuary = 1, whole estuary = 3); and
- community rating of the issues addressed by the management objectives based finding from the community survey detailed in Section 3): (scoring: not important = 0, important = 3, very important = 5).

Table F.2 **Ranked List of Key Estuary Management Issues**

<i>Priority</i>	<i>Key Estuary Management Issue</i>	<i>Potential for Impact on Estuary Objectives</i>	<i>Timeframe over which Impacts Occur</i>	<i>Extent of Estuary Addressed</i>	<i>Community Rating</i>	<i>Priority Score</i>
1	Entrance Management to Address Water Quality, Sedimentation and Flooding	5	5	2	5	17
2	Stormwater Management and Pollutant Inputs from the Catchment	3	5	3	5	16
3	Poorly managed recreational activities and other practices have the potential to impact on riparian vegetation and thereby degrade the recreational experience of the lake	4	5	2	4	15
4	Elevated Turbidity, Total Nitrogen and Chlorophyll-a Values	3	5	2	5	15
5	Impacts of Climate Change on Estuary Ecology	4	5	3	2	14
6	Diminishing Fish Stocks	3	5	2	4	14
7	Loss of Aquatic Habitats	3	5	2	3	13
8	Environmental weeds degrading native riparian vegetation in mid to upper reaches of Woolgoolga and Poundyard Creeks	2	5	2	4	13
9	Water Quality Impacts Associated with Climate Change / Sea Level Rise	3	5	2	3	13
10	Lack of Continuity and Detail in Existing Water Quality Data	2	5	2	3	12
11	Existing recreational facilities and opportunities require upgrading and management to enhance and protect the recreational experience offered by Woolgoolga Lake	3	3	2	3	11
12	Flying-Fox Camp	3	3	1	3	10
13	Loss of visual amenity resulting from weed growth, poor maintenance practices, rubbish deposition and provision of unattractive and poorly located infrastructure	2	3	2	2	9
14	Dredging – the need to address effects of sedimentation including a perceived loss of recreational opportunity due to decreased waterway depth	1	1	1	5	8
15	Residues from the 1989 Dieldrin/Aldrin Spill	1	3	2	1	7

Entrance Management Policy

Woolgoolga Lake Estuary
Draft for Public Exhibition



quality solutions sustainable future

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Entrance Management Policy

Woolgoolga Lake Estuary

Draft for Public Exhibition

Prepared for: Coffs Harbour City Council
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Introduction

1.1 Reason for this Policy

The entrance to the Woolgoolga Lake estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Many ICOLL's are manually or artificially opened to the ocean by authorities to 'drain' the estuary for a range of reasons, often to reduce the impacts of flooding around the estuary foreshores. However, artificially opening ICOLL's can impact on estuary health. Therefore a policy is required to outline to Council if and when the entrance to Woolgoolga Lake estuary should be artificially opened.

1.2 The Purpose of this Policy

The purpose of this policy is to provide Council with criteria for initiating an artificial opening event and a procedure for artificial opening of the entrance of Woolgoolga Lake estuary.

1.3 Policy Statement

The Woolgoolga Lake Entrance Management Policy aims to:

- minimise interference with the natural opening and closing regime for Woolgoolga Lake estuary;
- minimise flooding of properties from elevated water levels in the estuary;
- minimise flooding of the local sewerage system from elevated water levels in the estuary;
- provide a procedure to address extreme water quality issues in the estuary;
- detail trigger levels for artificial opening of the estuary entrance;
- detail procedures and responsibilities for artificial opening of the estuary entrance; and
- details procedures for monitoring following an artificial opening event.

This policy will be implemented by Coffs Harbour City Council in consultation with the appropriate NSW Government agencies.

1.4 Area to Which this Policy Applies

The area covered by this policy is shown in **Illustration 1.1**. This policy applies to the catchment of the estuary which comprises the waterway, foreshores and land adjacent to the estuary up to the tidal limit of the tributary creeks and the extent of the drainage catchment directly contributing to the estuary waterways. The area relevant to this policy also includes the proposed access route along Woolgoolga Beach for excavator access to the estuary entrance.

1.5 Policy Context

This policy has been prepared as part of the Coastal Zone Management Plan (CZMP) for Woolgoolga Lake estuary. CZMP's for estuaries are prepared in accordance with Part 4A of the *Coastal Protection Act 1979* and the *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010). These guidelines require CZMP's for ICOLL's to include an entrance management policy.

A range of NSW legislation and policies are relevant to estuary management and the establishment of any entrance management policy and subsequent artificial opening procedures.

There may be a range of statutory approvals / licensing requirements that need to be sought in order to undertake entrance management activities, for example artificial opening. A range of approvals may be required due to potentially different land tenures, zonings and statutory provisions. These provisions may include Crown Lands licence under the NSW Crown Lands Act 1989, concurrence from NSW Fisheries for dredge and reclamation work on defined water land under the NSW Fisheries Management Act 1994, or other approvals and licences under the National Parks and Wildlife Act 1974 or the Marine Parks Act 1997.

In addition, the Environmental Planning and Assessment Act 1979 establishes the framework for development control and assessment in NSW. Certain activities may require approval under this Act and associated State Environmental Planning Policies (SEPP) (e.g. SEPP (Infrastructure) 2007). Certain works or activities may either require development consent or be exempt from requiring consent. In the case where works or activities may be exempt from requiring consent, a Review of Environmental Factors (along with all other relevant approvals / licences) would be required under Part 5 of the EP&A Act before works / activities can be carried out. This is addressed more fully in **Section 3** of this policy.

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 Source of base data: Coffs Harbour City Council

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 environmental management and design

Woolgoolga Lake Entrance Management Policy
 1616534

Area to Which Policy Applies

Illustration 1.1

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Background

2.1 Entrance Management Issues

The key issues for entrance management are:

- flooding of low-lying properties; and
- flooding of the local sewerage system.

Secondary issues relate to some community desire for artificial opening of the entrance to 'flush' the lake to improve water quality and reduce sedimentation in the lake. These secondary issues are discussed further in **Section 2.1.4**.

2.1.1 Flood Levels

The highest recorded flood level in Woolgoolga Lake was reported as 2.1 m AHD in 1974 (Bewsher Consulting, 1989).

Flood levels for Woolgoolga Lake are dependent on the flood storage capacity of the lake, outlet conditions and ocean water levels. A 2012 flood study for Woolgoolga Lake (BMT, WBM, 2012) estimated the following peak 1% Annual Exceedance Probability (AEP) event flood levels (ie 1 in 100 year event) based on a peak ocean level of 2.4 m AHD and a berm height of 1.5 m AHD:

- 2.6 m AHD for the lake entrance; and
- 2.7 m AHD at the upstream end of the lake.

The entrance berm geometry has the most significant impact on the modelled flood levels in Woolgoolga Lake and the surrounding floodplain. A catchment derived flood event occurring when the entrance is closed will provide a much higher flood level in the lake than a similar one occurring with an open entrance (BMT, WBM, 2012:81-83). The impact of adopting a 1.5m berm over a 1.0m berm is around a 0.4m increase in flood level within Woolgoolga Lake and a 0.3m increase at the Jarrett Creek confluence. The impact of adopting a 1.5m berm over an open entrance condition is around a 1.0m increase in flood level within Woolgoolga Lake and a 0.6m increase at the Jarrett Creek confluence (BMT, WBM, 2012:92).

The 2012 flood study for Woolgoolga Lake considered potential impacts of future climate change for the 1% AEP design event. The most significant impact for Woolgoolga Lake will be from the impact of the predicted increase in berm height, which is in line with the 0.4m and 0.9m sea level rise for the 2050 and 2100 planning horizons (BMT WBM, 2012:89).

Table 2.1 Flood Level Estimates – Woolgoolga Lake

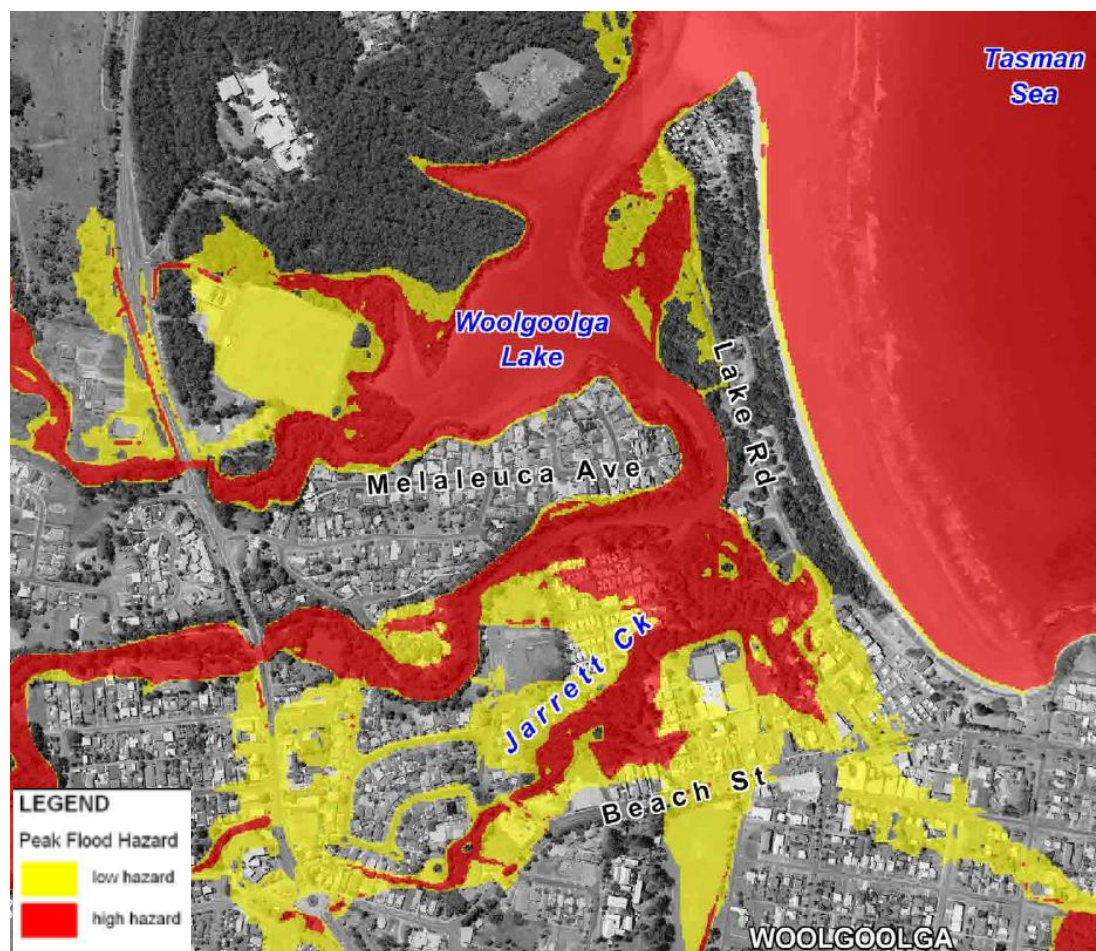
	<i>Flood Levels for the Lake Gauge at the Upstream End of the Lake (m AHD)¹</i>		
	<i>Immediate²</i>	<i>2050³</i>	<i>2100⁴</i>
1% AEP design event	2.9	3.2	3.7

Source: Table 8-6 in BMT, WBM, 2012

2.1.2 Flooding of Properties

Contour information indicates the ground level of low-lying properties adjoining the estuary is generally in the range of 2.0 - 2.5 m AHD. Flooding events in 2011 and 2012 have highlighted at-risk properties in Sunset Caravan Park with ground levels in the range of 1.5 – 2.0 m AHD and some floor levels of permanent sites in the range of 2.13 – 2.23 m AHD. The flood study for Woolgoolga Lake (BMT WBM, 2012) indicates these properties would flood with a 5 year ARI flood event with an entrance berm height of 1.5 m AHD. There are also at-risk properties in Pacific Street, Wharf Street, Boundary Street and Haines Close that were affected by floods in 2011 and 2012.

The flood level estimates in **Table 2.1** indicate other properties are at risk of flooding in the present 1% AEP event. There will be an increased number of properties at risk of flooding as a result of sea level rise. The lower contour levels around the lake are shown in **Illustration 2.1** to provide an indication of properties at risk of flooding in major events. The modelled flood hazards for the 1%AEP event from the 2012 flood study are shown in **Plate2.1**.



Source: Figure A-12 in BMT, WBM, 2012

Plate 2.1 Woolgoolga Flood Study – 1% AEP Modelled Peak Flood Hazards

2.1.3 Flooding of the Sewerage System

Council's previous informal policy of opening the lake entrance was based on preventing flooding of the adjoining sewerage system. Council's policy was to open the entrance when lake water levels reached an established flood mark of 1.8 m AHD. This is the level of the overflow pipe from Sewage Pump Station No.1 (PS 1) in Ganderton Street. At lake water levels greater than 1.8 m AHD, water will flood PS 1

causing water to enter the sewerage system causing excess pumping and potentially leading to sewage entering the lake system via Jarrett Creek. There is another low-lying sewage pump station (PS 16) on the southern foreshore of the lake, however this pump station is higher than PS 1 and does not currently dictate artificial opening of the entrance. Refer to **Illustration 2.2** in regard to the location of these pump stations.

2.1.4 Artificial Opening for Flushing the Estuary

A proportion of community participants in the consultation phase of the CZMP for Woolgoolga Lake estuary indicated a desire for an entrance opening policy for the purpose of:

- 'flushing' the lake to improve water quality; and
- reducing sediment in the lake.

2.1.4.1 Flushing to Improve Water Quality

Artificially opening estuary entrances is often carried out as a 'quick fix' to redress water quality problems stemming from other causes such as inadequate stormwater treatment from urban areas or inadequate erosion control measures in the catchment. Best practice for estuary management is based on addressing the source of the water quality issues rather than treating the symptoms by artificially opening entrances to 'flush' an estuary. The CZMP for Woolgoolga Lake estuary includes strategies to address the source of current water quality issues.

Water quality data examined in the Estuary Processes Study for Woolgoolga Lake (GeoLINK *et al.*, 2011) indicates the water quality of Woolgoolga Lake is generally in good condition with a high natural variance which is characteristic of ICOLLs. Therefore, there is no need for flushing of the estuary to improve water quality under 'normal' conditions. Nevertheless, there may be instances where artificial opening is justified to address extreme water quality issues such as a spill of contaminants into the waterway. This is addressed in **Section 2.5**.

2.1.4.2 Flushing to Reduce Sediment Levels

The major source of sedimentation in the estuary is from marine sands which are naturally pushed into the estuary through the entrance by tidal flows assisted by tidal and ocean currents and waves. Fluctuations in the amount of marine sediment in the estuary and consequent fluctuations in water depths are a natural trend. Secondary sediment sources include inputs from the broader catchment including from bank erosion and erosion associated with catchment land management practices.

The Estuary Processes Study for Woolgoolga Lake (GeoLINK *et al.*, 2011) indicates artificial opening of the lake entrance will not have any significant impact on reducing sedimentation in the lake or removing the shoals of marine sand from the entrance. Data indicates that only very large flooding events (eg. the 1974 event), potentially in combination with large ocean swell events, will remove significant quantities of marine sand from the entrance. Artificial opening will only result in minor scouring near the entrance. The effect of this would be short-lived with relatively quick in-filling with marine derived sands. Therefore, this policy does not recommend artificial opening of the entrance for the purpose of reducing sediment levels in the lake.

2.2 Water Level Monitoring

Water levels in the estuary are automatically monitored and recorded by Manly Hydraulics Laboratory (MHL) ("Woolgoolga Lake" station) and reported online. The water level recorder is located near the footbridge in Woolgoolga Creek, approximately 250 m upstream of the confluence of the creek and the lake as shown in **Illustration 1.1**. The instrument records the water level every 15 minutes.

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Lower Contour Levels Around Woolgoolga Lake

Woolgoolga Lake Entrance Management Policy
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Illustration 2.1

Attachment 2

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Source of base data: Coffs Harbour City Council

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Woolgoolga Lake Entrance Management Policy
1616535

Location of Sewage Pump Stations

Illustration 2.2

2.3 Natural Breakout Water Levels

Under natural conditions, ICOLL entrances open over a relatively wide range of water levels termed the 'natural breakout range'.

An occasional artificial opening of the entrance within the natural breakout range is not likely to have a significant environmental impact since it falls within the expected natural variation. However, over the longer term, numerous artificial openings especially at a comparatively low water level are likely to have a significant environmental impact since the natural frequency and duration of opening and closing to the ocean will be significantly altered.

Lake water level records for Woolgoolga Lake for the period of 1982 to 1988 indicate a natural breakout range of 1.2 to 1.8 m AHD. This was a period with varying rainfall years from very dry to very wet with some average years. Lake water level records for the period of 2007 to 2011 (a high rainfall period) indicate a similar 'natural breakout range' of 1.2 to 1.6 m AHD.

Table 2.1 summaries the water levels experienced in the lake during non-flood periods and for major flood events. The table includes estimates of future water levels based on the simple addition of predicted sea level rise.

Table 2.2 Lake Water Levels for Non-Flood and Flood Periods – Existing and Future

	<i>Existing¹ (2011)</i>	<i>2050²</i>	<i>2100³</i>
Non-Flood Periods			
Average water level (m AHD)	0.7	1.1	1.6
Maximum water level (m AHD)	1.8	2.2	2.7
Minimum water level (m AHD)	0.2	0.6	1.1
90 th percentile water level ⁴ (m AHD)	1.1	1.5	2.0
Natural breakout range ⁵ (m AHD)	1.2 – 1.8	1.6 – 2.2 ⁶	2.1 – 2.7 ⁶
Flood Events			
1 in 100 Year Flood (at upstream end of lake)	2.9 ⁷	3.2 ⁷	3.7 ⁷

- Notes: 1. Based on 1982 – 1988 data, 2004 data and 2007 – 2011 data in Estuary Processes Study (GeoLINK *et al*, 2011);
 2. Existing water level plus 0.4m sea level rise;
 3. Existing water level plus 0.9m sea level rise
 4. The water level greater than 90 percent of all recorded water levels
 5. Water levels at which a closed entrance naturally opens
 6. Estimates only – based on the assumption that opening mechanism remains unchanged and water levels will increase by the same amount as sea level rise
 7. Source: Table 8-6 in BMT, WBM, 2012

2.3.1 Rate of Water Level Rise During Flooding

The maximum rate of water level rise in the lake following a rainfall event has been estimated from an analysis of hourly water level records for the period of 2007 to 2011 (a high rainfall period). The analysis provided the following generalisations or indication of maximum rate of water level rise:

- 0.3 m rise in water level over 12 hours associated with approximately 120 mm of rainfall; and
- 0.6 m rise in water level over 24 hours associated with approximately 100 mm of rainfall; and
- 0.9 m rise in water level over 48 hours associated with approximately 100 mm of rainfall.

2.4 Trigger Water Levels

2.4.1 Opening Trigger Level

Based on the details in **Sections 2.1.2** and **2.1.3**, the lower desired water level in the lake to avoid flooding of properties and the sewerage system is approximately 1.6 m AHD. This level is near the upper limit of the natural breakout range (1.2 – 1.8 m AHD). Artificially opening the entrance at this level will be generally infrequent and will not have any significant impact on the natural opening and closing regime of Woolgoolga Lake and therefore unlikely to have a significant environmental impact on the estuary. Therefore, a lake water level of **1.6 m AHD** is recommended as an artificial opening trigger water level.

The opening trigger water level may need to be adjusted in the future in response to: sea level rise; implementation of flood mitigation measures; augmentation of the sewerage system; or other factors.

2.4.2 Alert Trigger Level

In consideration of the rate of rise of water levels in the lake (**Section 2.3.1**) it is recommended that an alert trigger level of **1.20 m AHD** (with a closed entrance) is used to initially alert Council to monitor the potential for significant increases in water levels. This should provide between 12 and 24 hours of warning prior to the lake reaching a level of 1.6 m AHD in the event of significant rainfall.

It is noted that 2007 - 2011 water level data indicates that a level of 1.20 m AHD was reached on average 5 times a year when the entrance was closed.

The alert trigger water level may need to be adjusted in the future in response to sea level rise or other factors.

2.5 Other Triggers for Artificial Opening

Artificial opening may be required to address extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the lake. However, it is not considered practical to include triggers to address a broad range of potential water quality scenarios. A range of factors would need to be considered during a water quality crisis, such as:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue;
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the lake.

This policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. It is recommended that any water quality crisis is assessed on an individual basis. If artificial opening is considered an appropriate option to address a water quality crisis, then this policy should be referred to in undertaking the opening procedure.

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Approvals

3.1 Statutory Provisions

The area of Woolgoolga Lake and any proposed entrance management works would be located within the Coffs Harbour LGA. The actual water body of Woolgoolga Lake is not zoned, but identified as "Creeks" under the Coffs Harbour Local Environmental Plan (CHLEP) 2000. Land immediately adjacent to and surrounding the defined water body of Woolgoolga Lake is zoned as 6A Open Space and Public Recreation under the CHLEP 2000.

Specifically, for the purpose of flooding mitigation works, Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out on any land and precludes them from requiring development consent. Clause 50 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land.*
- (2) *A reference in this clause to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with flood mitigation work:*
- (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *environmental management works.*

Although flood mitigation works would be permitted without consent on any land, the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council would be required to prepare a REF for proposed artificial opening of Woolgoolga Lake. The REF would outline the nature and extent of the proposal, what would be the trigger and determining factors for proceeding with artificial opening and identify and address any potential environmental effects which may result from such works. Hence the REF would also include mitigation measures and safeguards for the protection of the environment during artificial opening works. The REF would need to be consistent with the adopted CZMP and entrance management policy for Woolgoolga Lake.

In conjunction with preparation of the REF, Council would be required to consult with and seek any relevant licences and or concurrence from other state government agencies. These would include:

- Crown Lands under the Crown Lands Act 1989;
- Department of Primary Industries - Fisheries under the Fisheries Management Act 1994;
- Marine Parks Authority under the Marine Parks Act 1997;
- NSW Office of Water under the Water Management Act 2000; and
- Office of Environment and Heritage (National Parks and Wildlife) under the National Parks and Wildlife Act 1974.

3.1.1 Crown Lands Act 1989

Due to the artificial opening works affecting the waterway of Woolgoolga Lake and the coastline, it is likely that such works would affect Crown Land. Artificial opening of the entrance will require authority by way of licences from the Crown under Part 4, Division 1 of the Crown Lands Act 1989.

3.1.2 Fisheries Management Act 1994

The objectives of the Fisheries Management Act 1994 *are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.* The provisions of Division 3, Part 7 of the Act are likely to be relevant to any works associated with the artificial opening of Woolgoolga Lake. The provisions relate to the protection of aquatic habitat. Although flood mitigation works would be precluded from requiring consent under ISEPP, the provisions of the Fisheries Management Act 1994 are still applicable and as part of the REF process concurrence from the Department of Primary Industries (Fisheries) would be required for certain activities. **Table 3.1** outlines the relevant provisions of the Act that would apply to the artificial opening of Woolgoolga Lake.

Table 3.1 Activities requiring concurrence under the Fisheries Management Act 1994

Fisheries Management Act 1994	Sections 198-202	Concurrence is required from the Minister, Department of Primary Industries (Fisheries) for dredge and reclamation works on defined water land. The nature of artificial opening would constitute dredge works and also potentially reclamation works in watered land. Hence a permit and concurrence from s required prior to commencement of any works.
	Sections 219-220	Concurrence is required when barriers to the movement of fish including water course crossings are to be constructed or modified. Any proposed artificial opening is unlikely to create a barrier to the movement of fish. However such specifics would need to be confirmed within the REF.
	Sections 204-205	Any artificial opening works would likely be restricted to the sand berm. Any works must not affect mangroves or other protected marine vegetation. If marine vegetation would be harmed by flood mitigation works a permit must be sought from the Minister before works commence. Clause 205 (2) states that <i>A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part.</i> It is unlikely that any such vegetation would be affected by works associated with the artificial opening of Woolgoolga Lake, however the REF must confirm this.
	Schedules 4, 4A, 5 and 6	The REF prepared for works associated with artificial opening would need to consider any presence of local threatened aquatic habitat for flora or fauna. Thus Key Threatening Processes (KTPs) would need to be considered in preparation of the REF. The following KTPs may be relevant and required consideration: <ul style="list-style-type: none"> ▪ <i>Degradation of native riparian vegetation along NSW water courses.</i> ▪ <i>Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.</i>

3.1.3 Marine Parks Act 1997

As Woolgoolga Lake forms park of the Solitary Islands Marine Park, Council would be required to obtain a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 in order to undertake any works on land affected by the Marine Park and any associated zoning. Preparation of the REF would need to consider these factors and seek the relevant concurrence / permit.

3.1.4 Water Management Act 2000

A controlled activity approval under the Water Management Act 2000 (WM Act) is required for certain types of developments and activities that are carried out in or near a river, lake or estuary (water land). Under the WM Act, a controlled activity means:

- the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
- the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
- the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- the carrying out of any other activity that affects the quantity or flow of water in a water source.

Artificial opening of Woolgoolga Lake would constitute a controlled activity under the WM Act. However under the Water Management (General) Regulation 2011, Clause 38 Controlled activities—public authorities, states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.*

Although Coffs Harbour City Council would be exempt from requiring a Controlled Activity Approval, Clause 37, *Condition applying to all exemptions under this Subdivision*, of the Regulations states: *An exemption conferred under this Subdivision is subject to the condition that the person by whom the relevant controlled activity is carried out must comply with applicable requirements (if any) of the Minister that are published in the Gazette, or notified in writing to the person, for the purposes of this clause and that are for the protection of:*

- (a) *the waterfront land on which the activity is carried out, or*
- (b) *any river, lake or estuary to which that land has frontage.*

3.1.5 National Parks and Wildlife Act 1974

The Woolgoolga Lake system falls within the Coffs Coast Regional Park. The park was created through a partnership of Council and the National Parks and Wildlife Service (now within OEH). The National Parks and Wildlife Act 1974 applies if the park is a reserve made under the Act. The Park's management is guided by a Trust Board. Preparation of an REF for artificial opening works would need to determine whether or not the park is a reserve under the Act and hence consultation / concurrence are required with OEH / National Parks and Wildlife Service. Consultation with the Trust Board would be required whether or not the park is affected by the Act. The REF would also need to consider any management plan that has been prepared for the park.

3.2 Summary of Potential Approvals

Artificial opening of the entrance for the purpose of flood mitigation is permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed artificial opening of the entrance to Woolgoolga Lake estuary. The REF needs to be consistent with the adopted CZMP and entrance management policy for Woolgoolga Lake estuary.

Preparation of the REF will involve consultation with relevant state government agencies. This will confirm the necessary approvals and licences required for artificial opening of the entrance. Preliminary assessment indicates the following approvals and licences may be necessary:

- a license from the Department of Crown Lands under the Crown Lands Act 1989;
- a permit and concurrence from the Minister, Department of Department of Primary Industries (Fisheries) under the Fisheries Management Act 1994 pursuant to Sections 198-202 for dredge and reclamation works on defined water land (the nature of artificial opening would constitute dredge works and also potentially reclamation works); and
- a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 as Woolgoolga Lake forms park of the Solitary Islands Marine Park.

The Woolgoolga Lake system falls within the Coffs Coast Regional Park, which was created through a partnership of Council and the National Parks and Wildlife Service. Consultation with the National Parks and Wildlife Service and Trust Board is required to determine if any approvals are required under the National Parks and Wildlife Act 1974.

It is noted that a Controlled Activity Approval under the Water Management Act 2000 is not required due to the Water Management (General) Regulation 2011, Clause 38 Controlled activities - public authorities, which states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.* However, Council is still required to follow any applicable guidelines of NSW Office of Water under the Water Management Act 2000.

Artificial Opening Procedure

4.1 Decision Making Process

The logic of the decision making process relates to avoiding flooding of low-lying properties and the local sewerage system. Nuisance flooding of low-lying properties occurs at lake water levels of approximately 1.6 m AHD. At higher levels of approximately 1.8 m AHD, water will flood Sewage Pump Station No.1 in Ganderton Street causing excess pumping and potentially leading to sewage entering the lake system via Jarrett Creek.

The general decision making process is shown in the flow chart in **Illustration 4.1** and involves:

- an alert is issued when the entrance is closed and lake water level reaches **1.20 m AHD**. If rainfall forecasts indicate that significant water level increases are likely then the process proceeds into the 'Standby' phase;
- the process proceeds from the 'Standby' phase into the 'site assessment' phase if the lake water level reaches **1.30 m AHD** (and the entrance remains closed);
- the process proceeds into the 'deployment' phase when the lake water level reaches **1.50 m AHD** (and the entrance remains closed) or if Council's designated officer considers it appropriate based on the site assessment;
- artificial opening works are undertaken when the lake water level reaches **1.60 m AHD** or if Council's designated officer considers it appropriate to commence artificial opening works based on the prevailing conditions.

4.1.1 Alert Phase

The alert level of 1.20 m AHD will be based on water level data automatically monitored at 15 minute intervals by Manly Hydraulics Laboratory (MHL) at Woolgoolga Lake station at the footbridge in Woolgoolga Creek (refer to **Illustration 1.1**). An alert will be automatically sent to Council if the level of 1.20 m AHD is reached and the water level records indicate the entrance condition is closed.

Following the 1.20 m AHD alert, Council will monitor rainfall forecasts to predict if water levels are likely to rise significantly. If significant rainfall / water level rise is considered likely then Council will initiate 'standby' phase.

4.1.2 Standby Phase

The "standby" phase will involve:

- Council making preparations for potential deployment of personnel / machinery for artificial opening of the entrance;
- Council alerting relevant state government agencies of the potential for an artificial opening event; and
- Council monitoring rainfall forecasts and water level alerts.

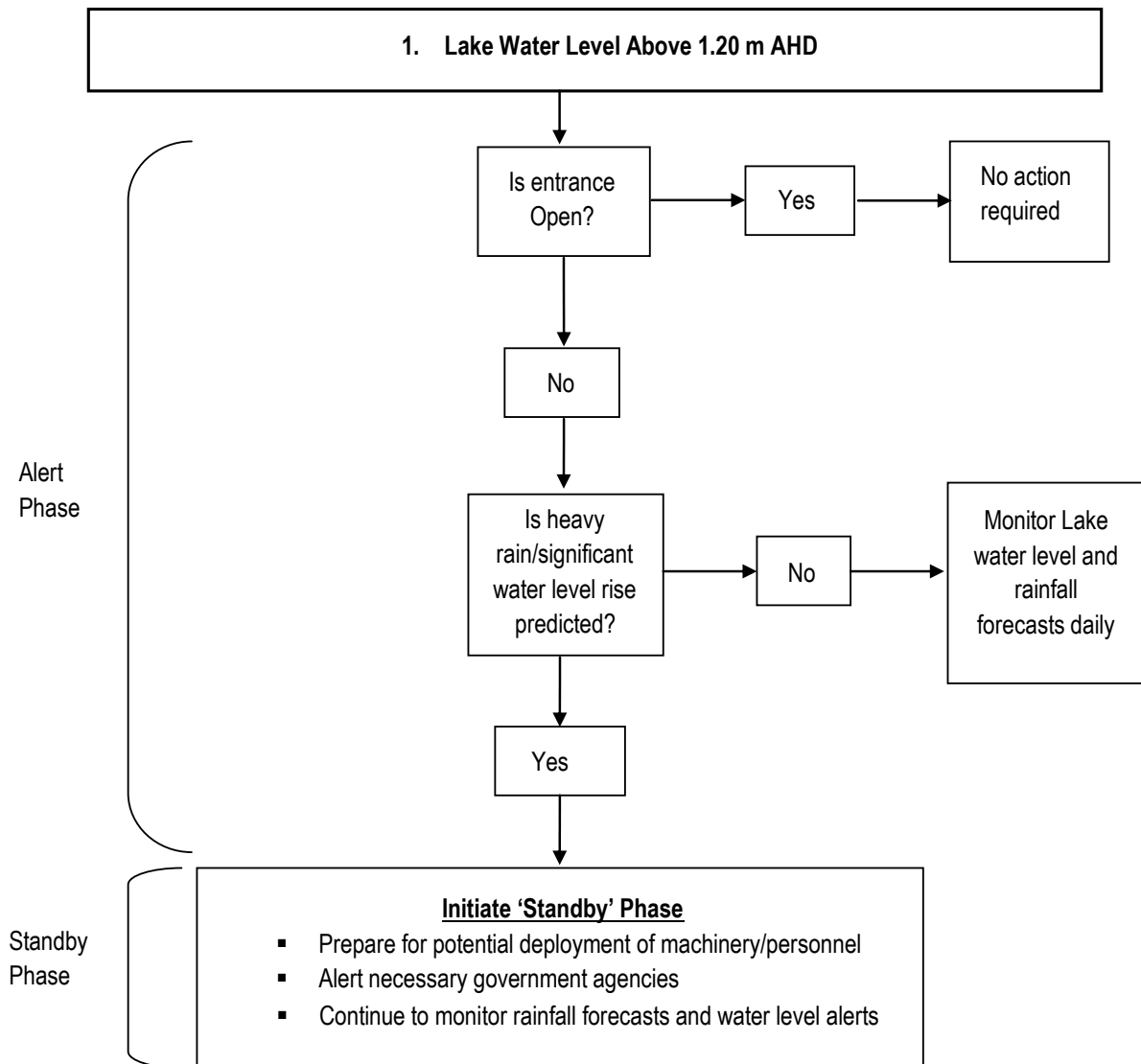


Illustration 4.1 Artificial Opening Decision Making Flowchart – Alert Phase and Standby Phase

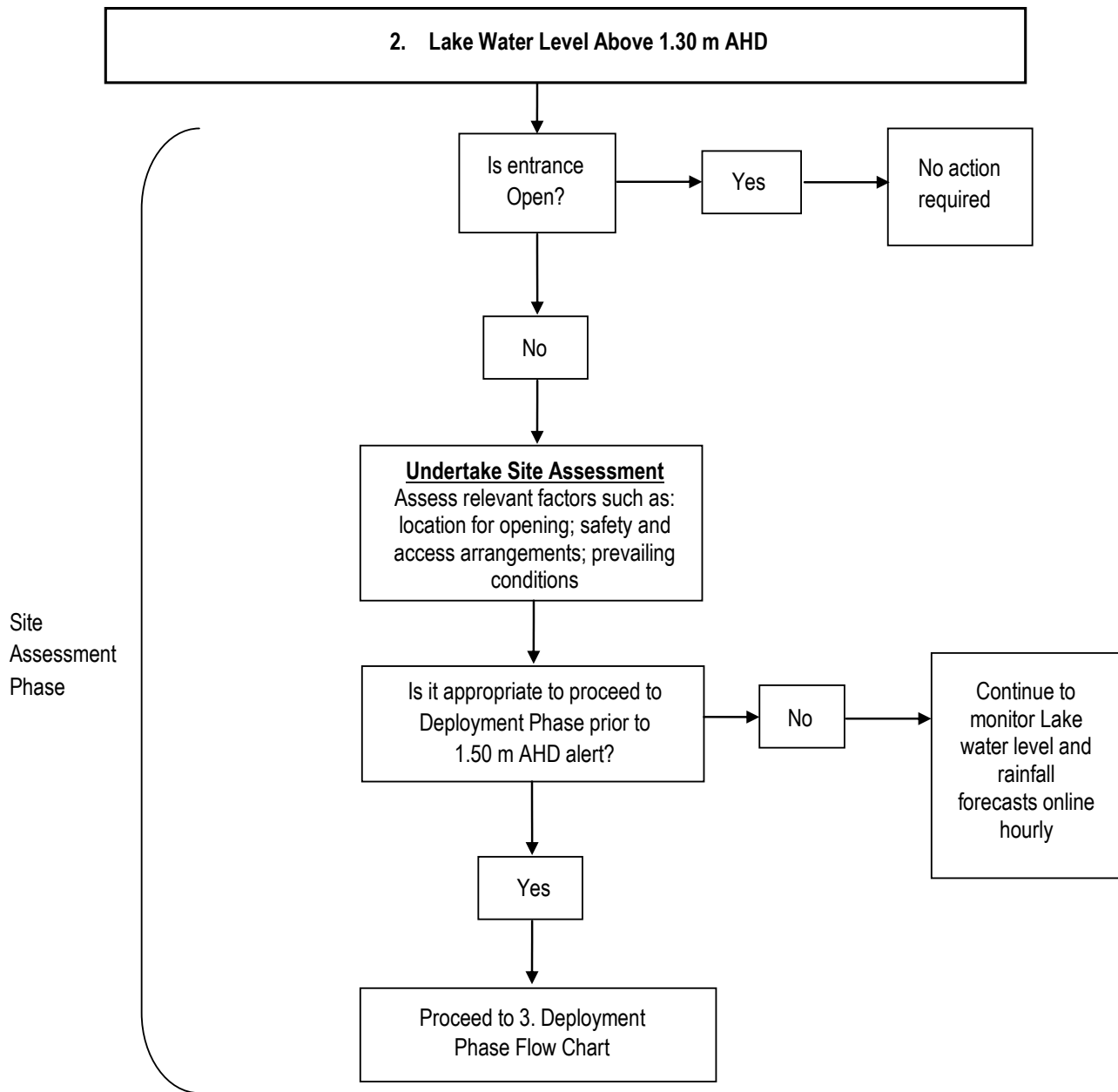


Illustration 4.2 Artificial Opening Decision Making Flowchart – Site Assessment Phase

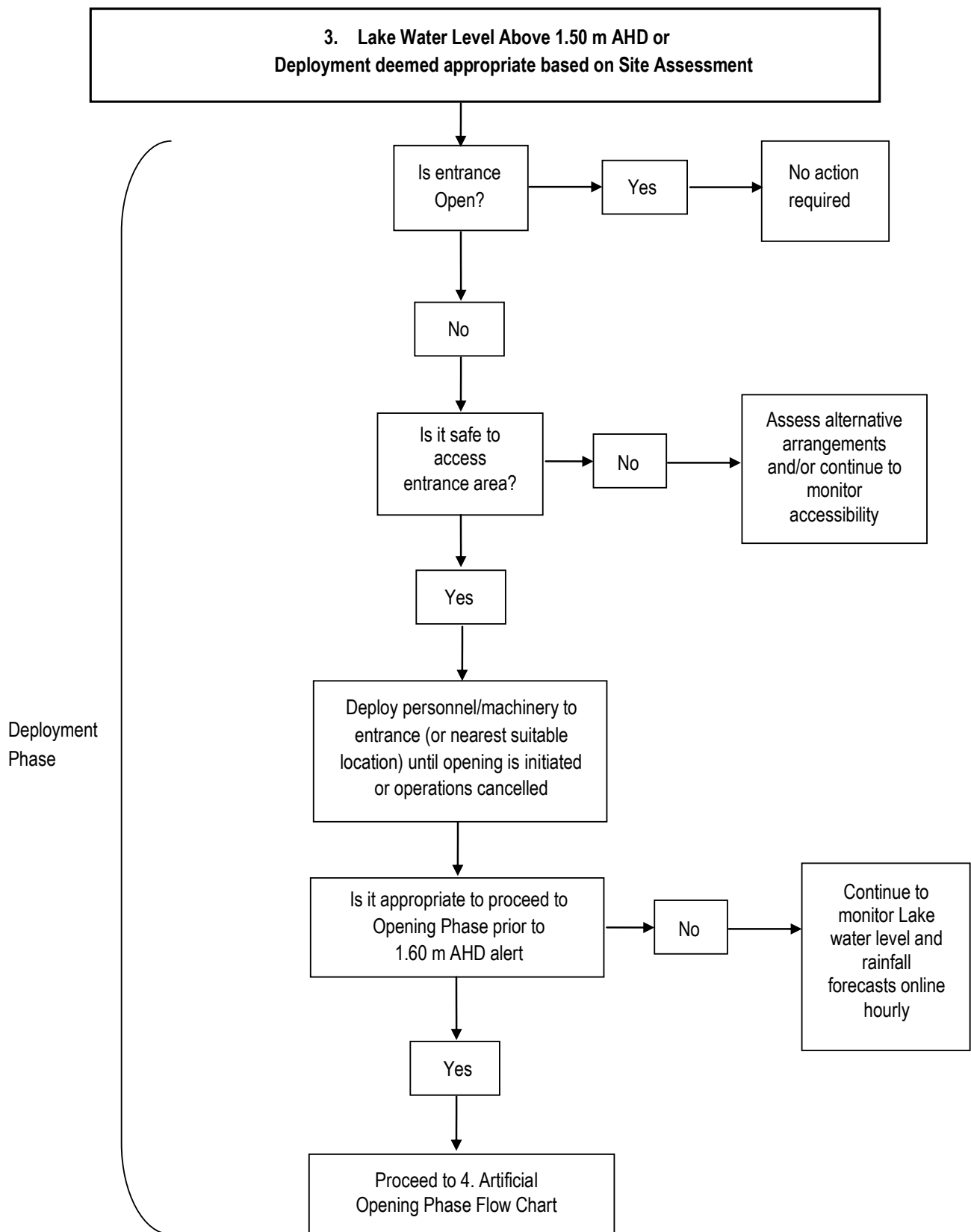


Illustration 4.3 Artificial Opening Decision Making Flowchart – Deployment Phase

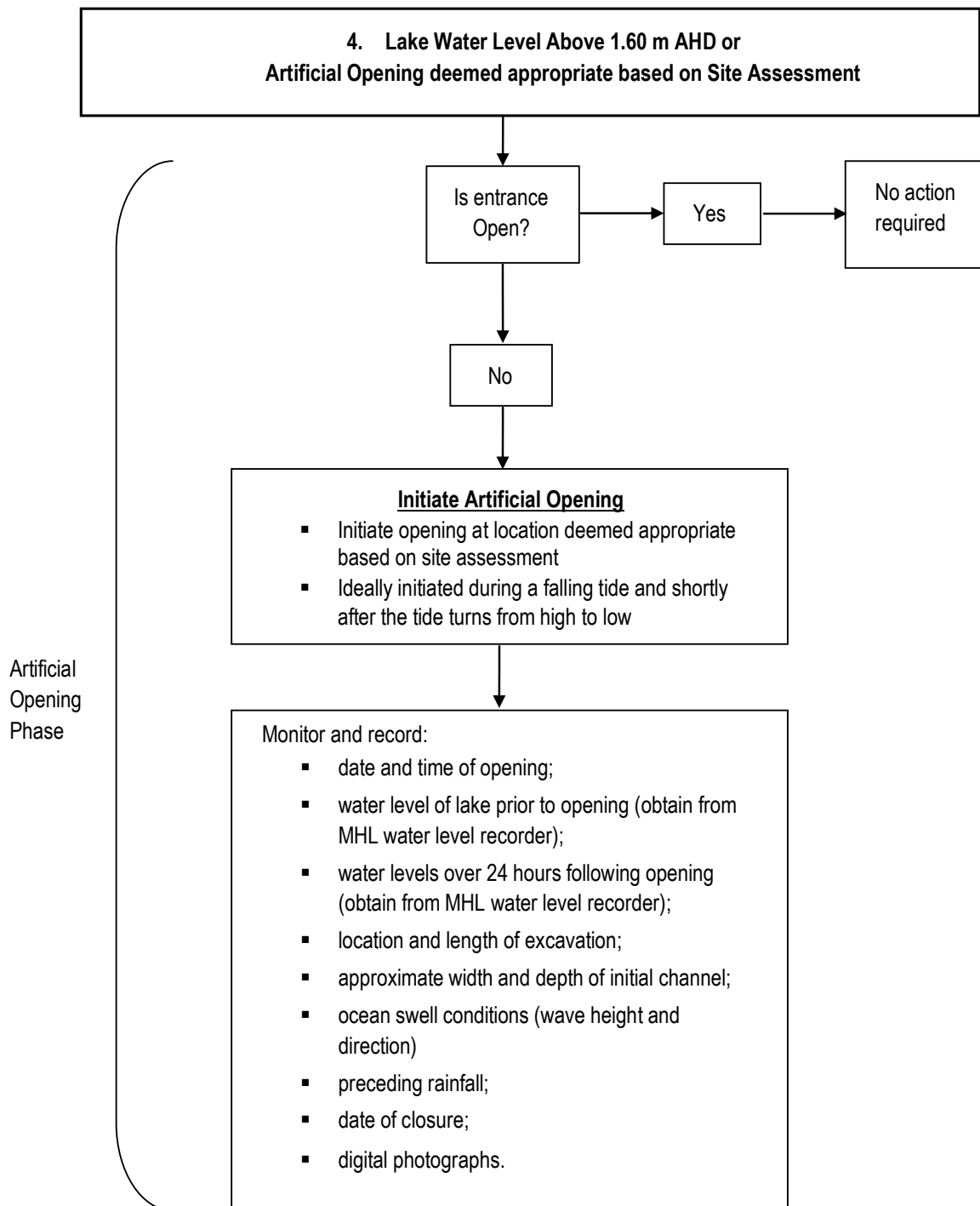


Illustration 4.4 Artificial Opening Decision Making Flowchart – Artificial Opening Phase

4.1.3 Site Assessment Phase

The process proceeds into the 'site assessment' phase if a second alert is issued by MHL when the lake water level reaches **1.30 m AHD** (and the entrance remains closed). During this phase Council's designated officer will undertake a site inspection to assess relevant factors such as: the appropriate location for the artificial opening; safety and access arrangements; and the prevailing conditions. The purpose of the assessment is to help inform the decision and logistics associated with artificially opening the entrance.

4.1.4 Deployment Phase

The process proceeds into the 'deployment' phase if a third alert is issued by MHL when the lake water level reaches **1.50 m AHD** (and the entrance remains closed) or if Council's designated officer considers it appropriate based on the site assessment.

During this phase Council's personnel and machinery will be deployed to the entrance if the site assessment considers it appropriate and safe. The recommended access route will be used unless the site assessment indicates an alternative route.

Council's personnel and machinery will remain at the entrance (or the nearest location deemed suitable under the prevailing conditions) until such time that artificial opening works are initiated or the operation is cancelled by Council's designated officer.

4.1.5 Artificial Opening Phase

Artificial opening works are undertaken if a fourth alert is issued when the lake water level reaches **1.60 m AHD** or if Council's designated officer considers it appropriate to commence artificial opening works based on the prevailing conditions.

Ideally, the artificial opening should be initiated during a falling tide and shortly after the tide turns from high to low (if possible around a spring tide when tidal fluctuations are larger).

The opening is to be initiated at the location identified by Council's designated officer and include the following:

- excavated sand to be placed to one or both sides of the excavated channel and will not be removed from site;
- the channel dimensions cannot be specified, but the initial excavated channel to be approximately 1 to 2 metres wide with a varying bed depth. The breach of the berm to be at an approximate depth of 0.3m to 0.4m below the lake water level;
- works to breach the berm are to be timed so that the final breach occurs as a tide commences to recede;
- excavation will cease once a strong outward flow of water has been established. The total excavation time will typically be of 2 to 4 hours duration;
- all machinery used on site is to be suitably sterilised before accessing the beach, and to be in a well maintained condition to reduce the likelihood of any contamination and/or spills;
- appropriate spill kits are to be available and at hand on site, to enable immediate response in the event of a spill. Spill kit procedures are to be addressed in the site tool box talk;
- appropriate pedestrian safety measures are to be in place during the works ie. either flagging tape or CHCC staff to prevent pedestrian access within 20m of machinery and the break out area.

4.2 Responsibilities for Artificial Opening

Coffs Harbour City Council is responsible for artificial opening of the entrance.

4.3 Monitoring

When mechanical openings have been carried out, monitoring of the entrance should be undertaken to determine the efficiency of the opening. For each artificial opening event, the following data will be recorded:

- date and time of opening;
- water level of lake prior to opening (obtain from MHL water level recorder);
- water levels over 24 hours following opening (obtain from MHL water level recorder);
- location and length of excavation;
- approximate width and depth of initial channel;
- ocean swell conditions (wave height and direction)
- preceding rainfall;
- date of closure; and
- digital photographs.

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Policy Updates

5.1 Review and Update of this Policy

This Policy and the associated REF should be reviewed every five years or in response to:

- outcomes of a future Floodplain Risk Management Study and Plan for Woolgoolga Lake;
- augmentations to components of the local sewerage system that are impacted by flood levels;
- legislation changes; and
- any other significant factors relevant to artificial opening of the entrance of Woolgoolga Lake estuary.

Review of the policy will include analysis of all monitoring data collected over that period to ensure that predictions, assumptions and trigger levels outlined in the current policy and REF are correct or appropriate. This will include a review of changes to climate change and sea level rise predictions and consequent impacts to this policy.

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Acronyms

AHD	Australian Height Datum
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CHLEP	Coffs Harbour Local Environmental Plan
CZMP	Coastal Zone Management Plan
ICOLL	Intermittently Closed and Open Lake and Lagoon
ISEPP	State Environmental Planning Policy (Infrastructure), 2007
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory
PS	Pump Station
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy



Willis Creek Estuary Coastal Zone Management Plan

Draft for Public Exhibition



Coffs Harbour City Council has prepared this document with financial assistance from the NSW Government through the Office of Environment and Heritage. This document does not necessarily represent the opinions of the NSW Government or the Office of Environment and Heritage.

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Coastal Zone Management Plan

Willis Creek Estuary Draft for Public Exhibition

Prepared for: Coffs Harbour City Council and
Office of Environment and Heritage
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Executive Summary

This draft Coastal Zone Management Plan (CZMP) describes proposed actions to be implemented by Coffs Harbour City Council, other public authorities and the private sector to address priority management issues for the Willis Creek estuary. The area addressed by this CZMP comprises the Willis Creek waterway and tributaries, foreshores and the catchment draining to the estuary up to the tidal limit of the creek and its tributaries. The CZMP also considers issues associated with the wider catchment upstream of the tidal limit.

Willis Creek is an Intermittently Closed and Open Lakes and Lagoon (ICOLL) meaning the entrance to naturally alternates between being open or closed to the ocean. The entrance is predominantly closed. The creek is part of the Solitary Islands Marine Park and is zoned as a Habitat Protection Zone up to the tidal limit.

The relatively dense vegetation and lack of public access to the Willis Creek estuary generates little recreational activity. However, the natural setting attracts people seeking quiet recreational opportunities such as bird watching and bushwalking. Willis Creek has a large area of swamp forest, wet heath and mangrove / saltmarsh complex which is largely contained in the Coffs Coast Regional Park. The Willis Creek / Hearn Lake entrance area hosts a significant breeding site in NSW for the threatened species, Little Tern (South-eastern Australian population).

Banana plantations and blueberry farms cover the majority of the upper catchment of Willis Creek. Industrial and residential land comprises the majority of the mid-catchment on the eastern side of the Pacific Highway. The site of the Woolgoolga Water Reclamation Plant (WWRP) covers a significant proportion of the lower estuary catchment. The WWRP released treated effluent into Willis Creek from 1973 to 2005. The release ceased in 2005 with the plant upgrade and connection to the Coffs Harbour recycled water system.

Identification of key estuary management issues and development of management strategies has been undertaken based on technical studies and consultation with the community and key stakeholder organisations. Consultation has included community workshops in 2010 and 2011, a community survey in 2011.

Estuary Management Issues

The key management issues for the estuary relate to:

- management of sediment, nutrient and other pollutant inputs from the catchment;
- protecting the native riparian vegetation (which is generally in good condition) from environmental weeds which reduce the ecological value and potentially impact upon bank stability, recreational amenity and aesthetics;
- preserving the recreational and visual amenity which is predominantly an undisturbed natural environment with low key recreational activities; and
- climate change impacts (particularly sea level rise and consequent lake water level increases) on the estuarine ecology.

Estuary Management Strategies

A range of potential management strategies have been developed, prioritised and detailed to address the key issues. These strategies are summarised in the following Implementation Schedule. The key management strategies include:

- continue educational and incentive schemes that address the management of soil resources and pesticide / herbicide / fertiliser use in agricultural activities, encourage establishment of vegetated riparian zones on farm watercourses;

- auditing the existing drainage systems and industrial properties to identify any deficiencies in existing stormwater management systems;
- control significant land modification activities on rural lands by enforcing development consent where required under Council's Local Environmental Plan to enforce erosion and sediment controls for significant earthworks;
- a weed management strategy which targets priority environmental weeds in high value riparian areas;
- repairing the existing vehicular route to the carpark near the creek entrance to avoid / prevent vehicles creating additional 'bypass' tracks and maintaining the existing range and level of low impact recreation to preserve the dominant natural character of the estuary;
- implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise;
- include Willis Creek in the Ecohealth water quality monitoring program;
- a revegetation plan to enhance the existing natural character of the estuary to preserve and improve its high visual amenity; and
- implementing a formal Entrance Management Policy for Willis Creek with the aim to minimise interference with the natural opening and closing processes of the creek entrance whilst mitigating the impacts of extreme water quality issues and future sea level rise induced flooding of properties and infrastructure.

Implementation Schedule

The proposed management strategy actions are detailed in the following Implementation Schedule. Included in the schedule is:

- the lead agency responsible for executing the strategy action (other relevant support agencies are included in the strategy action details in the main body of the CZMP);
- the timeframe for implementing the strategy action. The year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP (refer to strategy action details in the main body of the CZMP with respect to monitoring of each action);
- The strategy actions are listed in general order of priority with a specific priority assigned to each strategy action in terms of "very high", "high", "medium" or "low" priority.

Prior to implementation of the Willis Creek estuary strategy actions Council will need to review to ensure consistency with the Coastal Zone Management Plan for the Coffs Harbour coastline and consistency with the Regional Park Management Plan.

Implementation Schedule

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
Strategy 1 - Stormwater Management and Catchment Pollutants						
1.1	Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities	DPI – Agriculture NSW	Year 1	\$5,000 per workshop for preparation, materials and delivery	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC Environmental Levy ▪ NRCMA ▪ OEH - Environmental Education Grants 	High
1.2	Encourage horticultural landowners to uptake incentives program for Best Practice Management	NRCMA	Years 1 – 5	<ul style="list-style-type: none"> ▪ Staff budget time for coordinating uptake of the incentives program ▪ \$20,000 pa for incentives funding from CHCC Environmental Levy ▪ \$20,000 pa for incentives funding from NRCMA. 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ NRCMA – Best Practice Management Horticultural Program 	Very High
1.3	Audit stormwater management systems for existing urban development	CHCC	<ul style="list-style-type: none"> ▪ Initial audit: 1 – 5 years ▪ Retrofit works: long term 	<ul style="list-style-type: none"> ▪ Initial audit: CHCC staff time as part of asset management ▪ Retrofit works: dependant on proposed works 	NSW Government Coastal and Estuary Management Program	High - Medium
1.4	Stormwater management for new urban development	CHCC	Review policy and guidelines every 5 years	Part of Council’s operational budget	n/a	Medium

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
1.5	Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management	NRCMA	Years 1 – 5	Part of cost listed in Strategy Action 1.2.	Same funding as listed in Strategy Action 1.2.	Very High
1.6	Control land modification activities on rural lands	CHCC	Year 1	Unknown additional staffing resources and additional costs to Council's operational budget	n/a	Very High
Strategy 2 - Water Quality - water quality issues are adequately addressed in the Strategy 1 actions of this CZMP. No further actions are proposed to address this issue						
Strategy 3 - Riparian Vegetation						
3.1	Develop a weed management strategy which prioritises areas of riparian foreshore to be treated and priority weeds to be targeted	CHCC	Years 1 - 2	Strategy development ~\$5,000 if done external to CHCC.	NRCMA will fund the development of a recognised NRM Plan up to a total cost of \$5000.	Very High
3.2	Undertake primary weed control in priority areas using specialist bush regeneration contractors	CHCC	Years 2 – 5	Subject to Weeds Management Strategy under Strategy Action 3.1 If external contractors are to be used, funds required is subject to the Weed Management Strategy but initially estimated at 200 hours per year @ \$35/hr (\$7,000/yr) over 5 years.	<ul style="list-style-type: none"> ▪ NRCMA funding for implementation of recognised NRM Plans. ▪ Environmental Trust Restoration and Rehabilitation grants. ▪ Grants through NSW Government for weed control works on Crown Lands. 	Very High

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
					<ul style="list-style-type: none"> CHCC Environmental Levy. 	
3.3	Foster a local Landcare group to undertake the secondary control or follow-up maintenance of areas treated by the CHCC bush regeneration team or specialist contractors	CHCC	Long term commitment required to support community groups	Dependent on activities, but generally limited to provision of tools, consumables, and support.	Support available through Coffs Landcare Network. Funding available through NRCMA where a recognised NRM plan exists (such as that formed under Strategy Action 3.1) any other grants available from time to time such as Environmental Trust Community Bush Regeneration and/or Restoration and Rehabilitation Grants.	Medium
Strategy 4 - Recreational Amenity						
4.1	Repair the existing vehicular route where required to avoid / prevent vehicles creating additional 'bypass' tracks	CHCC	Years 1 - 5	Repair the existing vehicular route and install discrete barriers: \$10,000	<ul style="list-style-type: none"> Caring for Our Country CHCC operating budget CHCC Environmental Levy 	Medium
Strategy 5 - Climate Change Impacts on Water Quality - addressing current water quality issues in accordance with Strategy 1 actions will be the best preparation for the impacts of climate change on water quality. No further actions are proposed to address this issue						
Strategy 6 - Fish Kills and Algal Blooms - Strategy 1 actions are considered adequate to address this issue. No further actions are proposed						
Strategy 7 - Climate Change Impacts on Estuary Ecology						

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
7.1	Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise	CHCC	Years 1 – 2	Staff time	CHCC operating budget	High
Strategy 8 - Water Quality Monitoring						
8.1	Include Willis Creek in the Ecohealth water quality monitoring program	CHCC	Years 1 – 2	\$5,000 for initial baseline report (or Council staff time) \$20,000 every 4 years for Ecohealth water quality monitoring program	<ul style="list-style-type: none"> ▪ CHCC operating budget. ▪ MPA - SIMP: in kind assistance 	Medium
Strategy 9 - Little Terns - current joint management undertaken by OEH - National Parks and Wildlife Service and Coffs Harbour City Council and the Shorebird Recovery Program for management of the Little Tern breeding site at the Hearn's Lake / Willis Creek entrance is consistent with the objectives of this CZMP. Therefore no specific CZMP actions are proposed in respect to the Little Tern breeding site at the Hearn's Lake / Willis Creek entrance						
Strategy 10 - Visual Amenity						
10.1	Prepare and implement a revegetation plan to enhance the existing natural character of the estuary to preserve and improve its high visual amenity	CHCC as Reserve Trust Manager	Years 1-10	Revegetation plan preparation and implementation: \$50,000	Caring for Our Country CHCC operating budget	Medium
Strategy 11 – Entrance Management						
11.1	Prepare a Review of Environmental Factors for potential artificial opening of the entrance to Willis	CHCC	Years 1 – 5	Staff time	CHCC operating budget	Low

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
	Creek estuary					
11.2	Refine, adopt and implement Willis Creek Entrance Management Policy	CHCC	Years 1 – 5	Staff time for adoption of policy.	CHCC operating budget	Low
11.3	Address flooding risks that have the potential to trigger artificial opening of the entrance in the future	CHCC	Years 5 - 10 for audit and assessment Years 10 – 25 for relocate, replace or modify essential services and assets	Audit and assessment: \$10,000 Augmentation works: dependant on proposed works	NSW Government Estuary Management Program	Low
11.4	Raise community awareness of the natural opening and closing regime of Willis Creek	CHCC	1-10 years	Incorporate into community awareness initiatives for <i>Shorebird Recovery Program</i> for Little Tern breeding site at the entrance	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC operating budget 	Low

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Introduction

This document presents a draft Coastal Zone Management Plan (CZMP) for Willis Creek estuary. The primary purpose of this CZMP is to describe proposed actions to be implemented by Coffs Harbour City Council, other public authorities and the private sector to address priority management issues for the Willis Creek estuary. These management issues relate to:

- risks to public safety and built assets;
- pressures on estuary health; and
- community uses of the estuary.

The area addressed by this CZMP comprises the Willis Creek waterway and tributaries, foreshores and the catchment draining to the estuary up to the tidal limit of the creek. The CZMP also considers issues associated with the wider catchment upstream of the tidal limit. The Willis Creek estuary is shown below and the extents of this area are mapped overleaf in **Illustration I.1**.



Source: Google Earth, 2011

Plate I.1 Aerial Image of Willis Creek Estuary

Background

In 2010, Coffs Harbour City Council (Council) and Office of Environment and Heritage (OEH) engaged GeoLINK in association with Aquatic Science and Management and GECO Environmental to develop a CZMP for Willis Creek estuary. Council's Coastal Estuary Management Advisory Committee's goal for the CZMP is to "to assist Council in achieving an integrated, balanced, responsible and ecologically sustainable use of the Willis Creek Estuary."

Drawn by: RE Checked by: TIM Reviewed by: TIM Date: May 2012
Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



GeoLINK
environmental management and design

Geographical Extent of the Coastal Zone Management Plan

Coastal Zone Management Plan - Willis Creek Estuary
1616039

Illustration I.1

Development of this draft CZMP has included the following preliminary phases: literature and information review; technical study of the relationship between the estuary processes, external influences and issues of concern; community uses assessment and development of key management objectives and issues. These preliminary studies are reported in the following documents:

- *Data Compilation and Estuary Processes Study – Darkum Creek, Woolgoolga Lake and Willis Creek* (GeoLINK et al., 2011a); and
- *Estuary Management Study – Willis Creek* (GeoLINK et al., 2011b).

Summaries of these preliminary phases are contained in:

- **Appendix C** – summary of literature and information review and technical study of estuary processes;
- **Appendix D** – summary of community uses assessment; and
- **Appendix E** – summary of development of key management objectives and issues.

Consultation

Community and stakeholder consultation was undertaken to gain input to the development of management action for Willis estuary. Consultation has included community workshops in 2010 and 2011, a community survey in 2011 and liaison with relevant stakeholders.

Addressing Coastal Management Principles

The notes below describe how this CZMP has considered the relevant Coastal Management Principles as detailed in the *Guideline for Preparing Coastal Zone Management Plans* (DECCW, 2010).

Principle 1: *The Plan will consider the objects of the Coastal Protection Act 1979 and the goals, objectives and principles of the NSW Coastal Policy 1997 and the NSW Sea Level Rise Policy Statement 2009.*

The NSW Coastal Policy deals with population and economic growth whilst protecting the natural, cultural, heritage and spiritual values of the coastal environment. The policy has a strong focus on the principles of Ecologically Sustainable Development. The NSW Coastal Protection Act 1979 aims to protect, enhance, maintain and restore the environment with concern for both the natural and built environments. These principles formed the basis of development and prioritisation of management strategies for Willis Creek estuary.

The benchmarks and guidelines in the *NSW Sea Level Rise Policy Statement 2009* have been considered in development of the entrance management policy, and in relation to climate change impacts on estuary ecology, hydrodynamics and community infrastructure.

Principle 2: *Optimise links between plans relating to the management of the coastal zone.*

Development of this CZMP including the literature review component has considered Council's Coastal Processes and Hazard Definition Study and Coastal Zone Management Study for the coastline, Council's Climate Change Mitigation and Adaptation Action Plan and other studies and management plans related to Willis Creek estuary.

Principle 3: *Involve the community in decision-making and make coastal information publicly available.*

As indicated above, community consultation was undertaken to gain input to the development of management action for Willis Creek estuary including community workshops in 2010 and 2011, and a community survey in 2011 and liaison with relevant stakeholders.

Principle 4: *Base decisions on the best available information and reasonable practice; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach.*

The estuary processes study component of the CZMP considered the above issues. Development of management strategies has included a continuous improvement management approach such as the measures outlined in respect to climate change impacts on flooding to minimise the future need for artificial opening events.

Principle 5: *The priority for public expenditure is public benefit; public expenditure should cost effectively achieve the best practical long-term outcomes.*

Development of strategies and priorities has included consideration of public expenditure.

Principle 6: *Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risks where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented.*

This principle is not directly applicable to the issues for the Willis Creek estuary.

Principle 7: *Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions.*

This principle is not directly applicable to the issues for the Willis Creek estuary.

Principle 8: *Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded coastal ecosystems.*

Development and prioritisation of strategies has considered the above approach such as management of environmental weeds which has been prioritised for riparian vegetation classified as either 'good' or 'very good' condition.

Principle 9: *Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy.*

This principle is not directly applicable to the issues for Willis Creek estuary, however, actions under Strategy 4 address the provision of recreational infrastructure.

Principle 10: *Support recreational activities consistent with the goals of the NSW Coastal Policy.*

Strategy 4 in this CZMP directly addresses recreational activities related to Willis Creek estuary.

Key Values of Willis Creek Estuary

The natural settings of the estuaries and coast within the Mid North Coast area are a feature that attracts visitors and locals to the area. Willis Creek is in keeping with this natural setting, and forms part of the network of bushland settings along the coast and estuaries and is of local and broader significance. The creek is part of the Solitary Islands Marine Park and is zoned as a Habitat Protection Zone up to the tidal limit.

Key values of the estuary include its natural setting, Little Tern breeding site and quiet recreational opportunities including bird watching and bushwalking. Willis Creek is a relatively small and remote coastal estuary with dense vegetation and a lack of public access. However it offers the following recreational values:

- water-based activity including kayaking and canoeing in the creek; and

- the natural setting attracts people seeking quiet recreational opportunities such as bird watching and bushwalking.

Willis Creek offers a predominantly undisturbed natural environment that forms an integral and important component of the natural settings along the coastline. Willis Creek is a remote, densely vegetated estuary and with limited access which combine to significantly restrict visual access into the area. It offers the following scenic values:

- limited, short distant views into the foreshore vegetation from the vehicle access track;
- highly scenic, panoramic views across upstream and downstream reaches of the creek from an elevated vantage point at the top of the dune near the carpark at the end of the track;
- the mouth of the creek to the south of the car park also offers an uninterrupted view of the downstream reach of the creek and its partial opening to the ocean; and
- much of the Willis Creek reserve has been retained in its natural state and the creek follows a narrow channel that meanders through dense, visually rich riparian vegetation which encloses and protects the creek to produce a highly tranquil and scenic environment.

Ecological values of Willis Creek include:

- a relatively large area of saltmarsh habitat. Saltmarsh contributes to the overall productivity of the estuary and provides habitat for fish and invertebrates. Saltmarsh is also protected as an endangered ecological community (EEC) under the *TSC Act*;
- an area close to the entrance to Willis Creek is used as a breeding site for a population of the endangered little tern (*Sterna albifrons*);
- the riparian vegetation of Willis Creek is mostly intact and in good (73%) to very good (9%) condition. Riparian vegetation filters overland flows, stabilises banks, provides structural habitat for fish and contributes to the overall productivity of the estuary;
- approximately 0.9 ha of mangrove habitat showing active recruitment. Mangroves are an important primary producer driving the overall productivity of the system, process pollutants in the water, provide structural habitat for fish and invertebrates and stabilise banks and sediment; and
- reeds and rushes are common along the margins of the central channel and upper creek, contributing to productivity, habitat value and bank stability.

The entrance to the Willis Creek estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Key Management Issues

The key estuary management issues that have been identified relate to:

- sediment, nutrient and other pollutant inputs from the catchment;
- protecting the native riparian vegetation (which is generally in good condition) from environmental weeds which reduce the ecological value and potentially impact upon bank stability, recreational amenity and aesthetics;
- preserving the recreational and visual amenity which is predominantly an undisturbed natural environment with low key recreational activities; and
- climate change impacts (particularly sea level rise and consequent lake water level increases) on the estuarine ecology.

Key Management Strategies

Key management strategies for Willis Creek estuary include:

- continue educational and auditing strategies that address the management of soil resources and pesticide / herbicide / fertiliser use in agricultural activities in the upper catchment;
- auditing the existing drainage systems and industrial properties to identify any deficiencies in existing stormwater management systems;
- incorporating adequate riparian buffer widths into the planning framework for rural properties;
- a weed management strategy which targets priority environmental weeds in high value riparian areas;
- upgrading the existing vehicular route to the carpark near the creek entrance and maintaining the existing range and level of low impact recreation to preserve the dominant natural character of the estuary;
- upgrading the car park area near creek entrance to enhance the visitor experience and the appreciation of the estuary's natural values by improving site interpretation and opportunity to view Willis Creek;
- assessing available corridors for upslope migration of mangrove and saltmarsh communities in response to sea level rise and making appropriate changes to planning instruments in order to protect saltmarsh and mangroves from future impacts associated with sea level rise;
- a water quality monitoring program for Willis Creek;
- a revegetation plan to enhance the existing natural character of the estuary to preserve and improve its high visual amenity; and
- implementing a formal Entrance Management Policy for Willis Creek with the aim to minimise interference with the natural opening and closing processes of the creek entrance whilst mitigating the impacts of extreme water quality issues and future sea level rise induced flooding of properties and infrastructure.

The management strategies in this document are presented in general order of priority (Strategy 1 being the highest priority). Specific priorities have also been assigned to each strategy action in terms of “very high”, “high”, “medium” or “low” priority. The priorities and timeframes provided in this CZMP are indicative and are to be used to guide the order of implementation. Priorities were established in response to:

- the degree to which the management strategies will impact on estuary issues;
- timeframe over which the strategy impacts will extend (the longer the better);
- extent of the estuary addressed by each management strategy;
- community rating of issues addressed by each management strategy (based on a community survey); and
- likely cost of effective implementation of the management strategy.

Coffs Harbour 2030 Plan

The Coffs Harbour 2030 Plan (CHCC, 2009), a strategic plan for the Coffs Harbour community (‘the 2030 Plan’), was adopted by Council in December 2009. The 2030 Plan is driven by the Community Vision 2030 and outlines the steps needed to create a sustainable future for Coffs Harbour LGA. It is the overarching plan that integrates planning and reporting frameworks, while mapping out the community's aspirations for the future of the Coffs Harbour LGA to 2030 and beyond.

This CZMP is consistent with the aspirations of the Coffs Harbour community as articulated in the 2030 Plan. The 2030 Plan covers five themes including *Moving Around* and *Looking after our Environment* which are more directly applicable to this CZMP. The 2030 Plan outlines outcomes, objectives and actions for each theme. The actions applicable to this CZMP are listed in **Table I.1** below. The final two columns of the table list the CZMP strategy actions that address the listed 2030 Plan strategies.

Table I.1 – Coffs Harbour 2030 Plan

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
MA2 Many of us walk and cycle from place to place	MA2.2 We have constructed an interconnected network of cycle ways, footpaths and walking tracks that connect our urban communities, hinterland and coastal villages.	MA 2.2.1 Work in partnership to provide cycle ways and footpaths.	-	Not considered an issue for Willis Creek estuary
LE1 We understand and value our unique natural environment and its cultural connections	LE1.3 We have many opportunities for nature experiences and learning through improved access to natural areas.	LE1.3.1 Promote connection to the environment through learning in the environment.	11.4	Raise community awareness of the natural opening and closing regime of Willis Creek via community awareness initiatives for <i>Shorebird Recovery Program</i> for Little Tern breeding site at the entrance
		LE1.3.2 Create and extend walking trails and other opportunities for environmental experiences.	4.1	Repair the existing vehicular route with the objective of preserving the recreational amenity of Willis Creek and the existing low level of activity
LE2 We protect and restore our environment to conserve its unique biodiversity for future generations	LE2.1 Our forests, beaches, headlands, ocean, rivers, forested mountain backdrop, plants and animals are conserved for future generations.	LE2.1.1 Ensure land use management policies and practices conserve the region's unique environmental and biodiversity values.	Strategy 1 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities Urban stormwater management
			Strategy 3 actions	Environmental weed strategy for riparian corridor
		LE2.1.2 Enhance protection of our marine areas and manage for change.	Strategy 1 actions	As above with respect to Strategy 1 actions
			8.1	Buffers to enable aquatic habitats to respond to sea level rise
		LE2.1.3 Maintain and conserve biodiversity through protected reserve systems and other land conservation mechanisms.	7.1	Buffers to enable aquatic habitats to respond to sea level rise
		LE2.1.5 Implement climate change planning,	7.1	Buffers to enable aquatic habitats to

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
		adaptation and mitigation strategies.	Strategy 11 actions	respond to sea level rise Address increased flooding risks from sea level rise that will impact on artificial entrance openings
	LE2.2 We have active programs to restore and improve our environment.	LE2.2.2 Manage our catchments effectively and adaptably.	Strategy 1 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities Urban stormwater management
		LE2.2.3 Build ecosystem resilience through a system of local and regional habitat corridors.	Strategy 3 actions 7.1	Management of riparian vegetation Buffers to enable aquatic habitats to respond to sea level rise
LE3 We manage our resources and development sustainably.	LE3.1 We are responsible in the use and management of our natural resources and work to reduce our ecological footprint.	LE3.1.2 Use best practice to prevent pollution impacts on our environment.	Strategy 1 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities Urban stormwater management

Coffs Harbour Coastal Zone Management Plan

Council is preparing a separate Coastal Zone Management Plan that addresses coastal risks along the Coffs Harbour coastline. This coastline plan will define the level of risk from coastal hazards and provide a co-ordinated approach to management of coastal hazards.

Initial review of draft actions proposed in the coastline plan does not indicate any inconsistencies with the Willis Creek estuary strategy actions. However, prior to implementation of the Willis Creek estuary strategy actions Council will need to review to ensure consistency with the Coastal Zone Management Plan for the Coffs Harbour coastline.

Coffs Harbour Regional Park Management Plan

Council is also preparing a Regional Park Management Plan. Prior to implementation of the Willis Creek estuary strategy actions Council will need to review to ensure consistency with the Regional Park Management Plan.

Strategy 1 - Stormwater Management and Catchment Pollutants

Catchment inputs in the form of stormwater, diffuse runoff and point source inputs are typically the major sources of poor water quality in estuaries and other coastal water bodies. The effects of poor water quality inputs can be magnified in ICOLLs such as Willis Creek depending on the status of the entrance.

Modelling undertaken during the Willis Creek Estuary Processes Study (GeoLINK *et al.*, 2011a) suggests that the major sources of sediment and nitrogen are horticultural and residential land uses in the western part of the catchment. The same modelling indicated that phosphorus inputs were clearly dominated by horticultural land uses. Careful management of runoff from agricultural and residential areas within the catchment may lead to long term improvements in water quality.

Community consultation indicates concern that additional effects arising from catchment runoff may be related to pesticide and herbicide use in agricultural activities (mostly blueberry and banana farming). Guidelines for best practice management of soil and water resources on blueberry (NSW DPI 2008a) and banana farms (NSW DPI 2008b) are available and have been used in the past as a basis for workshops and training activities for farmers.

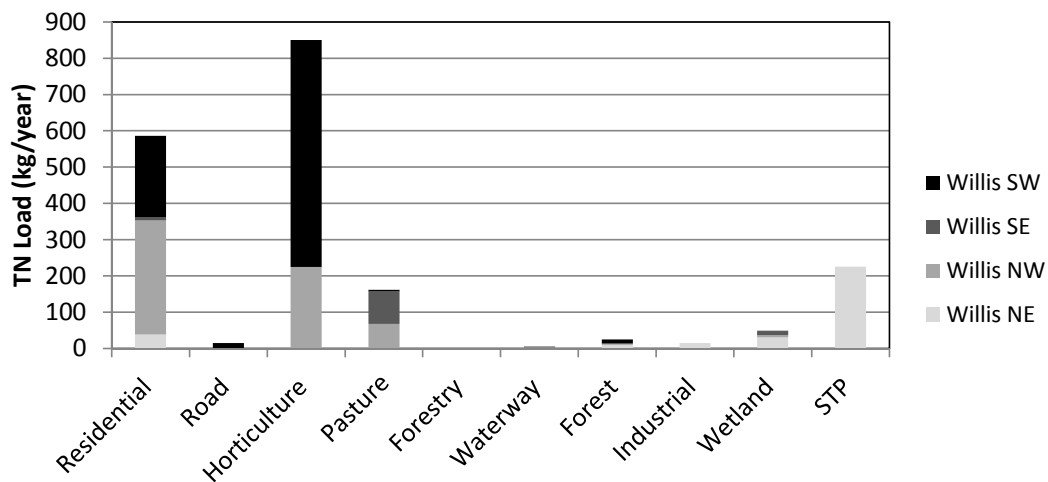


Illustration 1.1 Modelled Nitrogen inputs from different landuses and areas of the Willis Creek catchment

The site of the Woolgoolga Water Reclamation Plant occupies a significant proportion of the Willis Creek estuary. Effluent release from the plant into the creek ceased in 2005 with the upgrade of the plant and connection to the Coffs Harbour reclaimed water reticulation system. There are no releases of effluent into the creek with the exception of wet weather overflows approximately every 5 to 10 years. It is considered that current licence conditions and management of the plant adequately address potential issues associated with the plant.

1.1 Summary of Proposed Actions

- Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities.
- Encourage horticultural landowners to uptake incentives program for Best Practice Management.
- Audit stormwater management systems for existing urban development.
- Stormwater management for new urban development - ongoing updating of Council's Water Sensitive Urban Design (WSUD) Policy (2009) and associated guidelines.
- Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management.
- Control land modification activities on rural lands to prevent soil erosion and other impacts associated with rural development such as the construction of building pads for greenhouse structures.

1.1.1 Related Strategies

- **Strategy 2** Water Quality.
- **Strategy 3** Riparian Vegetation.
- **Strategy 5** Water Quality Impacts Associated with Climate Change Impacts on Water Quality.
- **Strategy 6** Fish Kills and Algal Blooms.
- **Strategy 8** Water Quality Monitoring.

1.1.2 Objectives Addressed

- Restore Terrestrial Habitats of High Ecological or Conservation Value by Removing Threats and Through Targeted Rehabilitation.
- Improved Water Quality.

1.2 Details of Proposed Actions

<p>Strategy Action 1.1</p> <p>Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities.</p>
<p>Background:</p> <p>Community consultation indicates concern that agricultural activities (mostly blueberry and banana farming) may be negatively impacting water quality in Willis Creek via inputs of sediment, nutrients and agricultural chemicals.</p> <p>A campaign of awareness targeting rural landholders is considered an appropriate way of addressing these concerns, improving agricultural practices and having a positive effect on water quality in Willis Creek. Workshops run by Coffs Harbour Regional Landcare targeting fertiliser use on blueberry farms are an example of recent initiatives that could be expanded upon. Workshops could be based upon existing guidelines (NSW DPI 2008a & b) and utilise the expertise of NSW DPI (Agriculture) staff from the Coffs Harbour region.</p>
<p>Specific Tasks</p> <p>Develop and deliver a series of workshops aimed at blueberry and banana farmers in the catchment that describe;</p> <ul style="list-style-type: none"> ▪ strategies to reduce erosion, such as contour alignment of rows, installation of trafficable cross banks at regular intervals, establishment of groundcovers, adequate riparian buffer widths on rural properties and

<p>the use of subsurface drainage;</p> <ul style="list-style-type: none"> ▪ strategies to maintain and monitor soil moisture such that irrigation is always used in the most efficient manner; ▪ strategies to maximise the efficiency of fertiliser, herbicide and pesticide use and application, such that the overall use is minimised and concentrations in runoff can be minimised; and ▪ strategies to minimise the risk of accidental spillage of fertiliser, herbicides and pesticides such as appropriate storage, transport and disposal; 				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
<p>Lead Agency:</p> <ul style="list-style-type: none"> ▪ DPI – Agriculture NSW <p>Related Agencies:</p> <ul style="list-style-type: none"> ▪ CHCC; ▪ NRCMA; <p>Landcare.</p>	Year 1	\$5,000 per workshop for preparation, materials and delivery	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC Environmental Levy ▪ NRCMA ▪ OEH - Environmental Education Grants 	Delivery of workshops is an appropriate benchmark.
<p>Strategy Action 1.2</p> <p>Encourage horticultural landowners to uptake incentives program for Best Practice Management</p>				
<p>Background:</p> <p>Community consultation indicates concern that agricultural activities (mostly blueberry and banana farming) may be negatively impacting water quality in Willis Creek via inputs of sediment, nutrients and agricultural chemicals.</p> <p>The Northern Rivers Catchment Management Authority (NRCMA) provides funding for landholders in specific horticultural industries to assist with the adoption of Best Management Practices for soil health in high priority landscapes including the Woolgoolga area. The targeted horticultural industries include blueberry, banana, macadamia, vegetable and coffee growers and growers of other perennial horticulture crops.</p> <p>Eligible project activities include, but are not limited to improvements to soil condition / soil health through application of mulch, organic matter, compost, cover crops, minimum tillage, use of crop residues etc. or other biological farming techniques; soil conservation works such as runoff controls, diversion banks, waterways or other erosion control earthworks; and, establishment / improvement of ground cover to stabilise soil.</p> <p>Successful applications are those that contribute to the soil health targets of the NRCAP, use the Best Management Practice techniques outlined in the Horticulture BMP Guidelines (eg. Soil and Water Management Practices for Blueberry growers in Northern NSW, 2008) and have in-kind contributions from the landholder with an ongoing commitment to maintaining the project.</p> <p>The program is funded by Caring for our Country and the NSW Government's Catchment Action NSW.</p> <p>Specific Tasks</p> <p>Council, NRCMA and Regional Landcare to promote and coordinate uptake of the incentives program amongst horticultural landowners.</p>				

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ NRCMA Related Agencies: <ul style="list-style-type: none"> ▪ CHCC ; ▪ Landcare; ▪ DPI. 	Years 1 – 5	<ul style="list-style-type: none"> ▪ Staff budget time for coordinating uptake of the incentives program ▪ \$20,000 pa for incentives funding from CHCC Environmental Levy ▪ \$20,000 pa for incentives funding from NRCMA. 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ NRCMA – Best Practice Management Horticultural Program 	CHCC to report annually on uptake numbers and implemented measures

Strategy Action 1.3
 Audit stormwater management systems for existing urban development

Background:
 Residential and industrial land is the second largest contributor of sediment and nitrogen in the catchment. This indicates that investment into effective stormwater management could be an effective means of improving overall estuary health. Therefore, it is important that stormwater management improvements (treatment and detention) are pursued in existing residential and industrial areas where existing arrangements are deficient. This may include retrofitting of existing drainage systems to improve treatment and detention as opportunities arise in association with redevelopment.

Specific Tasks

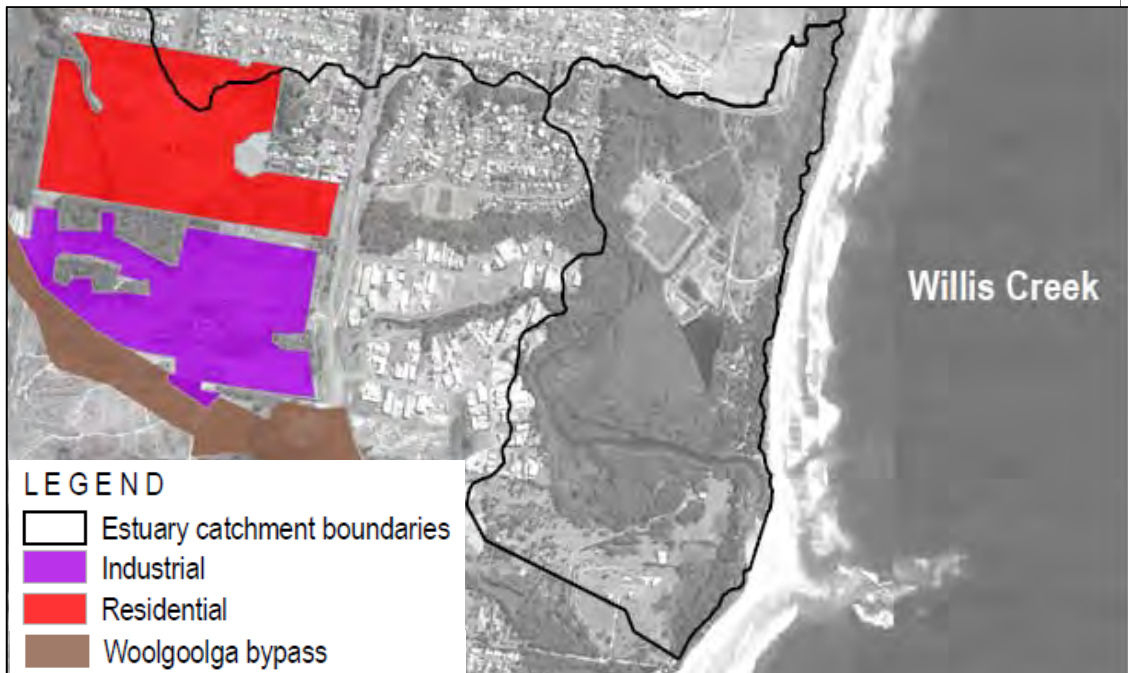
- Audit key stormwater outlets and associated drainage catchment to identify sub-standard treatment or sub-standard detention of flows and opportunities for retrofitting of the existing system;
- Audit industrial premises to identify any key stormwater issues that can be readily addressed with on-site treatment and detention measures;
- Based on the above audits, retrofit high-priority stormwater drainage systems with treatment and/or detention systems and direct industrial premises to rectify on-site stormwater issues where necessary.

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	<ul style="list-style-type: none"> ▪ Initial audit: 1 – 5 years ▪ Retrofit works: long term 	<ul style="list-style-type: none"> ▪ Initial audit: CHCC staff time as part of asset management ▪ Retrofit works: dependant on proposed works 	NSW Government Coastal and Estuary Management Program	Implementation of this action is an appropriate benchmark

Strategy Action 1.4
 Stormwater management for new urban development

Background:
 Projected future growth in the upper catchment of Willis Creek includes a “Special Investigation” area for residential and potential industrial medium term growth (2011 - 2016) – refer to **Plate 1.1**. New development

areas have the potential to reduce the quality of catchment runoff during and after the construction phase. It is important that controls placed on new developments are sufficient and enforced to ensure no negative net impact upon water quality.



Source: GeoLINK et al. (2011a)

Plate 1.1 Future Industrial and Residential Growth Areas

A significant component (20%) of the estuary catchment is zoned “2E Residential Tourist” on the southern side of Willis Creek. This area currently has minimal development. The area is addressed under Council’s *Hearnes Lake / Sandy Beach Development Control Plan (DCP) (2008)* which promotes sustainable development of the area including: a proposed increase in environmental protection areas adjoining the southern side of the creek; masterplanning of low-density residential and ecotourism in existing cleared areas; and specific stormwater quality management guidelines. The *Hearnes Lake / Sandy Beach DCP* is considered to satisfactorily address any potential water quality issues associated with future development of this area, accordingly this is not considered a significant issue for the estuary provided the DCP measures are enforced.

Council currently has a policy / guidelines addressing stormwater management for new development (Coffs Harbour City Council Water Sensitive Urban Design (WSUD) Policy, 2009a) and specific requirements for development of the “2E Residential Tourist” zone on the southern side of Willis Creek. These guidelines / development controls are consistent with current best-practice management measures in the industry. Therefore, this CZMP recommends continued implementation of Council’s policy and guidelines for stormwater management and ongoing updating of the policy and guidelines in line with developments in the stormwater management industry. No additional strategies are considered necessary in respect to controlling stormwater management for new development.

Specific Tasks

- Ongoing updating of Council’s Water Sensitive Urban Design (WSUD) Policy (2009) and associated guidelines in line with developments in the stormwater management industry.

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring

CHCC	Review policy and guidelines every 5 years	Part of Council's operational budget	n/a	Review policy and guidelines every 5 years
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Strategy Action 1.5

Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management

Background:

When looked at over the whole state of NSW, water quality data shows that the condition of an ICOLL degrades significantly once natural vegetation is lost from more than half of the catchment (Haines 2008). Clearly increased urban and agricultural development can result in negative impacts on waterways within the catchment. However, making provisions for adequate riparian buffer widths throughout a catchment can result in a number of benefits to receiving waters, such as reduced sediment and nutrient loads. It can also serve greater environmental purposes such as provision of wildlife corridors between alternative habitats.

Generally, the urbanised tributaries of Woolgoolga Lake are provided with vegetated riparian buffers of a minimum of 10 to 20 m width. The Processes Study indicates that riparian vegetation in the study area is predominately in moderate to good condition (GeoLINK *et al.*, 2011a). However, some tributaries in the upper catchment in horticultural areas are lacking any vegetated riparian buffer as indicated in the following plate.

NSW DPI recommend a minimum buffer of 50 m between watercourses and greenhouse horticulture in its handbook for managing land use conflict issues on the NSW North Coast (Learmonth, *at. al.*, 2007). The handbook recommends minimum buffer distances between watercourses and grazing land or non-greenhouse horticulture to be based on 'best practice management'.



An indication of what may be considered 'best practice management' is provided in NSW Office of Water recommendations for vegetated riparian zone widths – these widths should contain fully structured native vegetation (including groundcovers, shrubs and trees). These recommended widths are based on watercourse order as classified under the Strahler System of ordering watercourses and based on current 1:25 000 topographic maps (see table below). The width of the riparian zone should be measured from the top of the highest bank and on both sides of the watercourse. Based on the table below a minimum 10 metre wide vegetated riparian zone on either side of the watercourses is recommended in the upper tributaries.

Type of watercourse	Width of CRZ
Any first order watercourse and where there is a defined channel where water flows intermittently or any 'river' not identified on a topographic map	10 metres
<ul style="list-style-type: none"> ■ any permanently flowing first order watercourse, or ■ any second order watercourse and where there is a defined channel where water flows intermittently or permanently.	20 metres
Any third order or greater watercourse, where there is a defined channel and where water flows intermittently or permanently. Includes estuaries, wetlands and any parts of rivers influenced by tidal waters.	20 - 40 metres ¹

¹ merit assessment based on riparian functionality of the river, lake or estuary, the site and long-term land use.

Source: NSW Office of Water, 2011

It is considered that the best approach to establishing a vegetated riparian zone in the upper tributaries on rural land is via the incentives program for Best Practice Management for horticultural landowners in **Strategy Action 1.2**. Therefore no additional actions or tasks are proposed.

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ■ NRCMA Related Agencies: <ul style="list-style-type: none"> ■ CHCC; ■ Landcare; ■ DPI – Agriculture NSW. 	Years 1 – 5	Part of cost listed in Strategy Action 1.2 .	Same funding as listed in Strategy Action 1.2 .	Part of reporting as described for Strategy Action 1.2 .

Strategy Action 1.6

Control land modification activities on rural lands

Background:

Land disturbance associated with the construction, installation or maintenance of buildings, roads, or other infrastructure creates the potential for increased levels of soil erosion and consequent sediment pollution of waterways.

There has been significant development of the greenhouse horticulture industry in the rural area of Woolgoolga. Development of this industry can involve significant earthworks associated with the construction of building pads for greenhouse structures. These earthworks create the potential for significant sediment pollution of waterways without proper erosion and sediment control measures.

Past development of the greenhouse horticulture industry has generally proceeded without the requirement for development consent. There have been reported incidences where significant erosion and sediment control issues have occurred in association with construction of greenhouse structures. These incidences have been addressed under the Protection of the Environment Operations Act 1997. It is considered that a more proactive approach by Council to ensuring implementation of proper erosion and sediment control measures will provide a better outcome. This can be achieved through the development consent approach utilising

relevant provisions from the proposed Standard Instrument Local Environment Plan (SiLEP) such as Clause 7.7 Earthworks of the draft SiLEP (2012).

Specific Tasks

- Educate rural land holders about the above provisions / requirement for development consent in timing with the adoption of the proposed SiLEP;
- With respect to enforcing the provisions of the proposed SiLEP relevant to the above issues, Council is to undertake the following tasks when issues are brought to Council's attention:
 - investigate the requirement for consent for development captured by the relevant SiLEP provisions;
 - investigate compliance with development conditions in regard to erosion and sediment control measures;
 - investigate compliance where development has occurred without consent (and not been exempt development under the SiLEP or SEPP (Exempt and Complying Development Codes) 2008; and
 - utilise the provisions of the Protection of the Environment Operations Act 1997 to enforce erosion and sedimentation control where poorly managed earthworks pose a risk to, or have impacted, the environment.

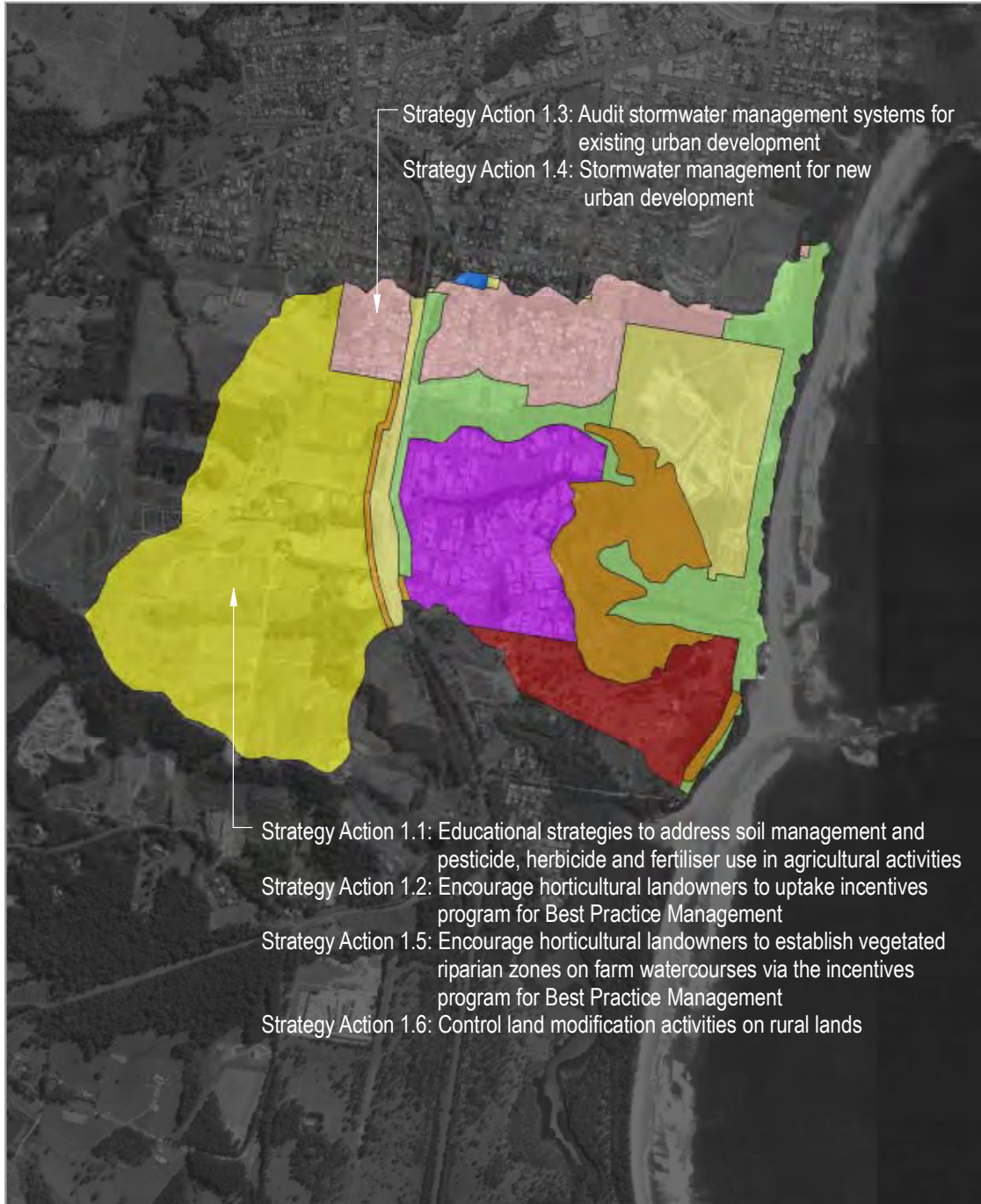
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Year 1	Unknown additional staffing resources and additional costs to Council's operational budget	n/a	Review development application / consent numbers and comparison with hothouse development based on aerial imagery

Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: June 2012

Information shown is for illustrative purposes only

Source of base data: Coffs Harbour City Council and Department of Environment and Heritage



LEGEND

- Agriculture
- Urban
- Tourism
- Business
- Industrial
- Community purpose
- Open space and public recreation
- Environmental protection



Strategy 1 - Stormwater Management and Catchment Pollutants



Coastal Zone Management Plan - Willis Creek Estuary
 1616040

Illustration 1.2

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Strategy 2 – Water Quality

It is common practice to compare water quality measurements with guideline values in order to determine the status of water quality in an aquatic system. For the protection of aquatic ecosystems in coastal waterways such as Willis Creek the most commonly applied guideline values are described by ANZECC (2000) and for the assessment of estuary condition DECCW (now OEH) released a set of guideline values based upon the salinity range in the waterway.



Comparison of existing water quality against guideline values revealed that turbidity, total nitrogen, total phosphorus and chlorophyll-a measurements are all elevated in Willis Creek, based upon the available guidelines (GeoLINK *et al.*, 2011a). It should be noted that no recent data was available to assess Willis Creek and that the most recent data was from 2005, when treated effluent was still discharged into the waterway.

2.1 Summary of Proposed Actions

Elevated levels of turbidity, nitrogen, phosphorus and chlorophyll-a are most likely to be a result of inputs from urban and non-urban areas in the catchment. As there are no point source inputs of sediments and nutrients into Willis Creek the main strategy available to reduce these pollutants loads is reducing the concentrations of sediments and nutrients in diffuse runoff from rural areas and in stormwater from urban areas. This is adequately addressed in the **Strategy 1** actions of this CZMP. No further actions are proposed to address this issue.

2.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants.
- **Strategy 5** Climate Change Impacts on Water Quality.
- **Strategy 6** Fish Kills and Algal Blooms.
- **Strategy 8** Water Quality Monitoring.

2.1.2 Objectives Addressed

- Improved Water Quality.

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Strategy 3 - Riparian Vegetation

A variety of terrestrial habitats of high conservation value have been identified within the riparian zone of Willis Creek. However, riparian weed mapping in January 2011 identified the presence of five environmental weed species listed as priority weeds in the *Northern Rivers Invasive Plants Action Strategy 2009-2013 (NRIPAS)*: Oakwood, 2009). Environmental weeds degrade the native riparian vegetation, reducing its ecological value and in some cases potentially impacting upon bank stability and other estuary values including recreational amenity and aesthetics.

The restoration of riparian vegetation is listed among the goals of the NRCMA Catchment Action Plan. Additionally, the Coffs Harbour Settlement Strategy lists the enhancement of riparian corridors as a key strategy for the Woolgoolga area to provide ecological links between coast and hinterland (Coffs Harbour City Council, 2011b).

This strategy is aimed at the protection and rehabilitation of native riparian vegetation communities with high ecological or conservation value where degradation through weed infestation has occurred. The strategy focuses on weeds species identified in the NRIPAS as Priority C or above.

3.1 Summary of Proposed Actions

- Develop a weed management strategy which prioritises areas of riparian foreshore to be treated and priority weeds to be targeted.
- Undertake primary weed control in priority areas using specialist bush regeneration contractors.
- Foster a local *Bushcare* group to undertake the secondary control or follow-up maintenance of areas treated by contractors.

3.1.1 Related Strategies

- **Strategy 4** Recreational Amenity.
- **Strategy 10** Visual Amenity.

3.1.2 Objectives Addressed

- Restore terrestrial habitats of high ecological or conservation value by removing threats and through targeted rehabilitation (e.g. riparian vegetation, endangered ecological communities such as Coastal Saltmarsh, Freshwater Wetlands, etc).
- Maintain and preserve the existing natural characteristics of the area as the dominant visual feature.
- Remove weed infestation and rehabilitate natural areas disturbed by previous uses or uncontrolled vehicle access.

3.2 Details of Proposed Actions

Strategy Action 3.1

Develop a weed management strategy which prioritises areas of riparian foreshore to be treated and priority weeds to be targeted

Background

Weed mapping undertaken in January 2011 identified the presence of environmental weed species throughout

Willis Creek (GeoLINK *et al.*, 2011a). The main species identified were groundsel bush, winter cassia, noogoora burr, and pink lantana in the mid to upper reaches, and bitou bush and coastal morning glory in the lower reaches.

According to the *Northern Rivers Invasive Plants Action Strategy 2009-2013 (NRIPAS; Oakwood, 2009)*, groundsel bush is the highest priority (Priority B) invasive weed species mapped during the field assessment. The Strategy also identifies winter cassia/senna and bitou bush (Priority C), and coastal morning glory (Priority D) as priority weeds in coastal landscapes, and lantana (Priority C) and coastal morning glory (Priority E) in riparian landscapes.

Weed control is a long-term and costly management action and so it is recommended that areas with important estuary values be targeted as a priority.

Illustration 3.1 identifies reaches where the riparian vegetation has been mapped as being in good to very good condition but where environmental weeds identified as either Priority B or C under the **NRIPAS** were also identified (ie. in this catchment: groundsel bush, senna/winter cassia, bitou bush, and lantana). These reaches are considered to be the highest priority for weed control for the next 5 years under this CZMP and should be the focus of the Weed Management strategy for Willis Creek.

Specific Tasks

It is recommended to develop a strategy based on existing mapping which;

- Sets clear objectives for weed management along the estuary over a 5 year timeline.
- Identifies priority areas for control efforts.
- Defines responsibilities for control works.
- Outlines appropriate methods for control works in estuarine environments.
- Estimates the number of hours required for primary control works and estimates hours required for maintenance over the 5 year time period.
- Outlines a strategy for raising community awareness of actions which can contribute to the spread of environmental weeds along the estuary.
- Identifies funding sources
- Sets monitoring and evaluation criteria

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
Lead Agency: ▪ CHCC Related Agencies: ▪ NRCMA; Landcare.	Years 1 - 2	Strategy development ~\$5,000 if done external to CHCC.	NRCMA will fund the development of a recognised NRM Plan up to a total cost of \$5000.	The benchmark for this Action is the development of a recognised NRM Plan for the Management of priority weed species in priority areas of Willis Creek.

Strategy Action 3.2

Undertake primary weed control in priority areas using specialist bush regeneration contractors

Background:

Estuarine and riparian areas are highly sensitive environments. As such, weed control work in these environments needs to be undertaken by specialist bush regenerators with skills in plant identification and

<p>knowledge of appropriate methods of control of weeds near waterways (especially where chemical control methods are to be used). In addition, such areas can be hazardous to workers, so it is essential that appropriate OHS strategies are implemented to ensure control works are undertaken in a safe manner.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Priority areas for weed control, species to be targeted, appropriate methods to be used, total available contract hours, and monitoring and evaluation actions/maintenance are to be defined in the Weed Management Strategy developed in Strategy Action 3.1 above. ▪ Priority works should where possible be scheduled into the operations/works plan of Council's Bush Regeneration team, alternatively specialist contractors could be engaged where funding is available 				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
<p>Lead Agency:</p> <ul style="list-style-type: none"> ▪ CHCC - Weeds Officer to provide oversight. <p>Related Agencies:</p> <ul style="list-style-type: none"> ▪ NRCMA; ▪ Landcare. 	Years 2 – 5	<p>Subject to development of the Weeds Management Strategy under Strategy Action 3.1 above.</p> <p>If external contractors are to be used, funds required is subject to the Weed Management Strategy but initially estimated at 200 hours per year @ \$35/hr (\$7,000/yr) over 5 years.</p>	<p>NRCMA funding for implementation of recognised NRM Plans, Environmental Trust Restoration and Rehabilitation grants, grants through NSW Government of weed control works on Crown Lands, CHCC Environmental Levy.</p>	<p>The benchmark for this Action is the engagement of specialist contractors to control priority weeds in areas identified in the Weed Management Strategy developed in Strategy Action 3.1</p>
<p>Strategy Action 3.3</p> <p>Foster a local Landcare group to undertake the secondary control or follow-up maintenance of areas treated by the CHCC bush regeneration team or specialist contractors</p>				
<p>Background:</p> <p>The effective control of environmental weeds requires a long-term and consistent approach. To be successful, the initial control works undertaken by the CHCC team or specialist contractors needs to be followed by periodic maintenance to ensure areas cleared of weeds do not become re-infested by regrowth or new weed seedlings. A model that has worked in many parts of the North Coast region has been to support local care groups operating under the Landcare umbrella. Small scale funding and support in the form of insurance coverage and tools is often available through the Landcare network. Group activities are also often part funded via NRCMA small grants (where a recognised NRM Plan exists), via Council environmental levies, Environmental Trust grants, etc.</p> <p>Specific Tasks</p> <p>Liaise with Coffs Harbour Landcare to determine the appropriate actions for establishing a Willis Creek Care group.</p>				

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC. Related Agencies: <ul style="list-style-type: none"> ▪ NRCMA; ▪ Landcare. 	Long term commitment required to support community groups	Dependent on activities, but generally limited to provision of tools, consumables, and support.	Support available through Coffs Landcare Network. Funding available through NRCMA where a recognised NRM plan exists (such as that formed under Strategy Action 3.1) any other grants available from time to time such as Environmental Trust Community Bush Regeneration and/or Restoration and Rehabilitation Grants.	The benchmark for this action is the successful formation of a Willis Creek Care group which includes as its activities the long term maintenance of high conservation value riparian vegetation communities.

Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

Information shown is for illustrative purposes only

Strategy Action 3.1: Develop a weed management strategy which prioritises areas of riparian foreshore to be treated and priority weeds to be targeted
Strategy Action 3.2: Undertake primary weed control in priority areas using specialist bush regeneration contractors



Strategy Action 3.3: Foster a local Bushcare group to undertake the secondary control or follow-up maintenance of areas treated by contractors

LEGEND

- Coastal Saltmarsh plus riparian vegetation in good condition but with bitou bush present
- Coastal Saltmarsh plus riparian vegetation in very good condition but with bitou bush present
- Coastal Saltmarsh threatened by gromsel, winter cassia, and lantana
- Coastal Saltmarsh threatened by lantana and gromsel infestation
- Coastal Saltmarsh threatened by lantana infestation



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Strategy 4 - Recreational Amenity

Increased recreational activity and uncontrolled pedestrian access to riparian areas of Willis Creek has the potential to damage the natural environment. Additionally, increased recreational activity has the potential to impact on the existing 'low-key' recreational amenity and sense of solitude experienced by walkers.



Willis Creek offers a predominantly undisturbed natural environment that forms an integral and important component of the natural settings along the coastline. It is a remote, densely vegetated estuary with limited access which significantly restricts visual access into the area. The creek follows a narrow channel that meanders through dense, visually rich riparian vegetation which encloses and protects the creek to produce a highly tranquil and scenic environment.

The Willis Creek estuary is an important natural resource but is largely hidden from public view. This is largely due to the screening effect of the surrounding riparian vegetation, lack of bush track access and the low level elevation of the surrounding landscape to enable a clear view of the creek setting.

The area is generally accessed along a vehicular route from South Street (branching off High Street). The vehicular route comprises a bitumen sealed road from High Street to the Woolgoolga Water Reclamation Plant and an unsealed ('dirt') road from the plant to the car park area near the creek entrance. The unsealed road varies in condition with poor drainage / pooling of water in some sections which has resulted in the creation of additional 'bypass' tracks around the 'boggy' sections. This has consequently impacted on the adjoining vegetation.

This strategy aims to preserve the recreational amenity of Willis Creek and the existing level of activity.

4.1 Summary of Proposed Actions

- Repair the existing vehicular route where required to avoid / prevent vehicles creating additional 'bypass' tracks.

4.1.1 Related Strategies

- **Strategy 3** Riparian Vegetation.
- **Strategy 10** Visual Amenity.

4.1.2 Objectives Addressed

- Preserve the quiet, undeveloped natural setting.
- Prevent excessive disturbance or fragmentation of the existing natural values.
- Maintain and preserve the existing natural characteristics of the area as the dominant visual feature.
- Remove weed infestation and rehabilitate natural areas disturbed by previous uses or uncontrolled vehicle access.

4.2 Details of Proposed Actions

Strategy Action 4.1				
Repair the existing vehicular route where required to avoid / prevent vehicles creating additional 'bypass' tracks				
Background:				
<p>The southern half of the vehicular access route from High Street to the car park near the creek entrance is unsealed and includes sections with poor drainage / pooling of water which has led to the creation of additional 'bypass' tracks around the 'boggy' sections. This has consequently impacted on the adjoining vegetation.</p> <p>The objective of this strategy is to repair the vehicular access route where required to prevent the creation of additional 'bypass' tracks and thereby preventing impacts on the adjoining vegetation whilst maintaining the existing 'low-key' recreational amenity of the area.</p> <p>Works under this strategy may relate to Crown Reserve No. 752853 for Future Public Requirements – managed by DPI – Catchments and Lands (Crown Lands).</p>				
Specific Tasks				
<ul style="list-style-type: none"> ▪ Seek relevant licences with respect to the following works on Crown Lands. ▪ Upgrade the existing vehicular route where required to prevent pooling of water on the roadway and to prevent disturbance of adjoining vegetation. This may include a combination of road configuration / drainage redesign and discrete barriers such as mounding, additional planting, or bollards to ensure vehicle access is maintained along the track. 				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 - 5	Repair the existing vehicular route and install discrete barriers: \$10,000	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC operating budget ▪ CHCC Environmental Levy 	Annual assessment of condition of vehicular access route


Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

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Strategy Action 4.1:
Repair the existing vehicular route where required to
avoid / prevent vehicles creating additional (bypass) tracks

LEGEND

 Crown land reserves

0 200



GeoLINK
environmental management and design

Coastal Zone Management Plan - Willis Creek Estuary
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Strategy 4 - Recreational Amenity

Illustration 4.1

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Strategy 5 - Climate Change Impacts on Water Quality

Forecast climate change and sea level rise scenarios are likely to result in a number of changes to water quality processes in ICOLLs such as Willis Creek. Some of the impacts will be direct, such as changes to average water temperature, whilst some will be indirect, following on from changes to physical process such as hydrodynamics (Haines 2006). Climate change scenarios may also result in an intensification of existing issues with water quality.

5.1 Summary of Proposed Actions

Addressing current issues in accordance with **Strategy 1** actions will be the best preparation for the impacts of climate change on water quality. No further actions are proposed to address this issue.

5.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants.
- **Strategy 2** Water Quality.
- **Strategy 7** Fish Kills and Algal Blooms.
- **Strategy 8** Climate Change Impacts on Estuary Ecology.
- **Strategy 9** Water Quality Monitoring.

5.1.2 Objectives Addressed

- Improved Water Quality.

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Strategy 6 - Fish Kills and Algal Blooms

The Woolgoolga Water Reclamation Plant previously released treated effluent into Willis Creek until 2005 when the plant was upgraded and connected to the Coffs Harbour reclaimed water reticulation system. There are no releases of effluent into the creek with the exception of wet weather overflows approximately every 5 to 10 years. These overflows from the wet weather balance pond occur in extreme rainfall events and the highly diluted sewage (approx. 90% stormwater / 10% sewage) (pers. comm. A. Wilson, CHCC, 10/10/2011). It is considered that current licence conditions and management of the plant adequately address potential issues associated with the plant operation.

Past releases of treated effluent into Willis Creek until 2005 has led to elevated nutrient concentrations that can lead to algal blooms and subsequent fish kills. Unfortunately there is little direct action that can be undertaken to rectify this problem. However, strategies aimed at reducing further input of nutrients and sediment from the catchment (see **Strategy 1** actions) will help to reduce new impacts and may increase the natural recovery of the system. No further actions are proposed to address this issue.

6.1 Summary of Proposed Actions

Strategy 1 actions are considered adequate to address this issue. No further actions are proposed.

6.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants.
- **Strategy 2** Water Quality.
- **Strategy 3** Riparian Vegetation.
- **Strategy 6** Climate Change Impacts on Water Quality.
- **Strategy 9** Water Quality Monitoring.

6.1.2 Objectives Addressed

- Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise.
- Improved Water Quality.

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Strategy 7 - Climate Change Impacts on Estuary Ecology

Under current projections for climate change and associated sea level rise there are likely to be a number of impacts upon estuary ecology. These may include direct impacts upon mangroves and saltmarsh and direct impacts upon fish diversity and abundance.



It is expected that mangroves communities will typically migrate landward in response to higher lake water levels. The distribution and species of mangroves may change due to higher water temperatures (Walsh, 2004a cited in Haines, 2006). Saltmarsh communities are considered to be particularly vulnerable to increases in average lake water levels, as they occupy relatively flat ground near the waters edge. Small changes in sea level will therefore result in extensive inundation (Walsh, 2004a cited in Haines, 2006). Further, landward migration of saltmarsh, mangroves, and other wetland communities in response to rising lake water levels may be restricted by existing development or barriers (e.g. natural elevated banks adjoining the creek) resulting in a loss of habitat (Pittock, 2003; Walsh, 2004b, Gilman, 2004 cited in Haines, 2006).

There may be also be indirect impacts upon estuary ecology related to climate change impacts upon water quality. Strategies that will reduce the impacts of forecast climate change scenarios upon water quality are discussed under **Strategy 1**.

7.1 Summary of Proposed Actions

- Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise.

7.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants.
- **Strategy 2** Water Quality.
- **Strategy 3** Riparian Vegetation.
- **Strategy 5** Climate Change Impacts on Water Quality.

7.1.2 Objectives Addressed

- Protect Saltmarsh and Mangrove Habitats from Disturbance.
- Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise.
- Preserve the Quiet, Undeveloped Natural Setting.

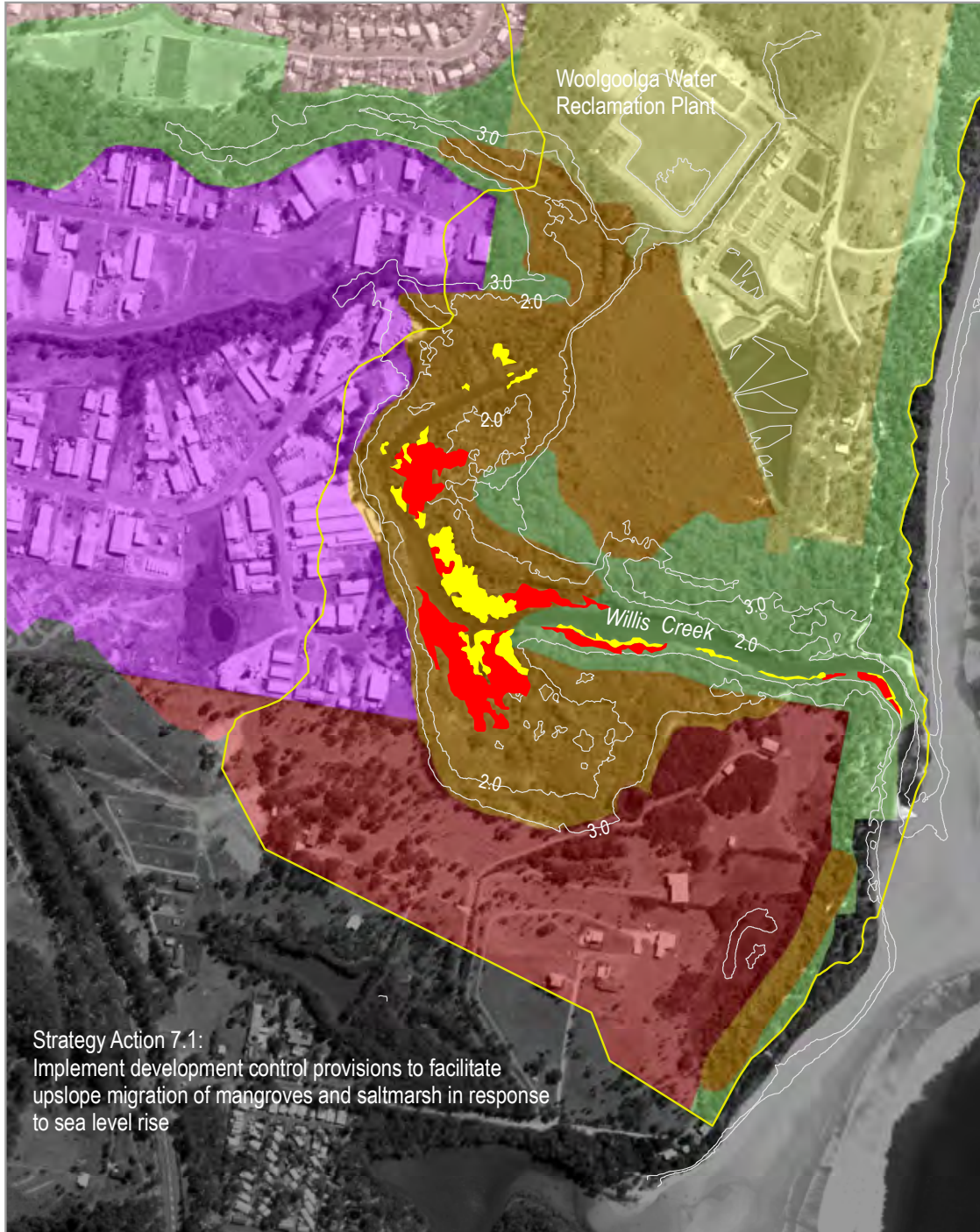
7.2 Details of Proposed Actions

Strategy Action 7.1				
Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise				
Background:				
<p>Currently, mangroves and saltmarsh in Willis Creek are mostly located below the 1.5 mAHD contour line and all located below the 2 mAHD contour line. The response of mangroves and saltmarsh colonies to sea level rise forecasts is likely to be a mixture of sediment accretion (ie, no migration) and upslope migration. The exact balance will be dependent upon a variety of geomorphic, biogeographic and development factors that will vary significantly by location. However, it can be safely assumed that the future total vertical migration of mangroves and saltmarsh is likely to be closely aligned with future total sea level rise (i.e approx. 0.9m by 2100) as the distribution of saltmarsh and mangroves is strongly defined by tidal heights. In areas where upslope migration is made possible by low sloping land, low development pressure and compatible current landuse careful planning for the future may result in improved outcomes.</p> <p>In addition to buffers allowing the upslope migration of mangroves and saltmarsh it is important to allow horizontal buffers for landward migration of riparian vegetation so that a suitable riparian strip is maintained under sea level rise scenarios. Current best practice suggests that a 40m riparian buffer is suitable for maintaining the environmental integrity of estuaries (see Strategy Action 1.5).</p> <p>The majority of Willis Creek foreshore where retreat of mangroves and saltmarsh is likely to occur is largely zoned 7A – Environmental Protection Habitat and Catchment with other areas zoned 6A – Open Space and Public Recreation. This is considered an adequate zoning for the protection of vertical and horizontal buffers for the upslope migration of saltmarsh and mangroves resulting from sea level rise over the near future. However, in the case that changes to the current zoning of foreshore land around Willis Creek be proposed or the Coffs Harbour LEP is reviewed, appropriate horizontal and vertical buffers must be protected to ensure the future integrity of mangrove and saltmarsh habitat in addition to a riparian buffer zone. A vertical buffer incorporating the 3 mAHD contour line and a horizontal buffer of 40 m landward from the 3 mAHD contour line will be adequate to preserve the ecological integrity of the system.</p>				
Specific Tasks				
<ul style="list-style-type: none"> ▪ Map a buffer zone around Willis Creek incorporating all lands currently zoned 5A, 6A and 7A falling within 40 m landward of the 3 mAHD contour line. ▪ Develop Development Control Plan (DCP) provisions for the above buffer zone that controls or limits development within the buffer zone such that potential upslope migration of mangroves and saltmarsh is not impeded. 				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 2	Staff time	CHCC operating budget	Preparation of a report which describes priority potential areas for future colonisation

Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

Drawn by: RE Checked by: TIM Reviewed by: TIM Date: August 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



LEGEND

- Saltmarsh (Aquatic Science and Management - 2009)
- Mangrove (Aquatic Science and Management - 2009)
- 2A Residential Low Density
- 2E Residential Tourist
- 4A Industrial
- 5A Sewage Treatment Plant
- 6A Open Space and Public Recreation
- 7A Environmental Protection Habitat and Catchment
- Contour at 2.0 and 3.0 m AHD



Strategy 7 - Climate Change Impacts on Estuary Ecology

Coastal Zone Management Plan - Willis Creek Estuary
 1616043

Illustration 7.1

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Strategy 8 - Water Quality Monitoring

The collection of water quality data is an important aspect of overall estuary management. When collected in a suitable fashion, water quality data informs managers of:

- natural and unnatural processes occurring in the waterway;
- risks to public safety associated with recreational pursuits;
- risks to public safety associated with the consumption of aquatic foods;
- potential risks to aquatic ecosystems;
- trends with respect to the 'health' of the aquatic system; and
- the effects of soil, water and other management strategies put in place throughout the catchment.

The long term dataset available for Willis Creek is not detailed or consistent enough to provide clear information about a number of the above listed items.

8.1 Summary of Proposed Actions

- Include Willis Creek in the Ecohealth water quality monitoring program.

8.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants.
- **Strategy 2** Water Quality.
- **Strategy 5** Climate Change Impacts on Water Quality.
- **Strategy 6** Fish Kills and Algal Blooms.

8.1.2 Objectives Addressed

- Improved Water Quality.
- Improved Monitoring of Water Quality.

8.2 Details of Proposed Actions

Strategy Action 8.1

Include Willis Creek in the Ecohealth water quality monitoring program.

Background:

The combined water quality dataset for Willis Creek has been identified as lacking in continuity and detail and insufficient to assist with management decisions for the estuary. Since the cessation of effluent release into the creek in 2005, very little water quality information has been collected making it difficult to make an informed assessment of current water quality.

Council currently has a number of estuaries included in the Ecohealth program. However, Willis Creek is not currently included in the program. The Ecohealth program is a catchment-based aquatic health monitoring program (including water quality monitoring) in the Northern Rivers CMA region that aims to provide consistency in monitoring and reporting. The Ecohealth program integrates information from the NSW Monitoring, Evaluation and Reporting (MER) Program, NSW State of Environment (SoE) reports, and a range of other reporting programs.

It is recommended that Willis Creek is incorporated into the Ecohealth program for water quality monitoring.

Specific Tasks

- Prepare a baseline report that compiles all past water quality monitoring for Willis Creek (refer to GeoLINK *et al.* (2011a) with regard to previous water quality monitoring);
- Design an Ecohealth water quality monitoring program for Willis Creek that includes (but is not limited to):
 - a clear set of objectives;
 - appropriate temporal and spatial scales for sampling;
 - a comprehensive list of parameters that will add to the understanding of the health of Willis Creek;
 - the responsibilities for field operations and data storage;
 - reporting requirements of CHCC and the NSW State Government; and
 - a system of review;
- Implement the Ecohealth water quality monitoring program.

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
Lead Agency: ▪ CHCC Related Agencies: ▪ NRCMA; ▪ OEH; ▪ MPA - SIMP	Years 1 – 2	\$5,000 for initial baseline report (or Council staff time) \$20,000 every 4 years for Ecohealth water quality monitoring program	▪ CHCC operating budget. ▪ MPA - SIMP: in kind assistance	Reporting every 4 years in line with SoE reporting

Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

Strategy 9 - Little Terns

The Little Tern (*Sterna albifrons*) is listed as an Endangered Species under the *Threatened Species Conservation Act 1995* (TSC Act) and a Migratory Species under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In recent times the Willis Creek / Hearn's Lake entrance area has become a significant NSW breeding site for the Little Tern (South-eastern Australian population). The site is located on crown land and is currently being actively managed seasonally to protect the nesting colony in a joint project undertaken by OEH - Parks & Wildlife Group and Coffs Harbour City Council. The objective is to continue the current management program and avoid activities / development that may threaten the success of the program.



Source: Coffs Coast Advocate 2010

A *Shorebird Recovery Program* has been devised to guide management of the Little Tern breeding site at the Hearn's Lake / Willis Creek entrance. Management actions include fencing off of the nesting site, community awareness initiatives, a fox abatement plan and monitoring. Continuance of this program is expected to reduce the impact of human activities on the Little Tern population.

The management works specifically undertaken for the Little Tern are considered to provide an umbrella effect for local biodiversity, including other locally breeding migratory and shorebirds species including the Red-capped Plover (*Charadrius ruficapillus*), Rainbow Bee-eater (*Merops ornatus*) and Striated Pardalote (*Pardalotus striatus*). It may also provide future benefits for other local threatened species such as the Sooty Oystercatcher (*Haematopus longirostris*) (Nigel Cotsell, CHCC Ecologist, *pers. comm.*).

9.1 Summary of Proposed Actions

It is considered the current joint management undertaken by OEH - National Parks and Wildlife Service and Coffs Harbour City Council is consistent with the objectives developed for the Willis Creek estuary. Therefore the CZMP supports the current joint management and *Shorebird Recovery Program* for management of the Little Tern breeding site at the Hearn's Lake / Willis Creek entrance. No specific CZMP actions are proposed in respect to the Little Tern breeding site at the Hearn's Lake / Willis Creek entrance.

9.1.1 Related Strategies

- **Strategy 4** Recreational Amenity;
- **Strategy 10** Entrance Management.

9.1.2 Objectives Addressed

- Protect Little Tern population from disturbance;
- Preserve the quiet, undeveloped natural setting;
- Prevent excessive disturbance or fragmentation of the existing natural values;
- Enhance public appreciation of the broader and site specific natural values of the creek environment; and
- Maintain and preserve the existing natural characteristics of the area as the dominant visual feature.

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Strategy 10 - Visual Amenity

Willis Creek offers a predominantly undisturbed natural environment that forms an integral and important component of the regional coastal landscape. It is a remote, densely vegetated area with limited bush track access and few public vantage points. Nearby Woolgoolga Back Beach, on the other hand, is highly visible and is the predominant destination for people who access the area.



The estuary offers the following scenic values:

- limited, short distant views into the foreshore vegetation from the vehicle access track;
- scenic, panoramic views across upstream and downstream reaches of the creek from an elevated vantage point at the top of the dune near the carpark at the end of the track;
- attractive upstream views through the creek mouth from Woolgoolga Back Beach;
- quiet, tranquil settings along the creek corridor created by the narrow channel that meanders through dense, visually rich riparian vegetation which encloses and protects the creek; and
- dramatic, panoramic views along the coastline provided by several beach access tracks .

The only public access road into the reserve passes through an area of degraded, weed infested vegetation as a consequence of poor maintenance and past land use activities. While the area is relatively remote from Willis Creek, it is highly visible and reflects poorly on the overall visual image of the coastal landscape.

This strategy aims to preserve and optimise the scenic values of Willis Creek, to restore areas of degradation and to complement the amenity of the more popular nearby beach setting.

10.1 Summary of Proposed Actions

The following action is proposed:

- Prepare and implement a revegetation plan to enhance the existing natural character of the estuary to preserve and improve its high visual amenity

10.1.1 Related Strategies

- **Strategy 3** Riparian Vegetation
- **Strategy 4** Recreational Amenity

10.1.2 Objectives Addressed

- Preserve the quiet, undeveloped natural setting
- Prevent excessive disturbance or fragmentation of the existing natural values
- Enhance public appreciation of the broader and site specific natural values of the creek environment
- Maintain and preserve the existing natural characteristics of the area as the dominant visual feature
- Remove weed infestation and rehabilitate natural areas disturbed by previous uses or uncontrolled vehicle access.

10.2 Details of Proposed Actions

Strategy Action 10.1				
Prepare and implement a revegetation plan to enhance the existing natural character of the estuary to preserve and improve its high visual amenity				
Background:				
<p>The creek and its immediate environment generally exhibit a high degree of visual amenity due to the preservation of its natural values. Elsewhere within the reserve, however, previous land practices have caused considerable damage to the natural landforms and vegetation of the area which now appears degraded and neglected. Attention to these areas while preserving the existing natural vegetation will be paramount to the enhancement of the site's visual amenity.</p> <p>This strategy relates primarily to Crown Reserve No. 68342 for Night Soil Depot managed by Council.</p>				
Specific Tasks				
<ul style="list-style-type: none"> ▪ Seek relevant licences with respect to the following works on Crown Lands. ▪ Prepare a revegetation plan to restore previously disturbed areas adjoining access roads / paths particularly the northern reaches of the reserve adjacent to the access road. Actively implement the plan by expanding existing revegetation programs undertaken by local dune or land care groups; ▪ Continue to provide a minimal level of infrastructure to support the existing low level of passive recreation within the estuary area. Upgrade walking tracks if necessary eg. steps or retaining wall construction to ensure path routes cause minimal environmental and visual impact; and ▪ Monitor the area for environmental weed invasion and rubbish dumping and manage as necessary. 				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC as Reserve Trust Manager	Years 1-10	Revegetation plan preparation and implementation: \$50,000	Caring for Our Country CHCC operating budget	Monitor success of revegetation program and provide maintenance support as necessary until establishment.

Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

Information shown is for illustrative purposes only

Strategy Action 10.1:

- Prepare a revegetation plan to restore previously disturbed areas adjoining access roads / paths particularly the northern reaches of the reserve adjacent to the access road
- Continue to provide a minimal level of infrastructure to support the existing low level of passive recreation within the estuary area
- Monitor the area for environmental weed invasion and rubbish dumping and manage as necessary



LEGEND

Crown land reserves



GeoLINK
environmental management and design

Coastal Zone Management Plan - Willis Creek Estuary
1616044

Strategy 10 - Visual Amenity

Illustration 10.1

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Strategy 11 – Entrance Management

The entrance to the Willis Creek estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons. Willis Creek is an ICOLL system that is predominantly closed.



Council does not have any current opening protocol for Willis Creek entrance. However, it is noted that during the period of release of effluent into Willis Creek from the Woolgoolga Water Reclamation Plant (1973 to 2005), the plant operator checked the entrance on a daily basis to ensure that it did not fully close (Jelliffe, 1997a). There are no records of artificial opening of the entrance since the cessation of effluent release in 2005.

Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant need for artificial opening for the purpose of flood mitigation. Nevertheless, a formal entrance management policy is required in accordance with OEH *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010).

The objective of the entrance management policy will be to maintain a natural opening / closing regime for the creek entrance. Interference (artificial opening of the entrance) would only be employed for critical situations such as to mitigate and reduce the impacts of flooding on properties and infrastructure adjoining the creek or addressing extreme water quality issues.

11.1 Summary of Proposed Actions

- Prepare a Review of Environmental Factors for potential artificial opening of the entrance to Willis Creek estuary.
- Refine, adopt and implement the draft Willis Creek Entrance Management Policy detailed in **Appendix A** of this CZMP.
- Address flooding risks that have the potential to trigger artificial opening of the entrance in the future.
- Raise community awareness of the natural opening and closing regime of Willis Creek.

11.1.1 Related Strategies

- **Strategy 4** Recreational Amenity.

11.1.2 Objectives Addressed

- Promote natural entrance opening / closing processes.
- Avoid flooding of properties and infrastructure.
- Enhance public appreciation of the broader and site specific natural values of the creek environment.

11.2 Details of Proposed Actions

Strategy Action 11.1				
Prepare a Review of Environmental Factors for potential artificial opening of the entrance to Willis Creek estuary				
Background:				
<p>Willis Creek is an ICOLL system that is predominantly closed. The entrance opens and closes to the ocean naturally in a constant but irregular cycle depending on fluvial, tidal and wave processes. Artificial opening of ICOLL's can have significant negative impacts on water quality, fish and other ecological communities.</p> <p>There are no records of artificial opening of the entrance being used in the past. Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant need for artificial opening for the purpose of flood mitigation. Nevertheless, a formal entrance management policy for Willis Creek is required in accordance with OEH <i>Guidelines for Preparing Coastal Zone Management Plans</i> (DECCW, 2010).</p> <p>Works / activities for the purpose of flood mitigation or waterway / foreshore management (to address an extreme water quality issue) would be permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed works / activities (e.g. artificial opening of the entrance to Willis Creek estuary). The REF needs to be consistent with the adopted CZMP and entrance management policy for Willis Creek estuary.</p>				
Specific Tasks				
Prepare an REF for artificial opening of the entrance to Willis Creek estuary in consultation with relevant state government agencies. The REF will confirm the necessary approvals and licences required for artificial opening of the entrance.				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 5	Staff time	CHCC operating budget	Implementation of this action is an appropriate benchmark.
Strategy Action 11.2				
Refine, adopt and implement Willis Creek Entrance Management Policy				
Background:				
<p>The development of an entrance management policy is a requirement for Coastal Zone Management Plans for ICOLL's under the OEH <i>Guidelines for Preparing Coastal Zone Management Plans</i> (DECCW, 2010). Therefore a policy has been drafted (included in Appendix A of this CZMP) with the aim to:</p> <ul style="list-style-type: none"> ▪ minimise interference with the natural opening and closing regime for the estuary; ▪ address extreme water quality issues in the estuary; ▪ minimise flooding of properties and infrastructure from elevated water levels in the estuary. <p>Future updating of the policy is to consider adjustments in the location of the entrance in response to coastal processes and climate change impacts. The Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2011) indicates that shoreline recession of the beach may result in the creek entrance shifting north as indicated in Plate 11.1.</p>				



Source: BMT WBM, 2011.

Plate 11.1 Beach Erosion and Shoreline Recession at Willis Creek Entrance

Specific Tasks

- Refine the draft Willis Creek Entrance Management Policy outlined in this CZMP (refer to **Appendix A**) based on the outcomes of the REF under **Strategy Action 11.1**.
- Adopt and implement the Willis Creek Entrance Management Policy.

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 5	Staff time for adoption of policy.	CHCC operating budget	Implementation of this action is an appropriate benchmark.

Strategy Action 11.3

Address flooding risks that have the potential to trigger artificial opening of the entrance in the future

Background:

Increased flood levels resulting from climate change impacts may present a risk of flooding in the future to some industrial properties at the end of Bosworth Road, sewer manholes to the north and south of the cul-de-sac of Hawke Drive, and potentially sewage pump station PS 5 located to the south of Nightingale Street – refer to **Illustration 11.1**.

The need for artificially opening the estuary entrance for future flood mitigation purposes can be avoided by implementing measures such as removing, relocating or otherwise managing items of low-lying infrastructure at risk of flooding which necessitates artificial openings. The intention of this objective is to minimise the need for future interference to the natural opening / closing regime of the creek entrance for the purpose of flood mitigation.

Specific Tasks				
<ul style="list-style-type: none"> undertake and audit of low-lying infrastructure and properties to identify key services and assets vulnerable to sea level rise impacts around Willis Creek which have the potential to necessitate artificial opening of the entrance (eg. industrial properties at the end of Bosworth Road, sewer manholes to the north and south of the cul-de-sac of Hawke Drive, and potentially sewage pump station PS 5 located to the south of Nightingale Street). Develop appropriate strategies where necessary for flood-proofing, relocation, replacement or modification of these services, assets and properties. Flood-proof, relocate, replace or modify essential services, assets and properties where appropriate to reduce potential for disruption and/or the need for artificial opening of the entrance. 				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	Years 5 - 10 for audit and assessment Years 10 – 25 for relocate, replace or modify essential services and assets	Audit and assessment: \$10,000 Augmentation works: dependant on proposed works	NSW Government Estuary Management Program	Implementation of this action is an appropriate benchmark
Strategy Action 11.4				
Raise community awareness of the natural opening and closing regime of Willis Creek.				
Specific Tasks				
To assist with establishing broad based community understanding and support for the entrance management policy for Willis Creek it is recommended that development of interpretive signage under Strategy Action 4.2 considers the inclusion of information on the natural opening and closing regime of Willis Creek.				
Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
CHCC	1-10 years	Incorporate into community awareness initiatives under <i>Shorebird Recovery Program</i> for Little Tern breeding site at the entrance	<ul style="list-style-type: none"> Caring for Our Country CHCC operating budget 	Implementation of this action is an appropriate benchmark.

Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

Drawn by: RE Checked by: TIM Reviewed by: TIM Date: June 2012
 Source of base data: Coffs Harbour City Council

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Acronyms

AHD	Australian Height Datum
ANZECC	Australia and New Zealand Environment Conservation Council
APZ	Asset Protection Zone
ASS	Acid sulfate soils
CAP	Catchment Action Plan
CCA	Comprehensive Coastal Assessment
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CMSS	Catchment Management Support System
DO	Dissolved Oxygen
DPI	NSW Department of Primary Industries
EMS	Estuary Management Study
ICOLL	Intermittently Closed and Open Lake and Lagoon
LGA	Local Government Area
MER	Monitoring Evaluating and Reporting
MHL	Manly Hydraulics Laboratory
MPA	Marine Parks Authority
NPWS	National Parks and Wildlife Service
NRCMA	Northern Rivers Catchment Management Authority
NRIPAS	Northern Rivers Invasive Plants Action Strategy 2009-2013
OEH	Office of Environment and Heritage, NSW Department of Premier & Cabinet
OEH – PWG	Office of Environment & Heritage – Parks & Wildlife Group
SIMP	Solitary Islands Marine Park
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
WSUD	Water Sensitive Urban Design

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Appendix A

Draft Entrance Management Policy Willis Creek Estuary

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Entrance Management Policy

Willis Creek Estuary

Draft for Public Exhibition

Prepared for: Coffs Harbour City Council and
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Introduction

1.1 Reason for this Policy

The entrance to the Willis Creek estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Many ICOLL's are manually or artificially opened to the ocean by authorities to 'drain' the estuary for a range of reasons, often to reduce the impacts of flooding around the estuary foreshores. However, artificially opening ICOLL's can impact on estuary health. Therefore a policy is required to outline to Council if and when the entrance to Willis Creek estuary should be artificially opened.

1.2 The Purpose of this Policy

The purpose of this policy is to provide Council with criteria for initiating an artificial opening event and a procedure for artificial opening of the entrance of Willis Creek estuary.

1.3 Policy Statement

The Willis Creek Entrance Management Policy aims to:

- minimise interference with the natural opening and closing regime for Willis Creek estuary;
- minimise flooding of properties and infrastructure from elevated water levels in the estuary; and
- provide a procedure to address extreme water quality issues in the estuary;
- detail procedures and responsibilities for artificial opening of the estuary entrance; and
- detail procedures for monitoring following an artificial opening event.

This policy will be implemented by Coffs Harbour City Council in consultation with the appropriate NSW Government agencies.

1.4 Area to Which this Policy Applies

The area covered by this policy is shown in **Illustration 1.1**. This policy applies to the catchment of the estuary which comprises the waterway, foreshores and land adjacent to the estuary up to the tidal limit of the tributary creeks and the extent of the drainage catchment directly contributing to the estuary waterways.

1.5 Policy Context

This policy has been prepared as part of the Coastal Zone Management Plan (CZMP) for Willis Creek estuary. CZMP's for estuaries are prepared in accordance with Part 4A of the *Coastal Protection Act 1979* and the *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010). These guidelines require CZMP's for ICOLL's to include an entrance management policy.

A range of NSW legislation and policies are relevant to estuary management and the establishment of any entrance management policy and subsequent artificial opening procedures.

There may be a range of statutory approvals / licensing requirements that need to be sought in order to undertake entrance management activities, for example artificial opening. A range of approvals may be required due to potentially different land tenures, zonings and statutory provisions. These provisions may include Crown Lands licence under the NSW Crown Lands Act 1989, concurrence from NSW Fisheries for dredge and reclamation work on defined water land under the NSW Fisheries Management Act 1994, or other approvals and licences under the National Parks and Wildlife Act 1974 or the Marine Parks Act 1997.

In addition, the Environmental Planning and Assessment Act 1979 establishes the framework for development control and assessment in NSW. Certain activities may require approval under this Act and associated State Environmental Planning Policies (SEPP) (e.g. SEPP (Infrastructure) 2007). Certain works or activities may either require development consent or be exempt from requiring consent. In the case where works or activities may be exempt from requiring consent, a Review of Environmental Factors (along with all other relevant approvals / licences) would be required under Part 5 of the EP&A Act before works / activities can be carried out. This is addressed more fully in **Section 3** of this policy.

Information shown is for illustrative purposes only



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Willis Creek Entrance Management Policy
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Area to Which this Policy Applies

Illustration 1.1

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Background

2.1 Entrance Management Issues

Willis Creek is an ICOLL system that naturally alternates between being open or closed to the ocean. There are no records of artificial opening of the entrance being used since the cessation of treated effluent release into the creek in 2005. Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant present need for artificial opening for the purpose of flood mitigation.

However, sea level rise caused by climate change will result in higher flood inundation levels within the estuary in the future. Current inundation levels are likely to increase by a similar amount as sea level rise increases. Adopted sea level rise estimates for NSW are a 0.4 m increase in sea level by 2050 (relative to 1990 levels) and a 0.9 m increase by 2100. Climate change also has the potential to result in an increased frequency of high rainfall events leading to more frequent flooding events.

This may present a risk of flooding to some industrial properties at the end of Bosworth Road and potentially sewage pump station PS 5 located to the south of Nightingale Street.

2.2 Entrance Behaviour

Theory suggests that the predominant hydrodynamic state of Willis Creek is a closed entrance. However, over the period of 1973 to 2005 when the creek received a continued release of treated effluent from the Woolgoolga Water Reclamation Plant the entrance was generally open, discharging low flows across the beach.

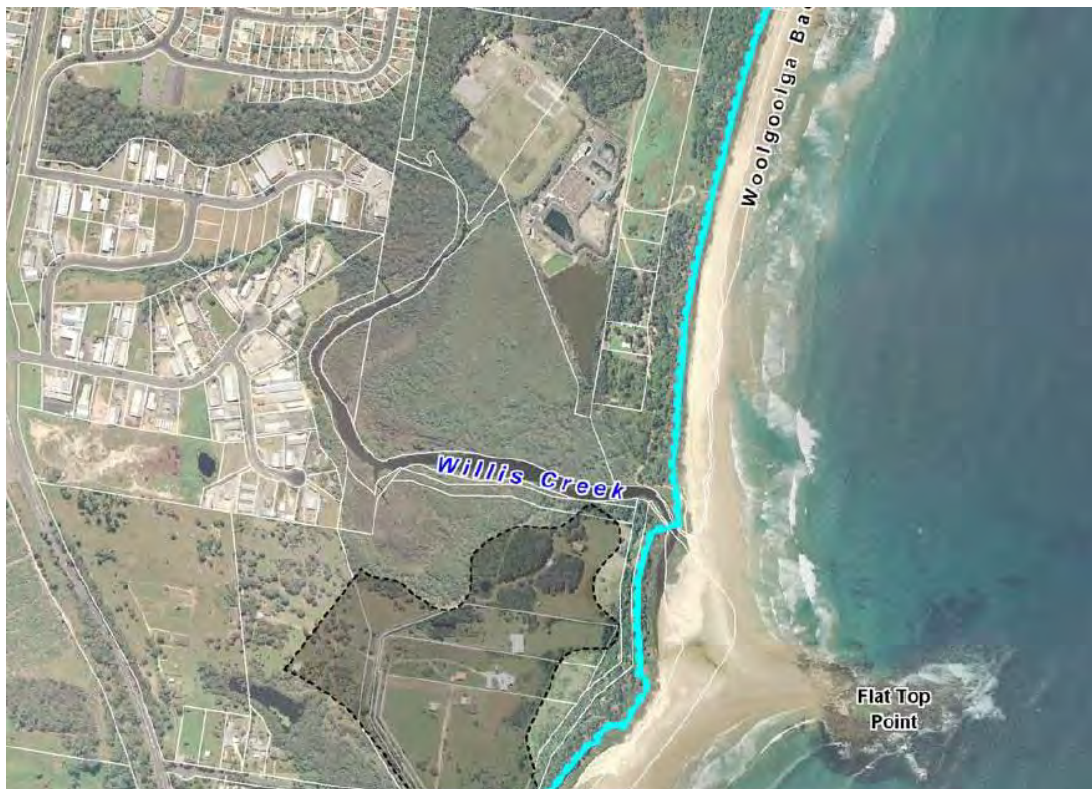
Aerial photography indicates the following in regard to entrance openings:

- 1940s and 1950s: the entrance channel was closed in the 1940s photography. In 1956 the entrance channel meandered to the south-east to discharge on the north side of the tombolo;
- 1960s and 1970s: six photos for the 1960s indicate the entrance channel was closed. Four photos for the 1970s indicate the entrance was open on three occasions and closed on the other;
- 1980s: the entrance channel was open on all photographs during the 1980s;
- 1990s: the entrance channel was open on all photographs (1994 and 1996); and
- 2000's: the entrance was closed in two photos (2000 and 2009) and open in three photographs (2001, 2006 and 2010).

2.2.1 Entrance Location

The entrance and dune along the back beach has revegetated such that the dune now has a low shrub/tree cover along its entire length. Where the creek channel used to discharge directly across the beach during high flows, it now runs to the south on the seaward face of this revegetated dune under all flow conditions. A low, hummocky sand spit has built up along the beach on the seaward side of the southerly trending channel. In the past 20 years this spit has become partly vegetated and is used for vehicular access to the beach. The creek flows across the sand tombolo (connecting to Flat Top Point) frequently discharging to the surf zone south of the tombolo and occasionally to the north (MHL, 1997).

The Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2011) indicates that shoreline recession of the beach may result in the creek entrance shifting north as indicated in **Plate 2.1**.



Source: BMT WBM, 2011.

Plate 2.1 Beach Erosion and Shoreline Recession at Willis Creek Entrance

2.2.2 Entrance Berm

The entrance berm level controlling flow into and out of the creek varied from 0.78 to 1.14 m AHD during the MHL study in 1997. The entrance berm level tends to increase during periods of higher tides and decrease during periods of lower tides (Jelliffe, 1997a).

The coastal processes assessment by BMT WBM (2011) did not assess entrance berm heights for Willis Creek. However, the nearby Hearn's Lake entrance berm reaches an estimated height of 2.0 m AHD on average, and a maximum of 2.6 m AHD (similar levels are expected at Willis Creek). The extreme scenario for entrance berm level adopted for all coastal lagoons is 3.5 m AHD, and relates to the potential height of incipient dunes should an entrance remain closed over a period of decades (BMT WBM, 2011).

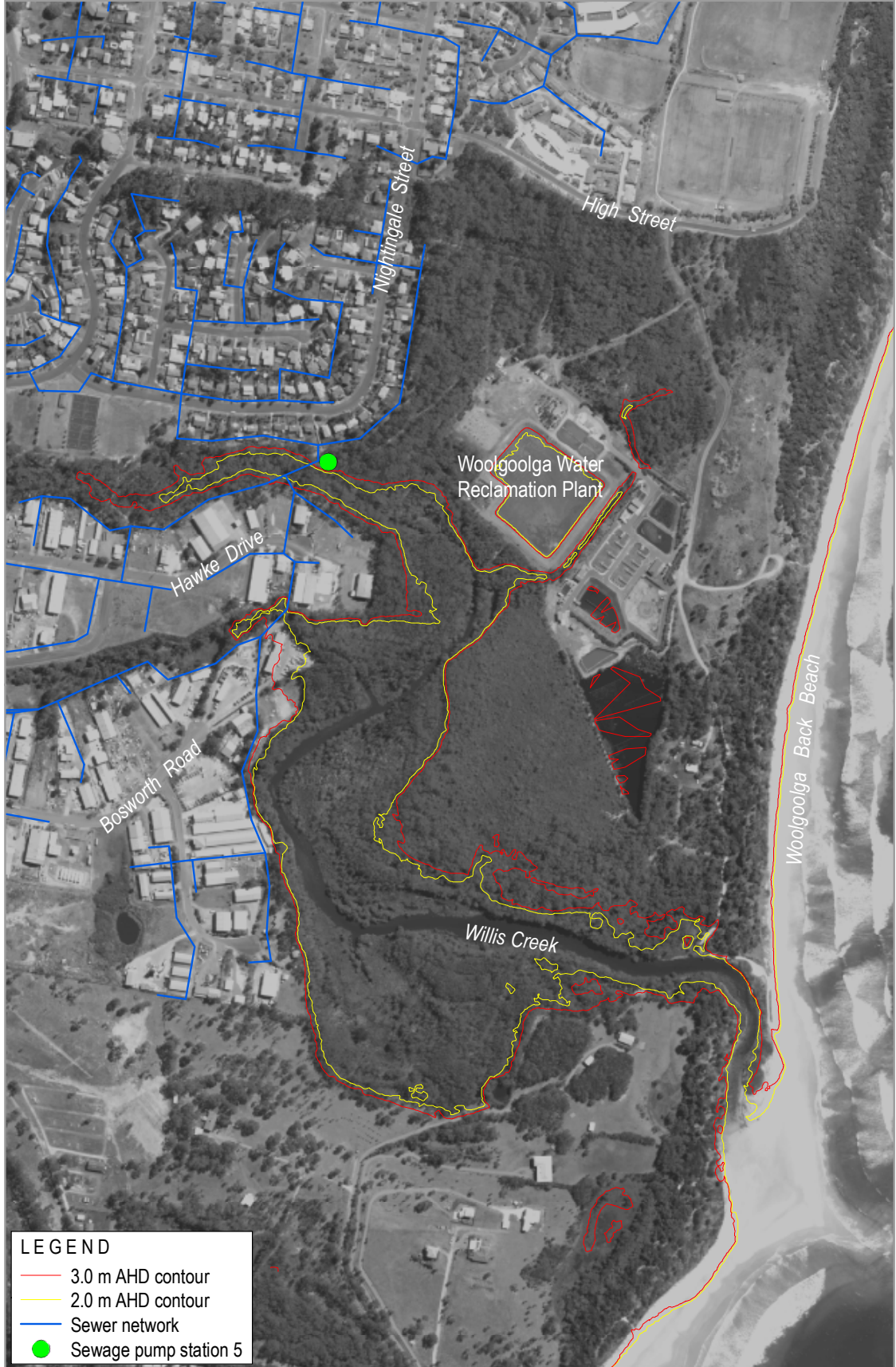
2.3 Flood Mitigation

2.3.1 Mitigation for Major Flood Events

No flood study exists for Willis Creek however flood levels for 1 in 100 year event were estimated as part of the Estuary Processes Study (GeoLINK *et al.*, 2011a). The flood level estimates are shown below in **Table 2.1. Illustration 2.1** shows the 3.0 m AHD contour level to provide context for the estimated flood levels.

Drawn by: RE Checked by: TIM Reviewed by: TIM Date: May 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



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Willis Creek Entrance Management Policy
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Contour Levels Indicative of Minor Flood Levels

Illustration 2.1

Table 2.1 Estimates of Flood, Ocean, and Berm Levels for Willis Creek Entrance

	Levels (m AHD)		
	Immediate	2050	2100
Flood - 1 in 100 year storm event	2.8	3.2 ¹	3.7 ²
Elevated Ocean Levels - 1 in 20 year event ³	2.5	2.9	3.5
Elevated Ocean Levels - 1 in 100 year event ³	2.7	3.1	3.7
Entrance Berm Height – Almost Certain ⁴	1.5	1.5	1.5
Entrance Berm Height – Unlikely ⁵	2.6	3.0	3.5

Notes: 1. Immediate flood level plus 0.4m sea level rise. Source: GeoLINK *et al.* (2011a);
 2. Immediate flood level plus 0.9m sea level rise. Source: GeoLINK *et al.* (2011a);
 3. Source: BMT WBM (2011);
 4. Estimated from comparison of MHL levels and BMT WBM levels – refer to **Section 2.2.2** above.
 5. Based on BMT WBM levels for Hearn's Lake in Table 3.8 in BMT WBM (2011).

It is important to note the flood levels for major events (shown above) are likely to be independent of any artificial entrance opening works. This is due to the effect of the elevated ocean water levels which would 'over-ride' any impact of an open entrance. This can be seen by comparing the elevated ocean levels in **Table 2.1** with the estimated berm heights at the entrance. The data in **Table 2.1** shows the entrance berm heights to be significantly less than the elevated ocean levels. Therefore, artificially opening the estuary entrance will not have any impact on major (1 in 100 year) flood levels.

Therefore, as flood levels for major events are independent of entrance conditions, there is no benefit to artificially opening the estuary entrance for flood mitigation purposes for major events.

2.3.2 Mitigation for Minor Flood Events

No flood study exists for Willis Creek however it is reasonable to assume that minor flood levels will be less than 2.5 m AHD for present conditions (this equates to a 1 in 20 year elevated ocean level). The extent of inundation at a flood level of 2.5 m AHD is indicated by the 2.0 and 3.0 m AHD contours in **Illustration 2.1**. It can be seen that this flood level does not impact significantly on properties or sewer pump stations. The only impact on sewer infrastructure at this flood level is potential inundation of sewer manholes to the north and south of the cul-de-sac of Hawke Drive. This latter issue could be rectified by sealing the manhole cover against floodwater inflow.

Therefore, there is no benefit to artificially opening the estuary entrance for flood mitigation purposes for present conditions to address minor flood events as there are no properties or infrastructure significantly at risk at present.

2.4 Water Quality

Artificially opening estuary entrances is often carried out as a 'quick fix' to redress water quality problems stemming from other causes such as inadequate stormwater treatment from urban areas or inadequate erosion control measures in the catchment. Best practice for estuary management is based on addressing the source of the water quality issues rather than treating the symptoms by artificially opening entrances to 'flush' an estuary. The CZMP for Willis Creek estuary includes strategies to address the source of current water quality issues.

No recorded physico-chemical water quality data has been found for Willis Creek for the period of 2005 to 2010 since cessation of effluent release in 2005.

Faecal indicator organism samples from the Estuary Processes Study for Willis Creek (GeoLINK *et al.*, 2011) indicate the waters of Willis Creek are generally safe for primary contact recreation. Chlorophyll-a concentrations indicate that Willis Creek was eutrophic during the period of effluent release. Nutrient and sediment modelling of the estuary catchment indicates horticulture and residential lands are the main

contributors of catchment derived sediments and nutrients for Willis Creek. Current assessments of general water quality in Willis Creek indicate there is no need for artificial opening of the entrance to improve water quality under 'normal' conditions.

Nevertheless, there may be instances where artificial opening is justified to address extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the creek system. However, it is not considered practical to include triggers to address a broad range of potential water quality scenarios. A range of factors would need to be considered during a water quality crisis, such as:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue; and
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the creek.

This policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. It is recommended that any water quality crisis is assessed on an individual basis.

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Approvals

3.1 Statutory Provisions

The area of Willis Creek and any proposed entrance management works would be located within the Coffs Harbour LGA. The actual water body of Willis Creek is not zoned, but identified as "Creeks" under the Coffs Harbour Local Environmental Plan (CHLEP) 2000. Land immediately adjacent to and surrounding the defined water body of Willis Creek is zoned as 6A Open Space and Public Recreation (6A zoning affects land adjoin the entrance) and 7A Environmental Protection Habitat and Catchment under the CHLEP 2000.

Specifically, for the purpose of flooding mitigation works, Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out by or on behalf of a public authority on any land and precludes them from requiring development consent. Clause 50 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land.*
- (2) *A reference in this clause to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with flood mitigation work:*
 - (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *environmental management works.*

Specifically, for the purpose of waterway or foreshore management activities, Clause 129 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out by or on behalf of a public authority on any land and precludes them from requiring development consent.

Waterway or foreshore management activities means:

- (a) *riparian corridor and bank management, including erosion control, bank stabilisation, re-snagging, weed management, revegetation and the creation of foreshore access ways, and*
- (b) *instream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes, and*
- (c) *coastal management and beach nourishment, including erosion control, dune or foreshore stabilisation works, headland management, weed management, revegetation activities and foreshore access ways, and*
- (d) *coastal protection works, and*
- (e) *salt interception schemes to improve water quality in surface freshwater systems, and*
- (f) *installation or upgrade of waterway gauging stations for water accounting purposes*

Clause 129 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Despite clause 129A, development for the purpose of waterway or foreshore management activities may be carried out by or on behalf of a public authority without consent on any land.*
- (1a) *To avoid doubt, subclause (1) does not permit the subdivision of any land.*

- (2) *In this clause, a reference to development for the purpose of waterway or foreshore management activities includes a reference to development for any of the following purposes if the development is in connection with waterway or foreshore management activities:*
- (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *emergency works, including works required as a result of flooding, storms or coastal erosion,*
Note. Emergency coastal protection works within the meaning of the Coastal Protection Act 1979 are excluded from the operation of the EP&A Act and therefore are not development to which this clause applies.
 - (d) *environmental management works.*
- (2a) *The following provisions apply in relation to the carrying out of new coastal protection works by or on behalf of a public authority on the open coast or entrance to a coastal lake:*
- (a) *if a coastal zone management plan is in force in relation to the land on which the development is to be carried out—the public authority (or person carrying out the works on behalf of the public authority) must consider the provisions of that plan before carrying out the development,*
 - (b) *if a coastal zone management plan is not in force in relation to the land on which the development is to be carried out—the public authority (or person carrying out the works on behalf of the public authority) must:*
 - i. *notify the Coastal Panel before carrying out the development, and*
 - ii. *take into consideration any response received from the Coastal Panel within 21 days of the notification.*
- (2b) *For the purposes of subclause (2a):*
New coastal protection works means coastal protection works other than:
- (a) *the placement of sand (including for beach nourishment) or sandbags, or*
 - (b) *the replacement, repair or maintenance of any such works.*

Although flood mitigation works and waterway and foreshore management activities would be permitted without consent on any land, the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council would be required to prepare a REF for any proposed relevant works or activities, e.g. artificial opening of Willis Creek. The REF would outline the nature and extent of the proposal, what would be the trigger and determining factors for proceeding with relevant works / activities such as artificial opening and identify and address any potential environmental effects which may result from such works. Hence the REF would also include mitigation measures and safeguards for the protection of the environment during relevant works / activities. The REF would need to be consistent with the adopted CZMP and entrance management policy for Willis Creek.

In conjunction with preparation of the REF, Council would be required to consult with and seek any relevant licences and or concurrence from other state government agencies. These would include:

- Crown Lands under the Crown Lands Act 1989;
- Department of Primary Industries - Fisheries under the Fisheries Management Act 1994;
- Marine Parks Authority under the Marine Parks Act 1997;
- NSW Office of Water under the Water Management Act 2000;
- Office of Environment and Heritage (National Parks and Wildlife) under the National Parks and Wildlife Act 1974.

3.1.1 Crown Lands Act 1989

Due to the artificial opening works affecting the waterway of Willis Creek and the coastline, it is likely that such works would affect Crown Land. Artificial opening of the entrance will require authority by way of licences from the Crown under Part 4, Division 1 of the Crown Lands Act 1989.

3.1.2 Fisheries Management Act 1994

The objectives of the Fisheries Management Act 1994 *are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.* The provisions of Division 3, Part 7 of the Act are likely to be relevant to any works associated with the artificial opening of Willis Creek. The provisions relate to the protection of aquatic habitat. Although flood mitigation works and waterway or foreshore management activities would be precluded from requiring consent under ISEPP, the provisions of the Fisheries Management Act 1994 are still applicable and as part of the REF process concurrence from the Department of Primary Industries (Fisheries) would be required for certain activities. **Table 3.1** outlines the relevant provisions of the Act that would apply to the artificial opening of Willis Creek.

Table 3.1 Activities requiring concurrence under the Fisheries Management Act 1994

Fisheries Management Act 1994	Sections 198-202	Concurrence is required from the Minister, Department of Primary Industries (Fisheries) for dredge and reclamation works on defined water land. The nature of artificial opening would constitute dredge works and also potentially reclamation works in watered land. Hence a permit and concurrence from s required prior to commencement of any works.
	Sections 219-220	Concurrence is required when barriers to the movement of fish including water course crossings are to be constructed or modified. Any proposed artificial opening is unlikely to create a barrier to the movement of fish. However such specifics would need to be confirmed within the REF.
	Sections 204-205	Any artificial opening works would likely be restricted to the sand berm. Any works must not affect mangroves or other protected marine vegetation. If marine vegetation would be harmed by relevant works / activities, a permit must be sought from the Minister before works commence. Clause 205 (2) states that <i>A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part.</i> The REF would need to determine if artificial opening works are likely to affect mangroves or other protected marine vegetation.
	Schedules 4, 4A, 5 and 6	The REF prepared for works associated with artificial opening would need to consider any presence of local threatened aquatic habitat for flora or fauna. Thus Key Threatening Processes (KTPs) would need to be considered in preparation of the REF. The following KTPs may be relevant and required consideration: <ul style="list-style-type: none"> ▪ <i>Degradation of native riparian vegetation along NSW water courses.</i> ▪ <i>Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.</i>

3.1.3 Marine Parks Act 1997

As Willis Creek forms park of the Solitary Islands Marine Park, Council would be required to obtain a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 in order to undertake any works on land affected by the Marine Park and any associated zoning. Preparation of the REF would need to consider these factors and seek the relevant concurrence / permit.

3.1.4 Water Management Act 2000

A controlled activity approval under the Water Management Act 2000 (WM Act) is required for certain types of developments and activities that are carried out in or near a river, lake or estuary (water land). Under the WM Act, a controlled activity means:

- the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
- the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
- the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- the carrying out of any other activity that affects the quantity or flow of water in a water source.

Artificial opening of Willis Creek would constitute a controlled activity under the WM Act. However under the Water Management (General) Regulation 2011, Clause 38 Controlled activities—public authorities, states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.*

Although Coffs Harbour City Council would be exempt from requiring a Controlled Activity Approval, Clause 37, *Condition applying to all exemptions under this Subdivision*, of the Regulations states: *An exemption conferred under this Subdivision is subject to the condition that the person by whom the relevant controlled activity is carried out must comply with applicable requirements (if any) of the Minister that are published in the Gazette, or notified in writing to the person, for the purposes of this clause and that are for the protection of:*

- (a) *the waterfront land on which the activity is carried out, or*
- (b) *any river, lake or estuary to which that land has frontage.*

3.1.5 National Parks and Wildlife Act 1974

The Willis Creek system falls within the Coffs Coast Regional Park. The park was created through a partnership of Council and the National Parks and Wildlife Service (now within OEH). The National Parks and Wildlife Act 1974 applies if the park is a reserve made under the Act. The Park's management is guided by a Trust Board. Preparation of an REF for artificial opening works would need to determine whether or not the park is a reserve under the Act and hence consultation / concurrence are required with OEH / National Parks and Wildlife Service. Consultation with the Trust Board would be required whether or not the park is affected by the Act. The REF would also need to consider any management plan that has been prepared for the park.

3.2 Summary of Potential Approvals

Works / activities for the purpose of flood mitigation or waterway / foreshore management (to address an extreme water quality issue) would be permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed works / activities (e.g. artificial opening of the entrance to Willis Creek estuary). The REF needs to be consistent with the adopted CZMP and entrance management policy for Willis Creek estuary.

Preparation of the REF will involve consultation with relevant state government agencies. This will confirm the necessary approvals and licences required for artificial opening of the entrance. Preliminary assessment indicates the following approvals and licences may be necessary:

- a license from the Department of Crown Lands under the Crown Lands Act 1989;
- a permit and concurrence from the Minister, Department of Department of Primary Industries (Fisheries) under the Fisheries Management Act 1994 pursuant to Sections 198-202 for dredge and reclamation works on defined water land (the nature of artificial opening would constitute dredge works and also potentially reclamation works); and
- a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 as Willis Creek forms park of the Solitary Islands Marine Park.

The Willis Creek system falls within the Coffs Coast Regional Park, which was created through a partnership of Council and the National Parks and Wildlife Service. Consultation with the National Parks and Wildlife Service and Trust Board is required to determine if any approvals are required under the National Parks and Wildlife Act 1974.

It is noted that a Controlled Activity Approval under the Water Management Act 2000 is not required due to the Water Management (General) Regulation 2011, Clause 38 Controlled activities - public authorities, which states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.* However, Council is still required to follow any applicable guidelines of NSW Office of Water under the Water Management Act 2000.

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Artificial Opening Procedure

4.1 Decision Making Process

This policy presently only recommends artificial opening of the Willis Creek estuary entrance in the event of extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the creek system. However, the decision to initiate an artificial opening event will be based on assessment of each individual circumstance of an extreme water quality issue with consideration of:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue; and
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the creek.

As noted in **Section 2.3**, this policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. Determining what constitutes an extreme water quality issue would include reference to water quality monitoring results for Willis Creek to determine if the issue is 'outside' normal water quality variations for the creek system.

The general decision making process / procedure for determining if artificial opening is to be employed to address an extreme water quality issue is shown in the flow chart in **Illustration 4.1** and involves:

- Following warning of potential extreme water quality issues Council's designated officer will alert relevant state government agencies of the issues and potential for an artificial opening event;
- Council's designated officer will then conduct a site assessment and/or review of water quality monitoring data to determine in consultation with relevant state government agencies if artificial opening is an appropriate response;
- If artificial opening is considered an appropriate response Council's designated officer will initiate deployment of Council's personnel and machinery to the entrance and direct when and where artificial opening is to be initiated. Ideally, the artificial opening should be initiated during a falling tide and shortly after the tide turns from high to low (if possible around a spring tide when tidal fluctuations are larger).

4.2 Responsibilities for Artificial Opening

Coffs Harbour City Council is responsible for artificial opening of the entrance.

4.3 Monitoring

When artificial openings have been carried out, monitoring of the entrance should be undertaken to determine the efficiency of the opening. For each artificial opening event, the following data will be tested / recorded:

- prior to opening:
 - testing of water quality parameters relevant to the specific water quality issue;
 - survey water level of creek prior to opening;
- date and time of opening;
- survey water levels of creek over 24 hours following opening;

- testing of water quality parameters relevant to the specific water quality issue over 24 hours and at appropriate intervals following 24 hours after the opening;
- location and length of excavation;
- approximate width and depth of initial channel;
- ocean swell conditions (wave height and direction);
- preceding rainfall;
- date of closure;
- digital photographs.

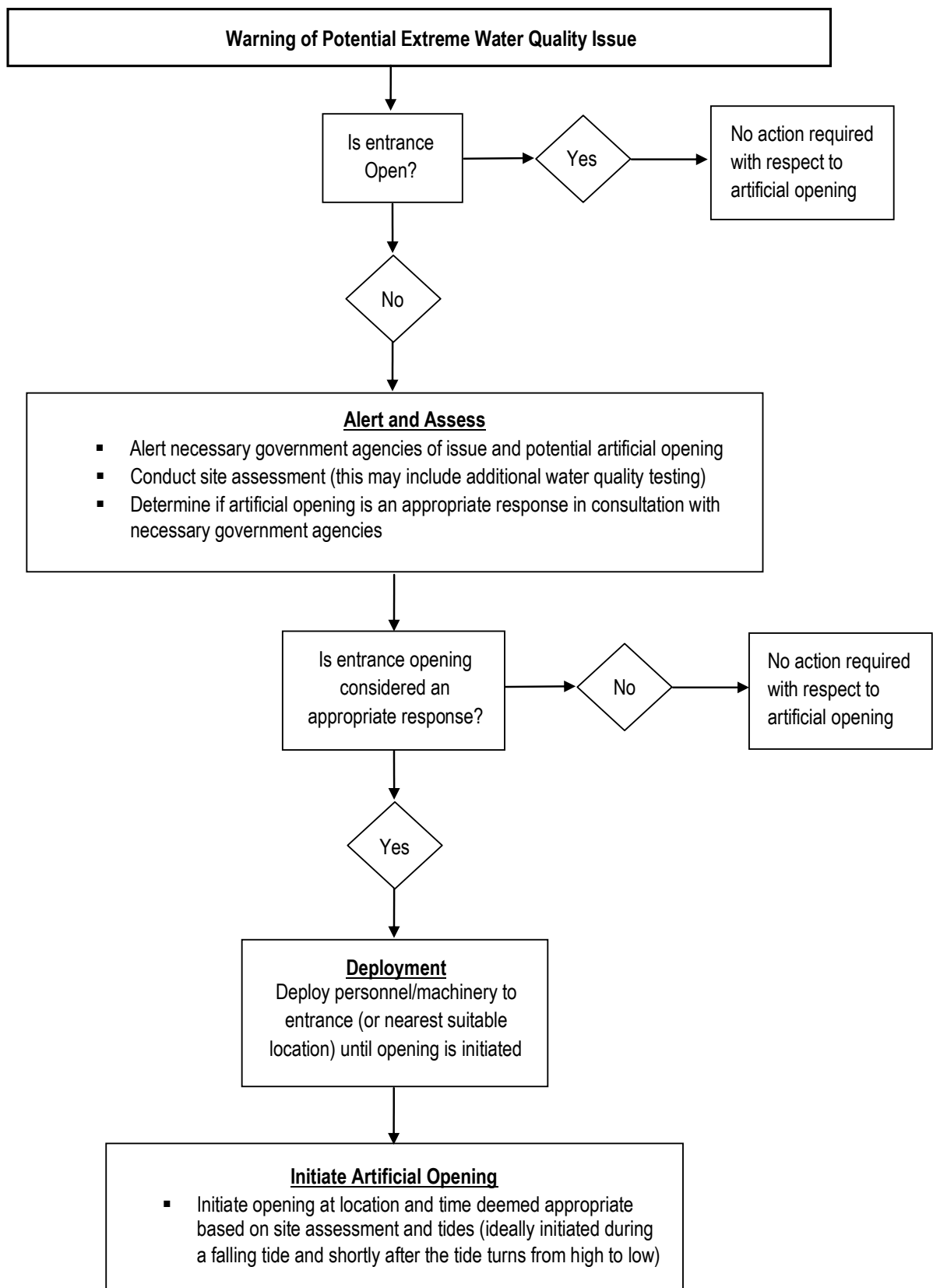


Illustration 4.1 Artificial Opening Decision Making Flowchart

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Policy Updates

5.1 Review and Update of this Policy

This Policy and the associated REF should be reviewed every five years or in response to:

- legislation changes; and
- any other significant factors relevant to artificial opening of the entrance of Willis Creek estuary.

Review of the policy will include analysis of all monitoring data collected over that period to assess if the assumptions and procedures outlined in the current policy and REF are correct or appropriate. This will include a review of changes to climate change and sea level rise predictions and consequent impacts to this policy.

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Acronyms

AHD	Australian Height Datum
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CHLEP	Coffs Harbour Local Environmental Plan
CZMP	Coastal Zone Management Plan
ICOLL	Intermittently Closed and Open Lake and Lagoon
ISEPP	State Environmental Planning Policy (Infrastructure), 2007
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory
PS	Pump Station
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy

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Appendix B

Funding Sources

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Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
<p>Various – jointly administered by Northern Rivers Catchment Management Authority (NRCMA)</p>	<ul style="list-style-type: none"> ▪ Various – jointly administered by NRCMA 	<ul style="list-style-type: none"> ▪ Community capacity targets. These include targets with respect to the awareness, knowledge and skills of the community in relation to Natural Resource Management, and the levels of engagement of the community. These are specifically: <ul style="list-style-type: none"> ▪ CCB1, Awareness knowledge and skills; ▪ CCB2, Community engagement; and ▪ CCB3, Community support. ▪ Land use planning targets. The relevant land use planning targets relate to aboriginal cultural integration in the planning process, environmental assets and significant farmland protection, landuse conflict within and adjacent to key environmental and farming assets and the integration of natural resource assets into planning. They are specifically; <ul style="list-style-type: none"> ▪ LUP1, Aboriginal cultural integration; ▪ LUP2, Environmental assets/rural production areas; ▪ LUP3, Land use conflict and key natural resources; and ▪ LUP4, Natural resource integration. ▪ Biodiversity targets. These targets relate to the area of land under secure conservation management, habitat connectivity, the mitigation of threats to biodiversity, threatened species management, sustainable management of terrestrial and aquatic ecosystems and habitat rehabilitation and revegetation. The targets are; <ul style="list-style-type: none"> ▪ B1, Secure conservation management; ▪ B2, Habitat connectivity; ▪ B3, Biodiversity threat mitigation; ▪ B4, Threatened species; ▪ B5, Biodiversity management and enhancement; and ▪ B6, Habitat rehabilitation and revegetation. ▪ 	<p>Funding (General): http://www.northern.cma.nsw.gov.au/get-involved/funding</p> <p>Current Funding Opportunities: http://www.northern.cma.nsw.gov.au/get-involved/funding</p>

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		<ul style="list-style-type: none"> ▪ Water targets. These targets relate to the integrated management of urban water cycles and community education about and monitoring of water resources. The targets are; <ul style="list-style-type: none"> ▪ W1, River structure riparian vegetation and fish passage; ▪ W2, Urban water cycle management; ▪ W3, Water information and education; and ▪ W4, Aquifer health and river flow. ▪ ▪ Coastal targets. The relevant coastal targets relate to the management and assessment of coastal lakes and estuaries. The targets are; <ul style="list-style-type: none"> ▪ C1, Coastline; and ▪ C2, Estuaries and coastal lakes. ▪ ▪ Marine targets. The relevant marine targets relate to management practices that reduce threats to and impacts on the marine environment. The targets are; <ul style="list-style-type: none"> ▪ M1, Marine research and planning; ▪ M2, Best practice; ▪ M3, Marine protected areas; and ▪ M4, Improved marine environment management practices. ▪ ▪ Soil and land resource targets. The most relevant of the soil and land targets relates to the area of high risk acid sulfate soils under active management. The complete list of targets is; <ul style="list-style-type: none"> ▪ L1, Soil health; ▪ L2, Acid sulphate soils; and ▪ L3, Soil conservation/remediation. ▪ 	
Caring for Our	Jointly administered by the Australian Government:	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to achieve an environment that is healthy, better protected, well-managed, resilient 	http://www.nrm.gov.au/index.html

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Country	<ul style="list-style-type: none"> ▪ Department of Agriculture, Fisheries and Forestry; and ▪ Department of Sustainability, Environment, Water, Population and Communities 	<p>and provides essential ecosystem services in a changing climate.</p> <p>Priorities:</p> <ul style="list-style-type: none"> ▪ the National Reserve System; ▪ biodiversity and natural icons; ▪ coastal environments and critical aquatic habitats; ▪ sustainable farm practices; ▪ natural resource management in northern and remote Australia; and ▪ community skills, knowledge and engagement. 	
Estuary Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to provide support to councils to improve the health of NSW estuaries; and ▪ understand the potential risks from climate change. <p>Support provided to councils under these programs includes financial assistance to:</p> <ul style="list-style-type: none"> ▪ prepare estuary management plans and supporting studies; ▪ carry out projects to improve estuary health. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ updating estuary plans to consider climate change impacts, including sea level rise ▪ estuary health monitoring and improvement ▪ focusing on high-hazard coastal areas and stressed estuaries. <p>Grant offers are subject to availability of funds for each financial year and State-wide priorities. Funding of up to 50% of a project's costs will normally be offered for successful grant applications.</p>	<p>http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm</p>

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Coastal Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to provide support to local councils to manage the risks from coastal hazards such as coastal erosion, ▪ and to restore degraded coastal habitats. <p>Support provided to councils under these programs includes financial assistance to:</p> <ul style="list-style-type: none"> ▪ prepare coastline, and coastal zone management plans and supporting studies ▪ carry out projects to reduce risks associated with coastal hazards and improve coastal environments. <p>▪ updating coastal hazard studies to incorporate sea-level rise benchmarks</p> <p>▪ focusing on high-hazard coastal areas and stressed estuaries.</p> <p>Grant offers are subject to availability of funds for each financial year and State-wide priorities. Funding of up to 50% of a project's costs will normally be offered for successful grant applications.</p>	http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm
Floodplain Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to reduce the impacts of flooding and flood liability on communities; and ▪ to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible. <p>Priorities:</p> <p>Provides financial support to councils and eligible public land managers to:</p> <ul style="list-style-type: none"> ▪ make informed decisions on managing flood risk by preparing floodplain risk management plans (and associated background studies) under the floodplain risk management process; ▪ implement floodplain risk management plans to reduce flood risk to both existing and future development, and reduce losses through a range of property, flood and response modification measures as outlined in the manual; and ▪ provide essential information to the State Emergency Service to enable the effective preparation and implementation of local flood plans to deal with flood emergency response. <p>Assistance under the program is normally offered by the State Government providing \$2 for</p>	http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Environmental Trust Grants	NSW Department of Environment and Heritage	<p>every \$1 provided by the council.</p> <ul style="list-style-type: none"> ▪ to encourage and support restoration and rehabilitation projects; ▪ to promote research into environmental problems of any kind; ▪ to promote environmental education in both the public and private sectors; ▪ to fund the acquisition of land for the national parks estate; ▪ to fund the declaration of areas for marine parks and for related purposes; ▪ to promote waste avoidance, resource recovery and waste management (including funding enforcement and regulation and local government programs); ▪ to fund environmental community groups; and ▪ to fund the purchase of water entitlements for the purpose of increasing environmental flows for the State's rivers and restoring or rehabilitating major wetlands. <p>Relevant Programs:</p> <ul style="list-style-type: none"> ▪ the urban sustainability program funds projects carried out by local councils in partnership with the community that protect and restore the urban environment; ▪ the lead environmental community groups program provides administrative funds for environmental organisations that work with their communities to conserve the environment; ▪ the environmental restoration and rehabilitation program funds projects that restore or rehabilitate degraded areas, or protect important ecosystems and habitats, prevent or minimise future environmental damage and enhance the quality of specific environmental resources; ▪ the environmental education program supports projects that increase commitment to protecting the environment and promoting sustainable behaviour; ▪ the environmental research program funds projects managed by educational institutions and government agencies that research local solutions to environmental problems and ways of operating that are less harmful to the environment; ▪ the eco schools program funds schools so they can involve their students and the community in developing and implementing environmental management projects; ▪ the protecting our places program supports projects that restore or rehabilitate Aboriginal land or land that is culturally significant to Aboriginal people, or that educate 	http://www.environment.nsw.gov.au/grants/envtrust.htm

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		Aboriginal and other communities about the environment.	
Grants to Voluntary Environment Heritage Organisations (GVEHO)	Australian Government: Department of Sustainability, Environment, Water, Population and Communities	Objectives: <ul style="list-style-type: none"> ▪ help eligible community based environment and heritage organisations to value, conserve and protect Australia's natural environment and historic heritage by assisting with their administrative funding. 	http://www.environment.gov.au/about/programs/gveho/index.html
		Priorities: <ul style="list-style-type: none"> ▪ funds provided may be used to assist with salaries and salary on-costs for executive and administrative staff; office accommodation rental; electricity, gas, phone and other similar charges; essential office supplies and equipment; staff and volunteer training; photocopying and printing costs; and travel costs incurred on behalf of the organisation. 	
NSW Recreational Fishing Trusts	NSW Department of Primary Industries	Objectives: <ul style="list-style-type: none"> ▪ projects that improve recreational fishing in NSW; ▪ anyone can apply for funding from the Recreational Fishing Trusts, including fishing clubs and organisations, universities, councils, community groups, individuals and so on. Joint applications are also encouraged. ▪ funding applications must relate to the improvement of recreational fishing. 	http://www.dpi.nsw.gov.au/fisheries/recreational/licence-fee/apply-for-funds
		Priorities: <ul style="list-style-type: none"> ▪ recreational fisheries enhancement; ▪ angler education and information; ▪ research on recreational fishing; ▪ recreational fisheries access and facilities; and ▪ recreational fisheries sustainability 	
NSW Maritime Infrastructure Program: Better Boating Program Regional	NSW Transport Maritime	Objectives: <ul style="list-style-type: none"> ▪ the Better Boating Program provides waterways infrastructure for the benefit of the boating community and the marine sector on New South Wales waterways; ▪ the BBP provides individual grant contributions to proponents such as Local Government, State agencies, boating organisations and community groups for the 	http://www.maritime.nsw.gov.au/mpd/infra_program.html

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Infrastructure Grants		<p>development of public boating infrastructure.</p> <p>Priorities: Consideration for BBP funding will only be given to those projects that are:</p> <ul style="list-style-type: none"> ▪ principally infrastructure works of a lasting nature; ▪ intended to greatly improve current amenities (or addresss the lack thereof); ▪ located in a readily accessible public area with unrestricted public access; ▪ for use of or available to, a broad cross-section of the public boating community; ▪ situated either on public land or land owned by the Local Council, the Crown or NSW Maritime; ▪ able to be commenced within 6 months of the approval of the grant and be completed within 18 months from this approval date. It should be noted that any funding grants not utilised within that period may be withdrawn; ▪ supported in writing by key stakeholders, including the Local Council; ▪ able to meet the Program's criteria for assessment and are submitted by the nominated closing date. 	
Raising National Water Standards Program	Australian Government: National Water Commission	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ support for projects that are improving Australia's national capacity to measure, monitor and manage our water resources. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ funds are directed at activities across three strategic investment areas: <ul style="list-style-type: none"> - advancing the implementation of the National Water Initiative - improving integrated water management across Australia - improving knowledge and understanding of our water resources. ▪ more than 175 Raising National Water Standards projects have been funded under the following themes: <ul style="list-style-type: none"> - water accounting - emerging water markets - water planning and management - knowledge and capacity building 	<p>http://www.nwc.gov.au/ www/html/347- introduction-to- rnws.asp</p>

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		<ul style="list-style-type: none"> - irrigation and other rural water - water-dependent ecosystems - integrated urban water management - groundwater - northern rivers - national assessment of water resources - Northern Australia water futures assessment 	
Country Towns Water Supply and Sewage Program	NSW Department of Primary Industries Office of Water	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ a major government reform program that provides management, technical and financial support to local water utilities (LWUs) in the provision of water supply and sewerage services to country towns in NSW. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ management assistance through the Best-Practice Management of Water Supply and Sewerage Guidelines. ▪ technical assistance through: <ul style="list-style-type: none"> - regular inspections and advice on water and sewage treatment works operational problems - conducting water supply and sewerage operator training seminars/ courses - pre commissioning inspections of Fluoridation Plants and technical assistance to NSW Health to enable councils to comply with requirements under the Fluoridation of Public Water Supplies Act 1957 and in certification of fluoridation officers. - ongoing LWUs dam safety inspections and mentoring/ training of operators - ongoing LWUs liquid trade waste discharge approvals - conducting regional trade waste regulation courses - providing help desk services. ▪ financial assistance through grants to local water utilities towards the capital cost of works to address the backlog in water supply and sewerage infrastructure. 	http://www.water.nsw.gov.au/Urban-water/Country-town-water/default.aspx
Job Services	Australian Government:	Objectives:	http://www.deewr.gov.a

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Australia – New Enterprise Incentive Scheme (NEIS)	Department of Education, Employment and Workplace Relations	<ul style="list-style-type: none"> ▪ to give young people, aged 17 to 20 years, quality training and experience through structured and supervised projects that focus on areas where natural environmental conservation work and cultural heritage restoration is required ▪ to contribute to high priority conservation projects, to promote environmental, conservation and natural heritage outcomes and through this benefit the community and the environment and ▪ to contribute to NEIS participants': <ul style="list-style-type: none"> - personal development, including teamwork and leadership skills - skill development and training through activities that are structured and sequential in their learning outcomes - strengthened connections with the community through relationships, participation and contribution to the community; and - improved career and employment prospects through accredited training and on-the-project training. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ DEEWR provides funding for NEIS teams to work on projects which focus on areas where environmental and heritage restoration and conservation are needed ▪ participants in the NEIS programme work in teams from a central or regional location and may undertake projects in remote locations ▪ each project has a community focus and is developed in consultation with community representatives and ▪ participants undertake accredited training which enable them to complete project tasks, and increases their capacity to move into employment or further training at the end of their placement. 	u/Employment/JSA/EmploymentServices/Pages/NEIS.aspx

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Appendix C

Summary of Estuary Processes Study

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Willis Creek is an Intermittently Closed and Open Lakes and Lagoon (ICOLL). The density of vegetation and lack of public access to the Willis Creek estuary generates little recreational activity. However, the natural setting attracts people seeking quiet recreational opportunities such as bird watching and bushwalking. The Willis Creek / Hearn's Lake entrance area hosts a significant breeding site in NSW for the threatened species, Little Tern (South-eastern Australian population).

The total catchment area of Willis Creek is approximately 2.6 km². Banana plantations and blueberry farms cover the majority of the upper catchment. Industrial and residential land comprises the majority of the mid-catchment on the eastern side of the Pacific Highway. The catchment area downstream of the tidal limit includes the Woolgoolga Water Reclamation Plant (sewage treatment plant) and a large area of swamp forest, wet heath and mangrove / saltmarsh complex which is largely contained in the Coffs Coast Regional Park.

The tidal limit of Willis Creek is located near the eastern edge of the residential and industrial estates in the mid-catchment. The creek is part of the Solitary Islands Marine Park and is zoned as a Habitat Protection Zone up to the tidal limit.

The Woolgoolga Water Reclamation Plant released secondary treated effluent into Willis Creek from 1973 to 2005. The release ceased in 2005 with the upgrade of the plant and connection to the Coffs Harbour reclaimed water reticulation system.

The key findings and recommendations of the *Data Compilation and Estuary Processes Study – Darkum Creek, Woolgoolga Lake and Willis Creek* (GeoLINK *et al.*, 2011) is summarised below for Willis Creek.

C.1 Hydrodynamics

C.1.1 Hydrodynamic States and Entrance Behaviour

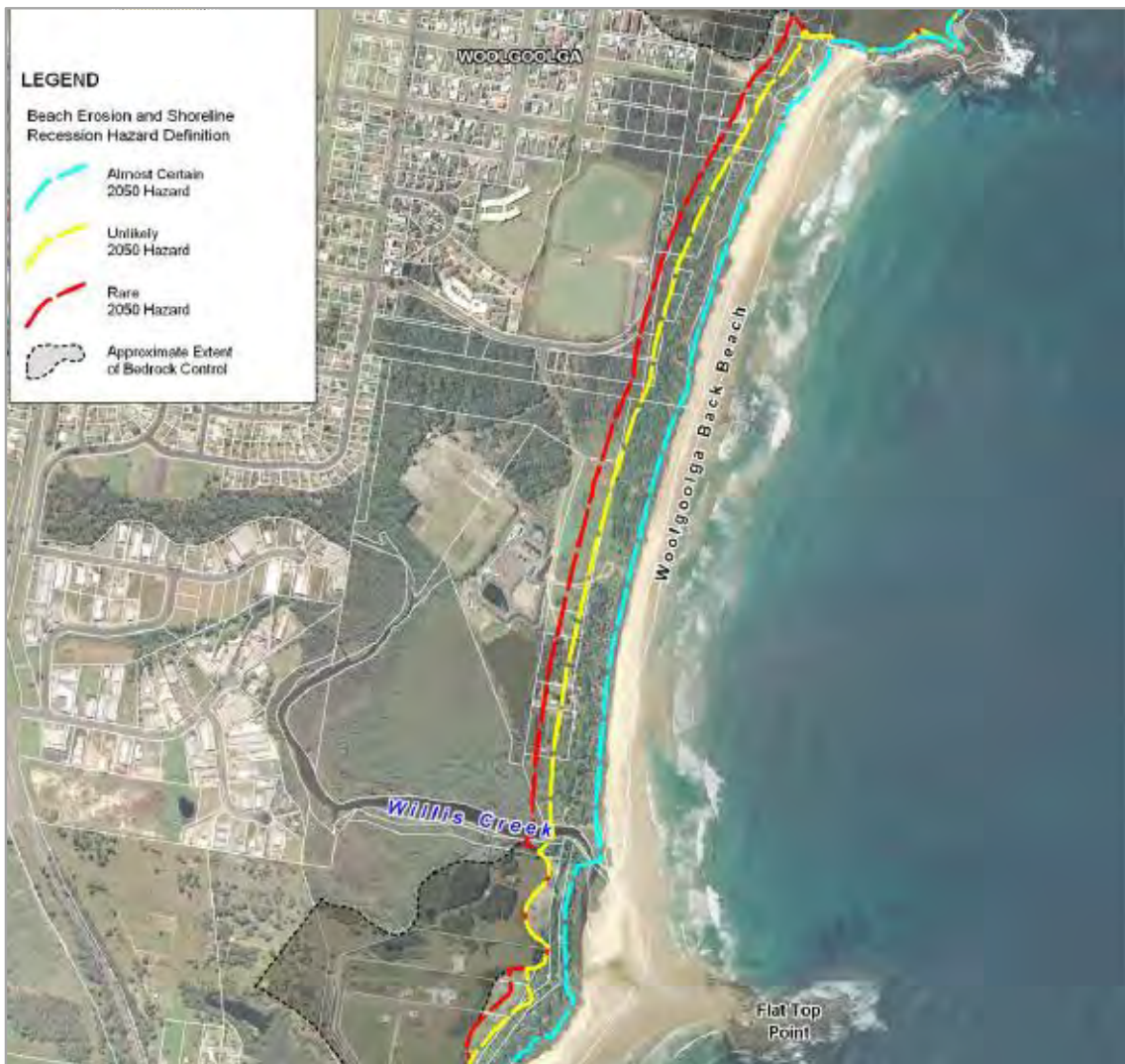
Theory suggests that the predominant hydrodynamic state of Willis Creek is a closed entrance. However, over the period of 1973 to 2005 when the creek received a continued release of treated effluent from the Woolgoolga Water Reclamation Plant the entrance was generally open, discharging low flows across the beach.

Aerial photography indicates the following in regard to entrance openings:

- 1940s and 1950s: the entrance channel was closed in the 1940s photography. In 1956 the entrance channel meandered to the south-east to discharge on the north side of the tombolo;
- 1960s and 1970s: six photos for the 1960s indicate the entrance channel was closed. Four photos for the 1970s indicate the entrance was open on three occasions and closed on the other;
- 1980s: the entrance channel was open on all photographs during the 1980s;
- 1990s: the entrance channel was open on all photographs (1994 and 1996); and
- 2000's: the entrance was closed in two photos (2000 and 2009) and open in three photographs (2001, 2006 and 2010).

C.1.2 Coastal Processes and Inundation

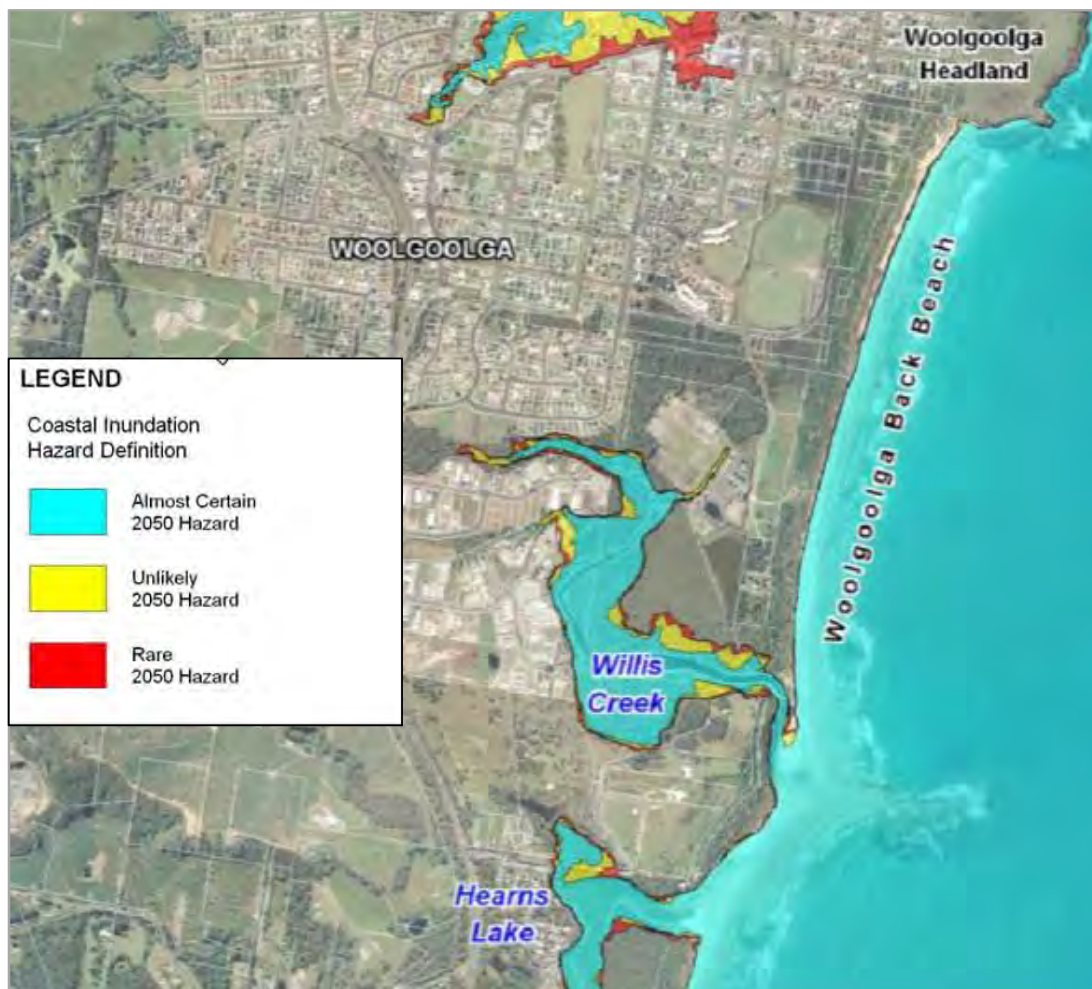
Coastal processes influence estuary hydrodynamics, sedimentation processes and entrance behaviour. Water levels in Willis Creek are relatively constant. Conductivity levels indicate the estuary is subject to regular seawater ingress through overtopping of the entrance berm during higher stages of the tide. The likely extent of beach erosion for the immediate timeframe is an 'almost certain' probability of 15 m, 'unlikely' probability of 50 m and 'rare' probability of 85 m landward movement of the beach position (BMT WBM, 2010b). For the 2050 and 2100 timeframes, the 'almost certain', 'unlikely' and 'rare' erosion extents are added to the long term shoreline recession values described above.



Source: BMT WBM (2010b)

Plate C.1 Beach Erosion and Shoreline Recession Mapping for the Year 2050

In the immediate timeframe, there is potential inundation of back beach areas at Willis Creek, with the 'almost certain' to 'rare' probability water levels covering a similar extent, generally over the footprint of Willis Creek. By 2100 with sea level rise, the 'unlikely' and 'rare' inundation extents expand in area around the creek footprint, but do not appear to threaten development (BMT WBM, 2010b:141) - refer to **Plate C.2**.



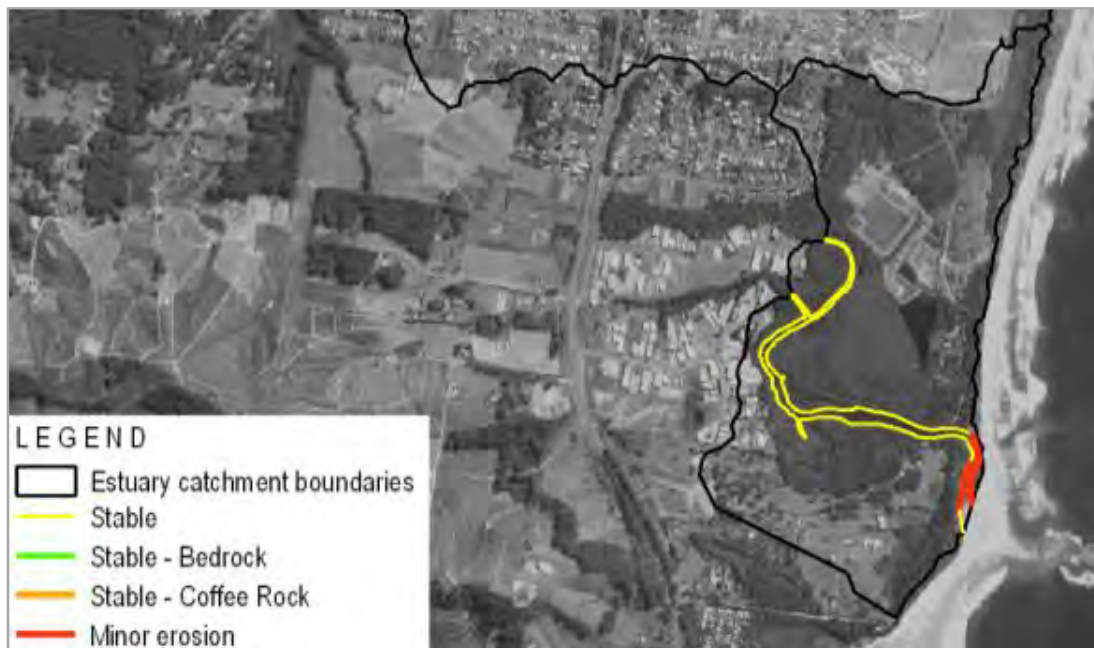
Source: BMT WBM (2010b)

Plate C.2 Coastal Inundation Mapping for the Year 2050

C.2 Geomorphology and Sediment Dynamics

C.2.1 Bank Erosion

Bank erosion is not a significant issue in the Willis Creek estuary with only 11% of estuary banks subject to minor erosion and no moderate or severe erosion reaches identified – refer to **Plate C.3**. The stable banks were naturally stable without the use of erosion protection works or bedrock outcropping.



Source: GeoLINK *et al.* (2011)

Plate C.3 Bank Erosion Severity (mapped January 2011)

C.3 Water Quality Processes

No recorded physico-chemical water quality data has been found for the period of 2005 to 2010 since cessation of effluent release in 2005.

Faecal indicator organism samples indicate the waters of Willis Creek (for the period sampled) are generally safe for primary contact recreation. Chlorophyll-a concentrations indicate that Willis Creek was eutrophic during the period of effluent discharge. Nutrient and sediment modelling of the estuary catchment indicates horticulture and residential land are the main contributors of catchment derived sediments and nutrients for Willis Creek.

C.4 Ecological Processes

C.4.1 Estuarine Habitat

Benthic habitat was a mixture of sand, mud and gravel bars in the estuary.

The extent of mangroves has increased in the estuary. In the opinion of the author/s this is probably a result of a reduction in freshwater inflow since the cessation of effluent discharge. Using the difference between the volume of effluent received at the plant and the volume of effluent recycled the average discharge over the years between 2002/03 and 2004/05 was in the order of 449 ML per annum (S Thorn 2011 pers comm). The removal of this freshwater influence is thought to have improved the conditions for grey mangrove recruitment through changes to the salinity regime.

Willis Creek has a large area of saltmarsh habitat – refer to **Plate C.4**. The area of saltmarsh recently mapped (2010) appeared almost four times less than shown by previous mapping (2004), however there are clear differences in the methods used between the two studies leading to an inconclusive trend.



Source: GeoLINK *et al.* (2011)

Plate C.4 Riparian Vegetation Condition (mapped January 2011)

C.4.2 Aquatic Fauna

Macroinvertebrate fauna were sampled and analysed: the results indicate that the central regions of the waterway contain the most diverse and abundant benthic macroinvertebrate fauna. A survey of fish species was undertaken with relatively few animals from a small number of taxa collected.

No threatened aquatic species have been reported for Willis Creek.

C.4.3 Little Terns

A significant NSW breeding site for the Little Tern is located at the Willis Creek / Hearn's Lake entrance area. A *Shorebird Recovery Program* has been devised to guide management of the site including fencing off of the nesting site, community awareness initiatives, a fox abatement plan and monitoring. The management works will provide an umbrella effect for local biodiversity, including other locally breeding migratory and shorebirds species.

C.4.4 Riparian Vegetation

Riparian vegetation in the study area is predominately in moderate to very good condition (refer to **Plate C.5**). 17% of banks had riparian vegetation in moderate condition and these reaches were confined to the banks nearest to the entrance.

The distributions of major weeds along the estuary have been mapped (refer to **Plate C.6**). Four of the mapped invasive weed species are listed as Priority B or C in coastal or riparian landscapes under the Northern Rivers Invasive Weed Strategy 2009-2013.

C.4.5 Estuary Health

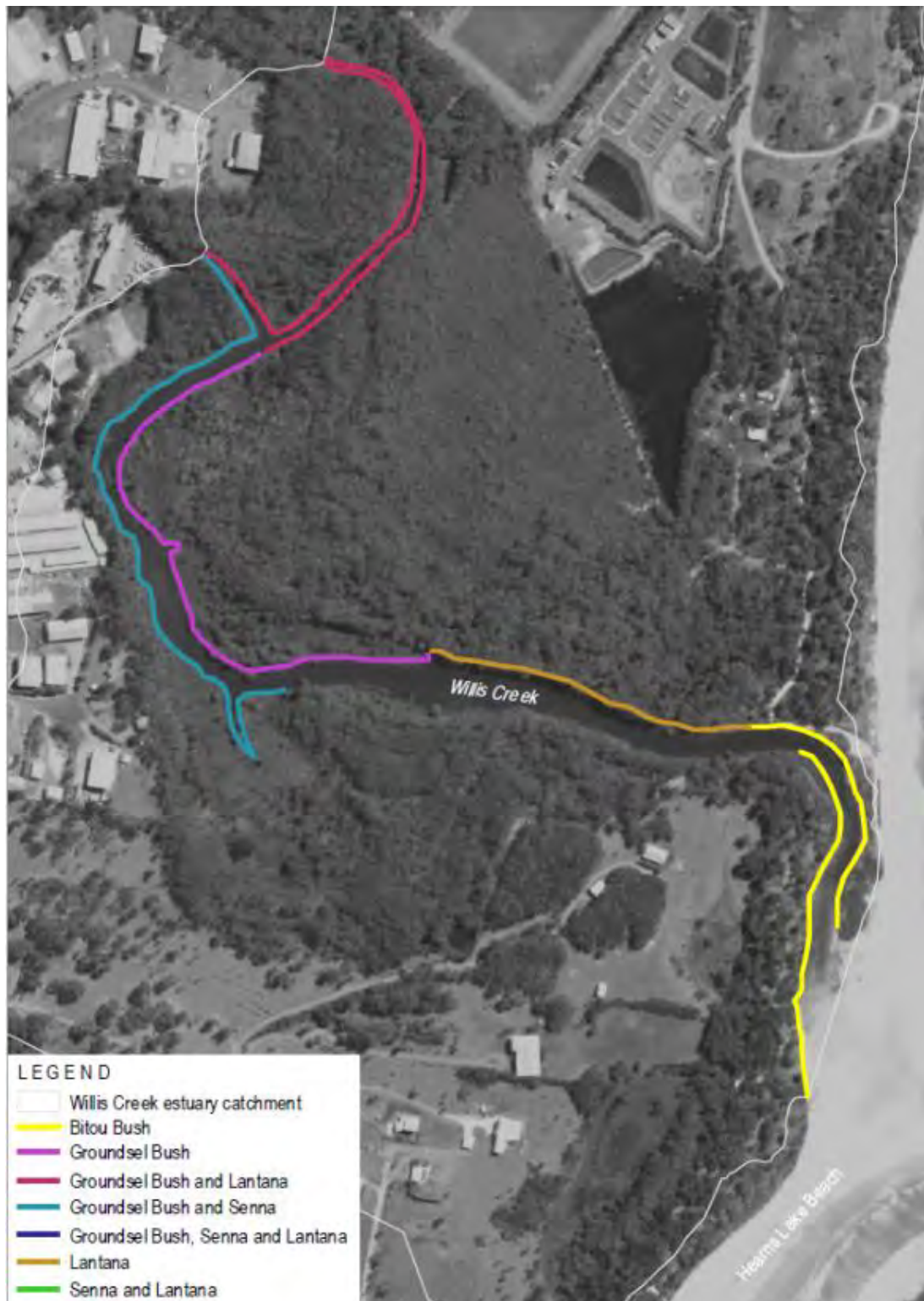
There is too little information to make an informed assessment of the health of Willis Creek:

- there is a lack of recent water quality data. Sediment quality data would also be useful as excess nutrients are likely to have been stored in the benthic sediment. Previous water quality data indicated that Willis Creek suffered from excessively high nutrient concentrations;
- saltmarsh and mangrove habitats are in relatively good condition. The riparian corridor is negatively impacted by weeds but well protected against erosion and well vegetated;
- fish and macroinvertebrate populations are scarce and lack diversity, though macroinvertebrate diversity appears to be improving; and
- blue green algae occurs in frequent small patches. There are no reported fish kills.



Source: GeoLINK *et al.* (2011)

Plate C.5 Riparian Vegetation Condition (mapped January 2011)



Source: GeoLINK *et al.* (2011)

Plate C.6 Distribution of Priority B and Priority C Invasive Weed Species (mapped January 2011)

C.5 Climate Change and Sea Level Rise

Climate change is projected to include an increased frequency of hot days, increased intensity and frequency of extreme daily rainfall events and droughts, changes to sea levels and changes in the occurrence of intense storm events. Climate change projections at the local scale for the Coffs Harbour area are described in a report by BMT WBM (2010a). The climate change projections for the Coffs Harbour area (relative to the 1977 to 2007 period) include the following:

- evaporation: decreases in summer and spring and increases in autumn and winter;
- temperature: decreases in average temperatures for summer, autumn and spring and increases in winter;
- Extreme Hot Days: significant increases in the annual number of extreme hot days;
- Average Rainfall: increases in annual totals and seasonal totals except for decreases in autumn totals for the Coffs Harbour area;
- High Rainfall Events: increases in frequency of high rainfall events in summer and autumn;
- Sea Level Rise: 0.4 m increase in mean sea level by 2050 and 0.9 m increase by 2100 (relative to 1990 mean sea levels); and
- Wave Climate: future wave climate will be similar to the present or within the variability of the existing wave climate. However, the Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2010b) investigated the possibility of a permanent shift from the existing south easterly wave climate to a more easterly wave climate with average wave height remaining the same.

C.5.1 Climate Change and Sea Level Rise Impacts on Estuary Processes

General estuary processes that will be impacted by climate change include (after Haines, 2006 and 2008; Mackenzie *et al.*, 2009):

- coastal processes and interactions with estuary entrances: e.g. a landward and upward shift in entrance channels in response to sea level rise;
- hydrodynamics: changes in water level and altered tidal prisms due to changes to entrance conditions; impacts of altered rainfall and evaporation patterns. Predicted sea level rise may result in higher water levels within the estuary and potentially an increase in typical water depths;
- sediment dynamics: changes to ingress of marine sediment due to changes to entrance conditions and changes to sediment derived from catchment runoff in response to an increase in high rainfall events;
- water quality: changes to water temperature and sediment dynamics and subsequent changes to chemical and physical processes in the estuary; and
- ecology: the impacts of increased water levels and altered hydrodynamics, sediment dynamics and water quality on ecological processes.

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Appendix D

Summary of Community Uses Assessment

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Community consultation aims to discover community aspirations and gain stakeholder input to the Project to ensure that the Estuary Management Plan is accepted by the community as a coherent, practical and achievable plan.

D.1 Initial Community Workshop

A Community Workshop was held at Woolgoolga Community Centre on 14 September 2010. The purpose of the initial Community Workshop was to gain input on Community values, issues and objectives for the three estuaries. Approximately 30 people attended the workshop.

Council and the consultant team (GeoLINK / GECO Environmental / Aquatic Science and Management) provided an introduction on the Estuary Management Plan process. The attendees then formed five groups to discuss and compile a list of key issues and goals for the estuaries. Following the group work a representative from each group summarised their key issues and goals. A final question time was undertaken before the workshop concluded.

The key focus of the attendees was generally Woolgoolga Lake and no specific comments were provided in regard to Willis Creek. However, some of the general comments applicable to the three estuaries are provided below in regard to goals and issues developed during group work.

Goals:

- improved water quality;
- foreshore management;
- water quality monitoring; and
- improved fish breeding.

Issues:

- Address water quality issues associated with runoff from rural lands and urban areas (nutrients, herbicides, pesticides, sediment and organic matter).

D.2 Community Survey

A Community survey was undertaken over a two month period from April to May 2011, encompassing a school holiday period to provide opportunity to capture input from the widest possible catchment of users. The surveys were located at Council offices, local outlets in the estuary catchments such as caravan parks, newsagents and post offices. In addition, a web survey was made available through the website.

The survey data is summarised below. The total number of completed surveys received was 50. Note that Questions 6 and 8 apply to the Woolgoolga Lake Estuary and have therefore not been included.

1. Where are respondents from?

Sixty percent of respondents were from the Woolgoolga area, 22 % from Safety Beach and 16 % from elsewhere in the Coffs Harbour Council area. One respondent was from outside the Coffs Harbour Council area at the time of completing the survey.

2. How often do you visit or use Willis Creek?

Eighty-four percent of respondents indicated they visit Willis Creek. 44% rarely or never visit, and 26% visit Willis Creek a few times a year. 4% of total respondents visit Willis Creek daily.

3. Indicate how you use the estuary:

Survey results indicate the main use of the Willis Creek estuary is walking, with 36% of total respondents identifying this use. Bird-watching and dog walking were the next most significant uses, identified by 14 and 10% of respondents respectively. Swimming and boating were not identified by any respondents as uses of

the Willis Creek estuary. Other uses of Willis Creek identified by respondents included volunteering for the Little Tern Colony, and bait collecting.

4. Indicate your level of concern for the following estuary-related issues:

The estuary issues of most concern that apply to Willis Creek estuary, identified by 66% of respondents was water quality issues associated with runoff from agricultural lands and urban areas. The estuary issues of least concern that apply to Willis Creek, identified by 38% of respondents was insufficient walking tracks around Willis Creek.

5. Indicate the importance you place on the following estuary related goals:

The estuary goals of most importance, identified by 76-82% of respondents were:

- improved water quality;
- improved aquatic habitat within the lake and creeks to support fish stocks, crustaceans, etc; and
- improved runoff control in urban areas of the catchment.

The estuary goals of least importance that apply to Willis Creek, identified by 22% of respondents was improved walking tracks around Willis Creek estuary.

7. Use of motor boats in the estuary:

Seventy-six percent of respondents indicated they do not support the use of motor boats, and 22% of respondents indicated they do support the use of motor boats in the Darkum Creek, Woolgoolga Lake and Willis Creek estuaries.

D.3 Stakeholder Consultation

The organisations listed below were consulted to obtain initial input to the study:

- NSW Department of Environment, Climate Change and Water
- NSW Department of Environment, Climate Change and Water – Environmental Protection Authority
- NSW Department of Environment, Climate Change and Water – Parks and Wildlife Group
- Solitary Islands Marine Park Authority
- Primary Industries (Fisheries) – Industry and Investment NSW
- Northern Rivers Catchment Management Authority - Coffs Harbour
- Department of Planning - Grafton
- NSW Department of Water
- Land and Property Management Authority
- NSW Maritime
- Roads and Traffic Authority
- Coffs Coast Tourism Association
- Local Aboriginal Land Council – Coffs Harbour
- Gumbular-Julipi Elders Council, c/o Coffs Harbour Local Aboriginal Land Council
- Woolgoolga Surf Life Saving Club
- Coffs Harbour Historical Society and Museum Inc.
- Landcare
- Woolgoolga Chamber of Commerce Industry & Tourism Inc
- Let's Save Woolgoolga Lake
- Coffs Harbour City Council
- Garby Elders
- Jim Stevens
- Woolgoolga Returned Services Golf Club

Input received from various organisations has been incorporated into the assessment of the relevant issues in the EMS. The issues are summarised below.

Table D.1 Consultation Correspondence

Stakeholder
Department of Planning (DoP)
The DoP refers to the following documents for consideration in preparing the CZMP: <ul style="list-style-type: none"> ▪ Mid North Coast Regional Strategy; and ▪ SEPP 71 – Coastal Protection.
The DoP raises the issue of future sea level changes and its consideration in planning for coastal areas. The DoP refers to the following documents and guidelines for consideration in preparing the CZMP: <ul style="list-style-type: none"> ▪ NSW Sea Level Rise Policy Statement; ▪ NSW Coastal Planning Guideline: Adapting to Sea Level Rise; ▪ Coastal Risk Management; and ▪ Flood Risk Management.

D.4 Final Community Workshop – Development of Strategies

A community workshop was held at Woolgoolga Community Centre on 13 October 2011 for the three estuaries (Darkum Creek, Woolgoolga Lake, and Willis Creek). The purpose of the workshop was to gain community input into the development of management strategies to ensure appropriate strategies have been developed, and to assist with identifying priorities. Approximately 30 people attended the workshop.

Council and the consultant team (GeoLINK / GECO Environmental / Aquatic Science and Management) provided an introduction on the key issues for the estuaries. The attendees then formed six groups to develop a list of key management strategies targeting the key issues for the estuaries. The output of the six groups are summarised in the following table. Following the group work a representative from each group summarised their strategies and reasoning. A final question time was undertaken before the workshop concluded.

The key focus of the attendees was generally Woolgoolga Lake, however some strategies such as catchment pollutant strategies related to all three estuaries. The main strategies generally aligned and supported the strategies that were being developed by the consultant team. The main strategies developed by the six groups are included:

- catchment pollutant strategies particularly with respect to rural runoff;
- management of environmental weeds and protection of riparian areas;
- urban stormwater management;
- sewerage overflows;
- dredging of the entrance;
- maintaining and enhancing existing walking trails; and
- prevent new development in areas affected by increased water / flood levels from sea level rise.

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Table D.2 Management Strategies Developed in Community Workshop on 13 October 2011

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Stormwater and Catchment Inputs	<ul style="list-style-type: none"> ▪ Education and address policing / fining ▪ Erosion due to building and bad farming practices (eg. Blueberry / bananas) ▪ Sewerage inspections ▪ Dog excrement: place "poo bags" at head of walking tracks and police this / fines ▪ Council and NPWS to enforce "Animals Act". 	<ul style="list-style-type: none"> ▪ Eliminate or reduce top soil erosion / runoff from entering Poundyard Creek from construction and rural activities eg. blueberries 	<ul style="list-style-type: none"> ▪ Ongoing monitoring of water quality from all waterways and action taken to correct any silt or chemical imbalances ▪ In rural areas ensure a minimum buffer zone of 22 m along all waterways to trap sediment runoff 	<ul style="list-style-type: none"> ▪ Address the issue of erosion from orchards ▪ Campaign awareness for residents in the catchment (rural and urban) 	<ul style="list-style-type: none"> ▪ Buffer zones to 30 m along waterways ▪ Construct nitrogen traps / filter zones ▪ Address litter from children ▪ Inspection of sewerage especially Poundyard Ck 	<ul style="list-style-type: none"> ▪ Stormwater treatment devices implemented on all outlets and regularly serviced ▪ Water quality monitoring ▪ Audit agricultural practices ▪ Fish sampling for water quality monitoring
Impacts to foreshores	<ul style="list-style-type: none"> ▪ Seek funding for protection of riparian areas ▪ Support for volunteer groups for removal of rubbish and regeneration activities ▪ Council implement / supplies facilities (eg. common green skip bins) for landowners / caravan parks to remove green waste to prevent illegal dumping ▪ Wooden barriers / bollards and planting to define boundary to prevent mowing encroachment to native bushland 	<ul style="list-style-type: none"> ▪ Removal of noxious weeds eg. mile-a-minute and morning glory 	<ul style="list-style-type: none"> ▪ Educate residents and council workers on detrimental effects of mowing and other foreshore gardening activities on native riparian vegetation ▪ Develop and implement a management plan to keep lantana and other environmental weeds out of the foreshore areas ▪ Develop and implement an erosion management strategy 	<ul style="list-style-type: none"> ▪ Bollard the western end of the Woolgoolga Lake picnic area to eliminate vehicle access and a sign erected to prohibit cars, bikes onto the lake foreshores ▪ Campaign to control noxious weeds on the edges of Woolgoolga Lake ▪ A campaign to eliminate the camphor laurel problem that is developing along these creeks in the upper reaches 	<ul style="list-style-type: none"> ▪ Address illegal mowing, tree removal, and use of fertilisers ▪ Requires more landcare, neighbourhood and weed management groups ▪ Bush regeneration at TAFE ▪ Re-establish buffer zones ▪ Council get rid of green bins and place mulch around trees ▪ Promote / educate community regarding composting / worm 	<ul style="list-style-type: none"> ▪ Address weeds – lantana, asparagus fern (CMA, School, Community) – continue spraying; ▪ Mangroves – implement colonisation study (CMA, schools).

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
				<ul style="list-style-type: none"> ▪ Keep natural, no rock walls, no retaining walls, no sandbags 	farms	
Flooding	Council to revise: <ul style="list-style-type: none"> ▪ stormwater planning ▪ level of outlets for sewerage or relocating outlets ▪ relocation of housing at risk from flooding 	<ul style="list-style-type: none"> ▪ Address sewerage pumping stations overflow in heavy rains ▪ Keep stormwater drains cleared 	<ul style="list-style-type: none"> ▪ Rebuild and vegetate southern dune peninsula (near Caravan Park) by pumping sand from sedimentation area. This should improve any flooding problems in Woolgoolga Lake 	<ul style="list-style-type: none"> ▪ Have to maintain vegetation corridors within the catchment to slow run-off and reduce intensity of flooding, particularly when setting up new developments ▪ To alleviate the flooding of foreshore, removing the silt from the estuary mouth (dredging and sand pumping) Council should setup regular maintenance of clearing sand build-up by way of earth moving equipment after dune erosion. Push the sand back onto the southern dune entrance and beachfront ▪ Stop removing branches and tree trunks from waterways 	<ul style="list-style-type: none"> ▪ Odour issues from pump station at end of Young Street ▪ Convert kerb and guttering to dish drains and local grasses and plants ▪ Install retention basin and sedimentation traps ▪ Promote stormwater infiltration devices on properties 	<ul style="list-style-type: none"> ▪ Manually open Woolgoolga Lake mouth in storm events ▪ Public notification (paper) of water quality following flood events.

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Sedimentation	<ul style="list-style-type: none"> ▪ Holding ponds higher up the catchment ▪ Do not remove or install large logs (natural damming) to slow water flow, catch sediment and provide fish / aquatic habitat. 	<ul style="list-style-type: none"> ▪ Dredging to remove sediment from bottom of lake 	Refer to Flooding comments.	<ul style="list-style-type: none"> ▪ Reinstate the natural northern lake entrance by removing the retaining wall ▪ Bulldoze the sand; ▪ Dredge the entrance to remove sand ▪ Return to contour planting in agriculture on the catchment hills (eg. blueberry farms) 	<ul style="list-style-type: none"> ▪ Re-establish riparian vegetation using neighbourhood group eg Sunset Lakes ▪ Utilise sediment traps and biological solutions to address sediment runoff ▪ Increase riparian buffer near sports oval by reclaiming 10 – 20 m on east of oval ▪ Increase riparian buffer along Darkum Creek within Golf Course 	<ul style="list-style-type: none"> ▪ Runoff and marine silts are considered the issue ▪ Water depth varies depending on mouth status ▪ Dredging is considered to be temporary relief (optic cable maybe impacted by dredging)
Recreation	<ul style="list-style-type: none"> ▪ Prevent 4WD entry / damage to environment ▪ No new walking tracks to be put in ▪ Maintain and enhance existing walking tracks so that public stay on tracks ▪ NPWS to prevent and police / fine 4WD's on beach 	<ul style="list-style-type: none"> ▪ No further trail networks are needed ▪ Bank erosion at the picnic area of the lake needs to be addressed 	<ul style="list-style-type: none"> ▪ Existing trail networks which are retained should be converted to boardwalks to prevent erosion ▪ Where trail (where boardwalks) are set back from waterways, then the land between can be developed as a catchment / erosion control zone for runoffs to ease siltation and erosion 	<ul style="list-style-type: none"> ▪ Walking trails on the cemetery side of the lake need fixing as it is washed out and dangerous ▪ Very important to keep and expand the walking trails so residents and visitors can enjoy the waterways 	<ul style="list-style-type: none"> ▪ Close off unnecessary trails ▪ Make clear signage – interpretation ▪ Retain only necessary well-walked trails ▪ Stop 4WDs / motorbikes on trails 	<ul style="list-style-type: none"> ▪ Pathways – adequate quantity but quality poor (fix steps / drainage – north shore, Safety Beach) ▪ Upgrade to “in-ground”, permanent well-constructed eg Port Macquarie Headland Walk.

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
			<ul style="list-style-type: none"> Educational signage at key points of each waterway on the importance of these as a natural environment. 			
Climate Change and sea level rise	<ul style="list-style-type: none"> No new developments in flood prone areas as designated by Coffs Coastal Zone Management Plan Protection (by zoning) of existing native riparian habitat 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Council to identify and publicise those properties which will be affected by climate change and flooding events and develop and implement property prevention measures 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Make retreat areas for animals and plants Households to use water retention strategies No new development in river / lake / sea level rise areas. 	<ul style="list-style-type: none"> No comment
Other	<ul style="list-style-type: none"> More active policing / fining of regulations by NPWS and Council Use signs and education avenues eg. in schools, social media, tv and papers Container legislation – 10c for return of bottles and cans to prevent litter 	<ul style="list-style-type: none"> The poor condition of Woolgoolga Lake Bridge is considered an eyesore 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Community Dune Care Groups should have to seek approval from Council and community before performing strategies and so-called improvements to the lake and foreshores, in particular pruning has been done which leaves a lot to be desired Ugly shade-cloth fences on beach front etc unnecessary and for long periods. 	<ul style="list-style-type: none"> Teach people to look at rivers for health, deterioration and regeneration, street education All new development to be required to be 40% under indigenous vegetation 	<ul style="list-style-type: none"> No superfluous signage – if a must, eco-friendly and reduce (maintain) education signs to a minimum



Appendix E

Summary of Development of Management Objectives and Issues

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E.1 Values

E.1.1 Local and Regional

The natural settings of the estuaries and coast within the Mid North Coast area are a feature that attracts visitors and locals to the area. Willis Creek is in keeping with this natural setting, and forms part of the network of bushland settings along the coast and estuaries and is of local and broader significance.

Key values of the estuary include its natural setting, Little Tern breeding site and quiet recreational opportunities including bird watching and bushwalking.

E.1.2 Cultural Heritage

Aboriginal, European and Sikh cultural heritage values are significant for the Woolgoolga area.

The Woolgoolga area was (and continues to be) inhabited by the Gumbayngirr people prior to European Settlement. Records show that an artefact find is located within the study area, and two Aboriginal ceremonial and dreaming sites are located within close proximity of the Willis Creek catchment. The cultural values of these Aboriginal sites within the Willis Creek catchment area require sensitive consideration and preservation.

Europeans moved into the Woolgoolga area from the 1870s. Records indicate that there are no listed European cultural items of significance within the study area. Land use within the Willis Creek estuary catchment changed from predominantly native vegetation in 1943, to clearing of land on the southern and western side of the creek between 1964 and 1974, and the significant growth of residential and industrial development (including the STP site) between 1974 and 1994 between the creek and the existing Pacific Highway.

The *Coffs Harbour Coastal Processes and Hazards Definition Study Draft Report*, prepared by WBM, indicates that sand mining leases existed and sand mining may have occurred at Woolgoolga Back Beach and Hearn's Lake Beach (Willis Creek estuary catchment area).

E.1.3 Recreational Values

Willis Creek is a relatively small and remote coastal estuary with dense vegetation and a lack of public access. However it offers the following recreational values:

- water-based activity including kayaking and canoeing in the creek; and
- the natural setting attracts people seeking quiet recreational opportunities such as bird watching and bushwalking.

Odours from the STP site may deter visitors at certain times such as early mornings when odours are relatively strong around the STP site.

E.1.4 Scenic Values

Willis Creek offers a predominantly undisturbed natural environment that forms an integral and important component of the natural settings along the coastline. Willis Creek is a remote, densely vegetated estuary and with limited access which combine to significantly restrict visual access into the area. It offers the following scenic values:

- limited, short distant views into the foreshore vegetation from the vehicle access track;
- highly scenic, panoramic views across upstream and downstream reaches of the creek from an elevated vantage point at the top of the dune near the carpark at the end of the track;
- the mouth of the creek to the south of the car park also offers an uninterrupted view of the downstream reach of the creek and its partial opening to the ocean; and
- much of the Willis Creek reserve has been retained in its natural state and the creek follows a narrow channel that meanders through dense, visually rich riparian vegetation which encloses and protects the creek to produce a highly tranquil and scenic environment.

E.1.5 Water Quality Values

It is difficult to describe the current water quality values of Willis Creek as very little water quality data has been collected since 2005. When water quality data were last collected the creek received treated effluent from the Woolgoolga Wastewater Treatment Plant (WWTP). In 2005 CHCC upgraded the WWTP and diverted treated effluent elsewhere. It is likely that the intervening years have resulted in an improvement in water quality. By most measures available, the water quality of Willis Creek was poor during the effluent release period. However, surprisingly, the water quality data during this period indicates that according to the old ANZECC (2000) guidelines for recreational use, Willis Creek would have been suitable for primary contact recreation.

Physico-chemical water quality information (salinity, pH, dissolved oxygen (DO), turbidity and temperature) was collected on 8 February 2011 as part of this study from three sites in Willis Creek to assess long channel and vertical variation in water quality. The creek was open to the ocean at the time of sampling, though it did not appear to be receiving tidal water, only draining to the ocean. Willis Creek was sampled at the beginning of the incoming tide. The results indicated the creek is well mixed for most of the estuary length, with a gentle reduction in salinity moving upstream, accompanied by a fall in pH and DO. The water quality of Willis Creek was a relatively even mixture of seawater and freshwater.

E.1.6 Ecological Values

Ecological characteristics of Willis Creek that can be considered values include:

- a relatively large area of saltmarsh habitat. Saltmarsh contributes to the overall productivity of the estuary and provides habitat for fish and invertebrates. Saltmarsh is also protected as an endangered ecological community (EEC) under the *TSC Act*;
- an area close to the entrance to Willis Creek is used as a breeding site for a population of the endangered little tern (*Sterna albifrons*);
- the riparian vegetation of Willis Creek is mostly intact and in good (73%) to very good (9%) condition. Riparian vegetation filters overland flows, stabilises banks, provides structural habitat for fish and contributes to the overall productivity of the estuary;
- approximately 0.9 ha of mangrove habitat showing active recruitment. Mangroves are an important primary producer driving the overall productivity of the system, process pollutants in the water, provide structural habitat for fish and invertebrates and stabilise banks and sediment;
- reeds and rushes are common along the margins of the central channel and upper creek, contributing to productivity, habitat value and bank stability; and
- a quiet, natural environment where low impact activities, such as bird watching and walking, can be appreciated.

E.2 Management Objectives

E.2.1 Entrance Conditions and Hydrodynamics Objectives

E.2.1.1 Promote Natural Entrance Opening / Closing Processes

Willis Creek is an ICOLL system that is predominantly closed. The entrance opens and closes to the ocean naturally in a constant but irregular cycle depending on fluvial, tidal and wave processes. Artificial opening of ICOLL's can have significant negative impacts on water quality, fish and other ecological communities.

Council does not have any current opening protocol for Willis Creek entrance. However, it is noted that during the period of release of effluent into Willis Creek from the Woolgoolga Water Reclamation Plant (1973 to 2005), the plant operator checked the entrance on a daily basis to ensure that it did not fully close (Jelliffe, 1997a). There are no records of artificial opening of the entrance since the cessation of effluent release in 2005.

Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant need for artificial opening for the purpose of flood mitigation. Nevertheless, a formal entrance management policy will be developed for Willis Creek in accordance with OEH *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010) which requires EMPs for ICOLLS to include such a policy.

The objective of the entrance management policy will be to maintain a natural opening / closing regime for the creek entrance. Interference (artificial opening of the entrance) would only be employed for critical situations such as to mitigate and reduce the impacts of flooding on properties and infrastructure adjoining the creek.

E.2.1.2 Minimise Flooding of Properties and Infrastructure

Flood level estimates for Willis Creek and inundation mapping associated with elevated ocean levels indicates there are no properties or infrastructure currently at risk of significant flooding. However sea level rise will result in higher inundation levels within the creek system in the future. Therefore the objective is to minimise or avoid future flooding of properties and infrastructure around the creek by appropriate means such as development controls for future development in flood prone areas; artificial opening of the creek entrance where appropriate; flood-proofing infrastructure; etc.

E.2.2 Bank Stability and Sedimentation Objectives

Bank erosion and estuary sedimentation are not significant issues in the Willis Creek estuary (Geolink et al., 2011), although 11% of banks surveyed were recorded with minor erosion, all such banks occurred in the lower reaches of the estuary where the channel runs between the beach dunes and the back barrier dune. As the banks are essentially composed of sands with little cohesion they are highly susceptible to wash and, when the entrance is open, tidal flow. Intervention in this setting is not required and consequently there are no recommended objectives for addressing bank stability or sedimentation in the Willis Creek estuary.

E.2.3 Ecological, Habitat and Biodiversity Objectives

E.2.3.1 Protect and Enhance Aquatic Habitats

The Northern Rivers Catchment Management Authority (NRCMA) Catchment Action Plan (CAP) lists rehabilitation of aquatic habitats among its goals. Willis Creek has abundant mangrove habitat and a locally significant area of saltmarsh habitat.

Mangrove and saltmarsh habitats in Willis Creek are mostly in good condition. An objective of the Willis Creek Estuary Management Plan is to protect these communities from disturbance;

E.2.3.2 Restore terrestrial habitats of high ecological or conservation value by removing threats and through targeted rehabilitation (e.g. riparian vegetation, endangered ecological communities such as Coastal Saltmarsh, Freshwater Wetlands, etc)

A variety of terrestrial habitats of high conservation value have been identified within Willis Creek estuary. The main threat to the integrity and viability of some of these habitats in the Willis Creek estuary is weed invasion.

This management objective is aimed at the rehabilitation of sites with high ecological or conservation value where degradation (such as weed infestation) has occurred.

E.2.3.3 Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise

Some negative ecological impacts are likely to result under current climate change and sea level rise scenarios. These may include changes in the distribution and extent of mangrove and saltmarsh colonies and reductions in the overall productivity of the estuary. Effective planning for future changes will help to mitigate negative impacts.

E.2.3.4 Protect Little Tern Population from Disturbance

A significant breeding site for the Little Tern (South-eastern Australian population) in NSW in recent times is located at the Willis Creek / Hearn's Lake entrance area. The site is located on crown land and is being actively managed seasonally to protect the nesting colony in a joint project undertaken by OEH - National Parks and Wildlife Service and Coffs Harbour City Council. The objective is to continue the current management program and avoid activities / development that may threaten the success of the program.

E.2.4 Water Quality Objectives

E.2.4.1 Improve Water Quality

There are a number of areas in which the water quality of Willis Creek can be improved. Unfortunately, nutrient enrichment after years of effluent discharge will only be mitigated as part of a natural recovery process. However, the process of natural recovery will be maximised if the current and future impacts of runoff from the catchment are minimised.

The NRCMA CAP lists an improvement in the condition of coastal zone natural resources as one of its targets. The assembled water quality information indicates that a reduction in the export of nutrients and sediment from the catchment through land and stormwater management would be the most efficient way to improve water quality in Willis Creek.

E.2.4.2 Improved Monitoring of Water Quality

A key objective for the management of Willis Creek is to improve the understanding of the current status of water quality in Willis Creek. A suggested water quality monitoring program that meets NSW government reporting obligations will be delivered as part of the Estuary Management Plan.

E.2.5 Recreational Use and Access Objectives

E.2.5.1 Preserve the quiet, undeveloped natural setting

Given the density of vegetation and lack of public access, the Willis Creek reserve generates little recreational activity. However the natural setting attracts people seeking quiet recreational opportunities such as bird watching, bushwalking and non-motorised water-craft.

This objective is accordingly to preserve the quiet undeveloped natural setting of the Willis Creek foreshores.

E.2.5.2 Prevent excessive disturbance or fragmentation of the existing natural values

An unformed access road connects the southern edge of Woolgoolga settlement with Woolgoolga Back Beach where it terminates as a small car park and turning area close to the mouth of the creek. A timber slatted walkway provides pedestrian access to the beach and there are no known walking tracks within the reserve.

This objective is to prevent excessive disturbance or fragmentation of the existing natural values by minimising the provision of additional recreational infrastructure and formal access routes.

E.2.5.3 Enhance public appreciation of the broader and site specific natural values of the creek environment.

Much of the Willis Creek reserve has been retained in its natural state and is protected as part of the Coffs Coast Regional Park. Identification, regulatory and interpretive signs provide limited information at the start of the beach access track. The purpose of this objective is partly to develop a sense of custodianship for the area to assist with preserving the existing natural characteristics.

E.2.6 Views and Visual Character

E.2.6.1 Maintain and preserve the existing natural characteristics of the area as the dominant visual feature

E.2.6.1 Remove weed infestation and rehabilitate natural areas disturbed by previous uses or uncontrolled vehicle access.

E.3 Management Issues

E.3.1 Entrance Conditions and Hydrodynamics Issues

E.3.1.1 Impacts of Climate Change on Flooding

Sea level rise caused by climate change will result in higher flood inundation levels within the Willis Creek system in the future. Current inundation levels are likely to increase by a similar amount as sea level rise increases. Adopted sea level rise estimates for NSW are a 0.4m increase in sea level (relative to 1990 levels) by 2050 and a 0.9m increase by 2100. Climate change also has the potential to result in an increased frequency of high rainfall events leading to more frequent flooding events.

Infrastructure that may be impacted by future coastal inundation include sewage pump station no. 5, located to the south of residential properties in Nightingale Street. The elevation within this area is approximately 4 to 5 m Australian Height Datum (AHD). Higher future flood levels may also present a risk of backyard flooding to some properties residential properties in Nightingale Street adjoining the creek system and industrial properties in Hawke Drive, Bosworth Road and Willis Road adjoining the creek system.

E.3.1.2 Shift in Entrance Location as a Result of Coastal Processes

The Willis Creek entrance may move to the north as a result of coastal processes responding to sea level rise and other climate change impacts. This may impact on the existing car park, 4WD access to the beach and associated infrastructure.

E.3.2 Bank Stability and Sedimentation Issues

At the date of development of this Estuary Management Study, there were no bank erosion issues requiring active management within the Willis Creek estuary.

E.3.3 Ecological, Habitat and Biodiversity Issues

E.3.3.1 Effects of Human Activities on the Little Tern Population

A *Shorebird Recovery Program* has been devised to guide management of the Little Tern breeding site at the Hearn's Lake / Willis Creek entrance. Management actions include fencing off of the nesting site, community awareness initiatives, a fox abatement plan and monitoring. Continuance of this program is expected to reduce the impact of human activities on the Little Tern population.

E.3.3.2 Impacts of Climate Change on Estuary Ecology

Some negative ecological impacts are likely to result under current climate change and sea level rise scenarios. These may include changes in the distribution and extent of mangrove and saltmarsh colonies, reductions in the overall productivity of the estuary and a reduction in feeding and nesting areas for wading birds.

E.3.3.3 Environmental weeds degrading native riparian vegetation communities along the estuary banks.

Weed mapping undertaken in January 2011 identified the presence of environmental weed species throughout Willis Creek (GeoLINK *et al.*, 2011). The main species identified were groundsel bush, senna, noogoora burr, and pink lantana in the mid to upper reaches, and bitou bush and coastal morning glory in the lower reaches. Environmental weeds degrade the native riparian vegetation, reducing its ecological value and in some cases potentially impacting upon bank stability and other estuary values including recreational amenity and aesthetics. Reaches of high priority for weed control will be determined as part of the Estuary Management Plan.

E.3.4 Water Quality Issues*E.3.4.1 Elevated Turbidity, Total Nitrogen and Chlorophyll-a Values*

The assembled water quality data for Willis Creek triggers ANZECC (2000) interim guidelines for the protection of aquatic ecosystems for total phosphorus, total nitrogen and chlorophyll-a. The limited dataset collected during the DECCW MER monitoring project indicates that turbidity is also above guideline levels.

The specific cause of elevated turbidity levels in Willis Creek is most likely to be associated with high levels of micro-algal growth in the water column. The following factors may be also be contributing:

- re-suspension of fine sediments on the bottom due to tidal flow or during entrance breakout events;
- elevated suspended sediment loads in catchment runoff.

Phosphorus and nitrogen enrichment in Willis Creek are a result of many years of effluent discharge. It is uncertain how the cessation of effluent discharge has affected nutrient concentrations but they are still likely to be contributing to high levels of micro-algal growth in the water column (indicated by high chlorophyll-a concentrations) and the risk of algal blooms and associated fish kills is probably still high.

E.3.4.2 Stormwater Management and Pollutant Inputs from the Catchment

During community consultation water quality issues associated with runoff from rural and urban lands were raised as a perceived issue. Nutrients, sediments, pesticides and herbicides, and organic matter were all seen as potential contaminants in runoff. A basic modeling exercise was undertaken as part of the Estuary Processes Study (GeoLINK *et al.*, 2011) using the Catchment Management Support System (CMSS). The CMSS is a method of calculating nutrient and sediment budgets based upon landuse types and their distribution within a catchment.

- **Rural Landuse:**

CMSS results indicate horticultural landuses, which account for approximately 25% of the Willis Creek catchment, dominate the supply of sediment and nutrients to the creek (particularly phosphorus). This highlights the importance of erosion and sediment controls for the main agricultural practices in the catchment (eg. banana and blueberry cultivation) and wastewater controls for intensive horticultural practices such as excess fertigation from greenhouse cucumber production.

- **Urban Development:**

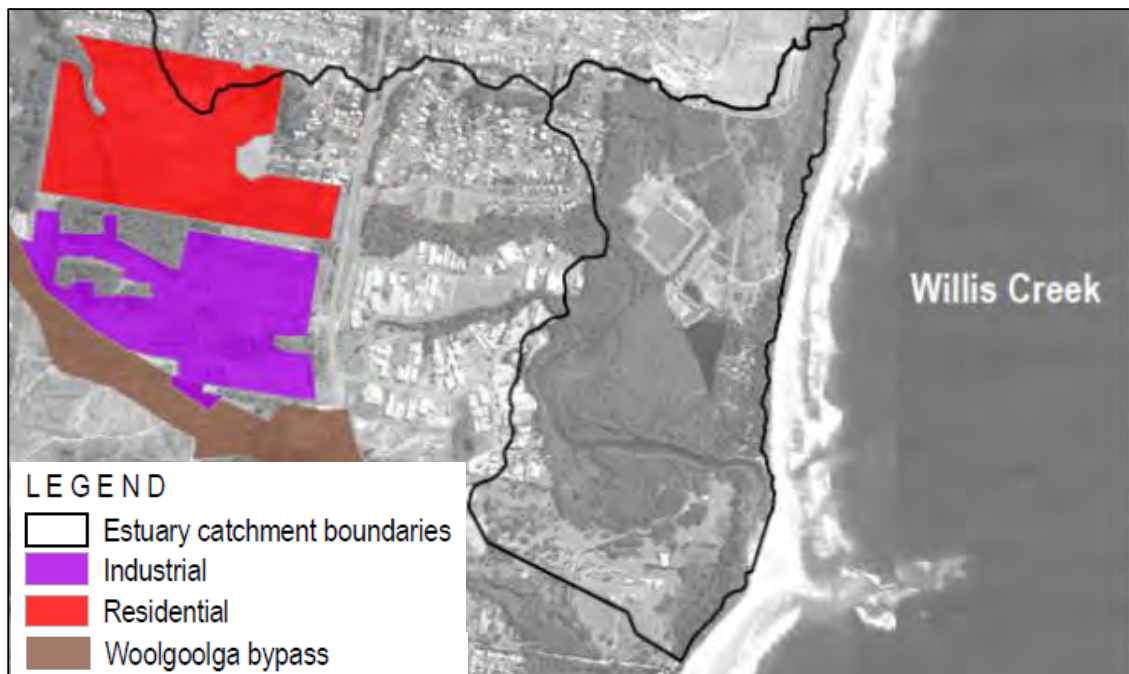
Residential and industrial land is the second largest contributor of sediment and nitrogen in the catchment. This indicates that investment into effective stormwater management could be an effective means of improving overall estuary health.

Projected future growth in the upper catchment of Willis Creek includes a "Special Investigation" area for residential and potential industrial medium term growth (2011 - 2016) – refer to **Plate E.1**. New development areas have the potential to reduce the quality of catchment runoff during and after the construction phase. It is important that controls placed on new developments are sufficient and enforced to ensure no negative net impact upon water quality.

A significant component (20%) of the estuary catchment is zoned "2E Residential Tourist" on the southern side of Willis Creek. This area currently has minimal development. The area is addressed under Council's *Hearnes Lake / Sandy Beach Development Control Plan (DCP)* (2008) which promotes sustainable development of the area including: a proposed increase in environmental protection areas

adjoining the southern side of the creek; masterplanning of low-density residential and ecotourism in existing cleared areas; and specific stormwater quality management guidelines. The Hearnes Lake / Sandy Beach DCP is considered to satisfactorily address any potential water quality issues associated with future development of this area, accordingly this is not considered a significant issue for the estuary provided the DCP measures are enforced.

Old on-site sewage management systems (septic systems) on rural and rural-residential properties also have potential to deliver excess nutrients and pathogens to the estuary system.



Source: GeoLINK *et al.* (2011)

Plate E.1 Future Industrial and Residential Growth Areas

- **Woolgoolga Water Reclamation Plant**
 The site of the Woolgoolga Water Reclamation Plant occupies a significant proportion of the Willis Creek estuary. Effluent release from the plant into the creek ceased in 2005 with the upgrade of the plant and connection to the Coffs Harbour reclaimed water reticulation system.

There is an overflow from the wet weather balance pond which overflows into Willis Creek in extreme rainfall events approximately every 5 to 10 years. The overflow is a highly diluted sewage (approx. 90% stormwater / 10% sewage) (pers. comm. A. Wilson, CHCC, 10/10/2011).
- **Decommissioned Landfill Site**
 A decommissioned landfill site is located to the east of the Woolgoolga Water Reclamation Plant. However, there are no records of this site contaminating Willis Creek.
- **Pacific Highway Upgrade**
 An additional and immediate development within the greater catchment area is the construction of the Woolgoolga bypass. It is important that water quality runoff from the construction of this major development is subject to strict controls and does not result in adverse impacts to water quality.

E.3.4.3 Water Quality Impacts Associated with Climate Change and Sea Level Rise

It is difficult to predict precisely how forecast climate change and sea level rise may impact upon water quality in Willis Creek. It is likely, however, that some existing issues might become more pronounced under climate change and sea level rise scenarios, particularly issues relating to catchment inputs.

E.3.4.4 Poor Water Quality Leading to Fish Kills and Algal Blooms

Jelliffe (1997) reported that both fish kills and algal blooms had resulted from poor water quality in Willis Creek. Nutrient enrichment as a result of many years of effluent discharge is the root cause of these issues. Refer to the previous discussion of the Woolgoolga Water Reclamation Plant in **Section E.3.4.2**.

E.3.4.4 General Lack of Water Quality Data

Water quality information was collected on a weekly basis during the period that treated effluent was released into Willis Creek. However, since the cessation of this activity in 2005, very little information has been collected making it difficult to make an informed assessment of current water quality. It also uncertain what effect, if any, runoff from the Bosworth Road Industrial Estate has upon water quality.

E.3.5 Recreational Use and Access Issues

E.3.5.1 Damage and loss of amenity from increased use

Increased recreational activity and uncontrolled pedestrian access to riparian areas of Willis Creek has the potential to damage the natural environment. Additionally, increased recreational activity has the potential to cause a loss of existing recreational amenity and sense of solitude experienced by walkers.

E.3.5.2 Lack of Appreciation of the Values of Willis Creek

Given the density of vegetation and lack of public access, the Willis Creek reserve generates little recreational activity. The natural setting attracts people seeking quiet recreational opportunities such as bird watching and bushwalking, and the creek would also be attractive to non-motorised water craft users although there are no boat launching sites near the access road. Swimming in the creek is prohibited. An issue for this estuary is therefore a lack of appreciation of the values of Willis Creek.

E.3.6 Views and Visual Character Issues

E.3.6.1 Loss of Visual Amenity

Weed infestation and fragmentation of the natural environment by uncontrolled vehicle and pedestrian movement may result in loss of visual amenity.

E.4 Ranked List of Issues

Table E.1 shows the ranked management issues in terms of their priority for management over the next five years. Five years is the expected planning timeframe for the Coastal Zone Management Plan before it undergoes review and adjustment. The ranking has been based on the scoring system below. The scoring attributed to each management option is shown in **Table E.1**.

Priorities have been allocated to management objectives based on a matrix assessment that considers:

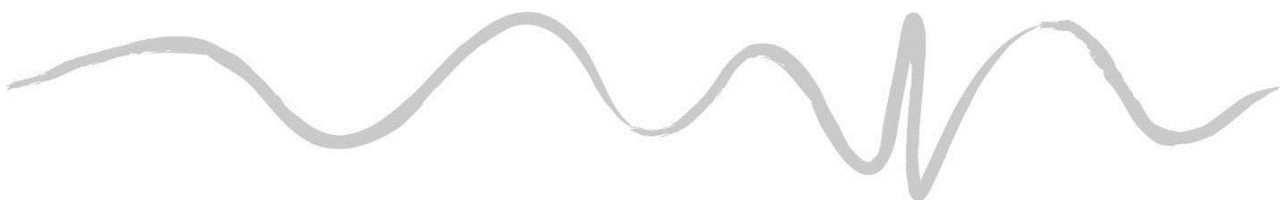
- the degree to which the management objectives will impact on estuary issues: (scoring: low = 1, moderate = 3, high = 5);
- timeframe over which the impacts are likely to occur: (scoring: short (< 3 years) = 1, medium (5-8 years) = 3, long (>10 years) = 5);
- extent of the estuary addressed by the management objective: (scoring: lower estuary = 1, middle estuary = 1, upper estuary = 1, whole estuary = 3); and
- community rating of the issues addressed by the management objectives based finding from the community survey): (scoring: not important = 0, important = 3, very important = 5).

Table E.1: Ranked List of Key Estuary Management Issues

<i>Priority</i>	<i>Key Estuary Management Issue</i>	<i>Report Reference</i>	<i>Potential for Impact on Estuary Objectives</i>	<i>Timeframe over which Impacts Occur</i>	<i>Extent of Estuary Addressed</i>	<i>Community Rating</i>	<i>Priority Score</i>
1	Stormwater Management and Pollutant Inputs from the Catchment	E.2.4.2	4	5	3	5	17
2	Elevated Turbidity, Total Nitrogen, Total Phosphorus and Chlorophyll-a Values	E.2.4.1	4	5	3	5	17
3	Environmental weeds degrading native riparian vegetation communities along the estuary banks.	E.2.3.3	3	5	3	4	15
4	Damage and Loss of Amenity from Increased Use	E.2.5.1	4	5	3	3	15
5	Lack of Appreciation of the Values of Willis Creek	E.2.5.2	4	5	3	3	15
6	Water Quality Impacts Associated with Climate Change and Sea Level Rise	E.2.4.3	3	5	3	3	14
7	Poor Water Quality Leading to Fish Kills and Algal Blooms	E.2.4.4	3	5	3	3	14
8	Impacts of Climate Change on Estuary Ecology	E.2.3.2	3	5	3	2	13
9	General Lack of Water Quality Data	E.2.4.5	2	5	3	3	13
10	Effects of Human Activities on the Little Tern Population	E.2.3.1	3	5	1	3	12
11	Loss of Visual Amenity	E.2.6.1	3	3	3	2	11
12	Impacts of Climate Change on Flooding	E.2.1.1	1	5	2	1	9
13	Shift in Entrance Location as a Result of Coastal Processes	E.2.1.2	1	5	1	1	8

Entrance Management Policy

Willis Creek Estuary
Draft for Public Exhibition



quality solutions sustainable future

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Entrance Management Policy

Willis Creek Estuary

Draft for Public Exhibition

Prepared for: Coffs Harbour City Council and
Office of Environment and Heritage
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Introduction

1.1 Reason for this Policy

The entrance to the Willis Creek estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Many ICOLL's are manually or artificially opened to the ocean by authorities to 'drain' the estuary for a range of reasons, often to reduce the impacts of flooding around the estuary foreshores. However, artificially opening ICOLL's can impact on estuary health. Therefore a policy is required to outline to Council if and when the entrance to Willis Creek estuary should be artificially opened.

1.2 The Purpose of this Policy

The purpose of this policy is to provide Council with criteria for initiating an artificial opening event and a procedure for artificial opening of the entrance of Willis Creek estuary.

1.3 Policy Statement

The Willis Creek Entrance Management Policy aims to:

- minimise interference with the natural opening and closing regime for Willis Creek estuary;
- minimise flooding of properties and infrastructure from elevated water levels in the estuary; and
- provide a procedure to address extreme water quality issues in the estuary;
- detail procedures and responsibilities for artificial opening of the estuary entrance; and
- detail procedures for monitoring following an artificial opening event.

This policy will be implemented by Coffs Harbour City Council in consultation with the appropriate NSW Government agencies.

1.4 Area to Which this Policy Applies

The area covered by this policy is shown in **Illustration 1.1**. This policy applies to the catchment of the estuary which comprises the waterway, foreshores and land adjacent to the estuary up to the tidal limit of the tributary creeks and the extent of the drainage catchment directly contributing to the estuary waterways.

1.5 Policy Context

This policy has been prepared as part of the Coastal Zone Management Plan (CZMP) for Willis Creek estuary. CZMP's for estuaries are prepared in accordance with Part 4A of the *Coastal Protection Act 1979* and the *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010). These guidelines require CZMP's for ICOLL's to include an entrance management policy.

A range of NSW legislation and policies are relevant to estuary management and the establishment of any entrance management policy and subsequent artificial opening procedures.

There may be a range of statutory approvals / licensing requirements that need to be sought in order to undertake entrance management activities, for example artificial opening. A range of approvals may be required due to potentially different land tenures, zonings and statutory provisions. These provisions may include Crown Lands licence under the NSW Crown Lands Act 1989, concurrence from NSW Fisheries for dredge and reclamation work on defined water land under the NSW Fisheries Management Act 1994, or other approvals and licences under the National Parks and Wildlife Act 1974 or the Marine Parks Act 1997.

In addition, the Environmental Planning and Assessment Act 1979 establishes the framework for development control and assessment in NSW. Certain activities may require approval under this Act and associated State Environmental Planning Policies (SEPP) (e.g. SEPP (Infrastructure) 2007). Certain works or activities may either require development consent or be exempt from requiring consent. In the case where works or activities may be exempt from requiring consent, a Review of Environmental Factors (along with all other relevant approvals / licences) would be required under Part 5 of the EP&A Act before works / activities can be carried out. This is addressed more fully in **Section 3** of this policy.

Information shown is for illustrative purposes only



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Willis Creek Entrance Management Policy
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Area to Which this Policy Applies

Illustration 1.1

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Background

2.1 Entrance Management Issues

Willis Creek is an ICOLL system that naturally alternates between being open or closed to the ocean. There are no records of artificial opening of the entrance being used since the cessation of treated effluent release into the creek in 2005. Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant present need for artificial opening for the purpose of flood mitigation.

However, sea level rise caused by climate change will result in higher flood inundation levels within the estuary in the future. Current inundation levels are likely to increase by a similar amount as sea level rise increases. Adopted sea level rise estimates for NSW are a 0.4 m increase in sea level by 2050 (relative to 1990 levels) and a 0.9 m increase by 2100. Climate change also has the potential to result in an increased frequency of high rainfall events leading to more frequent flooding events.

This may present a risk of flooding to some industrial properties at the end of Bosworth Road and potentially sewage pump station PS 5 located to the south of Nightingale Street.

2.2 Entrance Behaviour

Theory suggests that the predominant hydrodynamic state of Willis Creek is a closed entrance. However, over the period of 1973 to 2005 when the creek received a continued release of treated effluent from the Woolgoolga Water Reclamation Plant the entrance was generally open, discharging low flows across the beach.

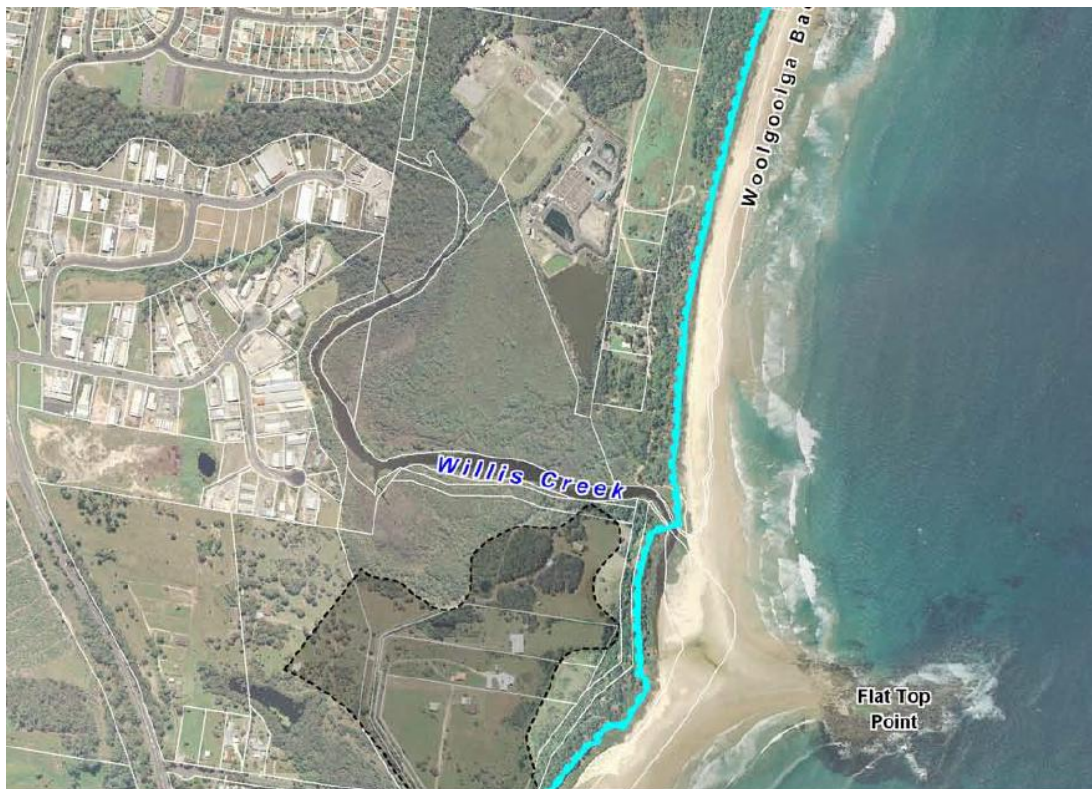
Aerial photography indicates the following in regard to entrance openings:

- 1940s and 1950s: the entrance channel was closed in the 1940s photography. In 1956 the entrance channel meandered to the south-east to discharge on the north side of the tombolo;
- 1960s and 1970s: six photos for the 1960s indicate the entrance channel was closed. Four photos for the 1970s indicate the entrance was open on three occasions and closed on the other;
- 1980s: the entrance channel was open on all photographs during the 1980s;
- 1990s: the entrance channel was open on all photographs (1994 and 1996); and
- 2000's: the entrance was closed in two photos (2000 and 2009) and open in three photographs (2001, 2006 and 2010).

2.2.1 Entrance Location

The entrance and dune along the back beach has revegetated such that the dune now has a low shrub/tree cover along its entire length. Where the creek channel used to discharge directly across the beach during high flows, it now runs to the south on the seaward face of this revegetated dune under all flow conditions. A low, hummocky sand spit has built up along the beach on the seaward side of the southerly trending channel. In the past 20 years this spit has become partly vegetated and is used for vehicular access to the beach. The creek flows across the sand tombolo (connecting to Flat Top Point) frequently discharging to the surf zone south of the tombolo and occasionally to the north (MHL, 1997).

The Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2011) indicates that shoreline recession of the beach may result in the creek entrance shifting north as indicated in **Plate 2.1**.



Source: BMT WBM, 2011.

Plate 2.1 Beach Erosion and Shoreline Recession at Willis Creek Entrance

2.2.2 Entrance Berm

The entrance berm level controlling flow into and out of the creek varied from 0.78 to 1.14 m AHD during the MHL study in 1997. The entrance berm level tends to increase during periods of higher tides and decrease during periods of lower tides (Jelliffe, 1997a).

The coastal processes assessment by BMT WBM (2011) did not assess entrance berm heights for Willis Creek. However, the nearby Hearn's Lake entrance berm reaches an estimated height of 2.0 m AHD on average, and a maximum of 2.6 m AHD (similar levels are expected at Willis Creek). The extreme scenario for entrance berm level adopted for all coastal lagoons is 3.5 m AHD, and relates to the potential height of incipient dunes should an entrance remain closed over a period of decades (BMT WBM, 2011).

2.3 Flood Mitigation

2.3.1 Mitigation for Major Flood Events

No flood study exists for Willis Creek however flood levels for 1 in 100 year event were estimated as part of the Estuary Processes Study (GeoLINK *et al.*, 2011a). The flood level estimates are shown below in **Table 2.1. Illustration 2.1** shows the 3.0 m AHD contour level to provide context for the estimated flood levels.

Drawn by: RE Checked by: TIM Reviewed by: TIM Date: May 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



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Willis Creek Entrance Management Policy
 1616050

Contour Levels Indicative of Minor Flood Levels

Illustration 2.1

Table 2.1 Estimates of Flood, Ocean, and Berm Levels for Willis Creek Entrance

	Levels (m AHD)		
	Immediate	2050	2100
Flood - 1 in 100 year storm event	2.8	3.2 ¹	3.7 ²
Elevated Ocean Levels - 1 in 20 year event ³	2.5	2.9	3.5
Elevated Ocean Levels - 1 in 100 year event ³	2.7	3.1	3.7
Entrance Berm Height – Almost Certain ⁴	1.5	1.5	1.5
Entrance Berm Height – Unlikely ⁵	2.6	3.0	3.5

Notes: 1. Immediate flood level plus 0.4m sea level rise. Source: GeoLINK *et al.* (2011a);
 2. Immediate flood level plus 0.9m sea level rise. Source: GeoLINK *et al.* (2011a);
 3. Source: BMT WBM (2011);
 4. Estimated from comparison of MHL levels and BMT WBM levels – refer to **Section 2.2.2** above.
 5. Based on BMT WBM levels for Hearn's Lake in Table 3.8 in BMT WBM (2011).

It is important to note the flood levels for major events (shown above) are likely to be independent of any artificial entrance opening works. This is due to the effect of the elevated ocean water levels which would 'over-ride' any impact of an open entrance. This can be seen by comparing the elevated ocean levels in **Table 2.1** with the estimated berm heights at the entrance. The data in **Table 2.1** shows the entrance berm heights to be significantly less than the elevated ocean levels. Therefore, artificially opening the estuary entrance will not have any impact on major (1 in 100 year) flood levels.

Therefore, as flood levels for major events are independent of entrance conditions, there is no benefit to artificially opening the estuary entrance for flood mitigation purposes for major events.

2.3.2 Mitigation for Minor Flood Events

No flood study exists for Willis Creek however it is reasonable to assume that minor flood levels will be less than 2.5 m AHD for present conditions (this equates to a 1 in 20 year elevated ocean level). The extent of inundation at a flood level of 2.5 m AHD is indicated by the 2.0 and 3.0 m AHD contours in **Illustration 2.1**. It can be seen that this flood level does not impact significantly on properties or sewer pump stations. The only impact on sewer infrastructure at this flood level is potential inundation of sewer manholes to the north and south of the cul-de-sac of Hawke Drive. This latter issue could be rectified by sealing the manhole cover against floodwater inflow.

Therefore, there is no benefit to artificially opening the estuary entrance for flood mitigation purposes for present conditions to address minor flood events as there are no properties or infrastructure significantly at risk at present.

2.4 Water Quality

Artificially opening estuary entrances is often carried out as a 'quick fix' to redress water quality problems stemming from other causes such as inadequate stormwater treatment from urban areas or inadequate erosion control measures in the catchment. Best practice for estuary management is based on addressing the source of the water quality issues rather than treating the symptoms by artificially opening entrances to 'flush' an estuary. The CZMP for Willis Creek estuary includes strategies to address the source of current water quality issues.

No recorded physico-chemical water quality data has been found for Willis Creek for the period of 2005 to 2010 since cessation of effluent release in 2005.

Faecal indicator organism samples from the Estuary Processes Study for Willis Creek (GeoLINK *et al.*, 2011) indicate the waters of Willis Creek are generally safe for primary contact recreation. Chlorophyll-a concentrations indicate that Willis Creek was eutrophic during the period of effluent release. Nutrient and sediment modelling of the estuary catchment indicates horticulture and residential lands are the main

contributors of catchment derived sediments and nutrients for Willis Creek. Current assessments of general water quality in Willis Creek indicate there is no need for artificial opening of the entrance to improve water quality under 'normal' conditions.

Nevertheless, there may be instances where artificial opening is justified to address extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the creek system. However, it is not considered practical to include triggers to address a broad range of potential water quality scenarios. A range of factors would need to be considered during a water quality crisis, such as:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue; and
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the creek.

This policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. It is recommended that any water quality crisis is assessed on an individual basis.

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Approvals

3.1 Statutory Provisions

The area of Willis Creek and any proposed entrance management works would be located within the Coffs Harbour LGA. The actual water body of Willis Creek is not zoned, but identified as "Creeks" under the Coffs Harbour Local Environmental Plan (CHLEP) 2000. Land immediately adjacent to and surrounding the defined water body of Willis Creek is zoned as 6A Open Space and Public Recreation (6A zoning affects land adjoin the entrance) and 7A Environmental Protection Habitat and Catchment under the CHLEP 2000.

Specifically, for the purpose of flooding mitigation works, Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out by or on behalf of a public authority on any land and precludes them from requiring development consent. Clause 50 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land.*
- (2) *A reference in this clause to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with flood mitigation work:*
 - (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *environmental management works.*

Specifically, for the purpose of waterway or foreshore management activities, Clause 129 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out by or on behalf of a public authority on any land and precludes them from requiring development consent.

Waterway or foreshore management activities means:

- (a) *riparian corridor and bank management, including erosion control, bank stabilisation, re-snagging, weed management, revegetation and the creation of foreshore access ways, and*
- (b) *instream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes, and*
- (c) *coastal management and beach nourishment, including erosion control, dune or foreshore stabilisation works, headland management, weed management, revegetation activities and foreshore access ways, and*
- (d) *coastal protection works, and*
- (e) *salt interception schemes to improve water quality in surface freshwater systems, and*
- (f) *installation or upgrade of waterway gauging stations for water accounting purposes*

Clause 129 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Despite clause 129A, development for the purpose of waterway or foreshore management activities may be carried out by or on behalf of a public authority without consent on any land.*
- (1a) *To avoid doubt, subclause (1) does not permit the subdivision of any land.*

- (2) *In this clause, a reference to development for the purpose of waterway or foreshore management activities includes a reference to development for any of the following purposes if the development is in connection with waterway or foreshore management activities:*
- (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *emergency works, including works required as a result of flooding, storms or coastal erosion,*
Note. Emergency coastal protection works within the meaning of the Coastal Protection Act 1979 are excluded from the operation of the EP&A Act and therefore are not development to which this clause applies.
 - (d) *environmental management works.*
- (2a) *The following provisions apply in relation to the carrying out of new coastal protection works by or on behalf of a public authority on the open coast or entrance to a coastal lake:*
- (a) *if a coastal zone management plan is in force in relation to the land on which the development is to be carried out—the public authority (or person carrying out the works on behalf of the public authority) must consider the provisions of that plan before carrying out the development,*
 - (b) *if a coastal zone management plan is not in force in relation to the land on which the development is to be carried out—the public authority (or person carrying out the works on behalf of the public authority) must:*
 - i. *notify the Coastal Panel before carrying out the development, and*
 - ii. *take into consideration any response received from the Coastal Panel within 21 days of the notification.*
- (2b) *For the purposes of subclause (2a):*
New coastal protection works means coastal protection works other than:
- (a) *the placement of sand (including for beach nourishment) or sandbags, or*
 - (b) *the replacement, repair or maintenance of any such works.*

Although flood mitigation works and waterway and foreshore management activities would be permitted without consent on any land, the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council would be required to prepare a REF for any proposed relevant works or activities, e.g. artificial opening of Willis Creek. The REF would outline the nature and extent of the proposal, what would be the trigger and determining factors for proceeding with relevant works / activities such as artificial opening and identify and address any potential environmental effects which may result from such works. Hence the REF would also include mitigation measures and safeguards for the protection of the environment during relevant works / activities. The REF would need to be consistent with the adopted CZMP and entrance management policy for Willis Creek.

In conjunction with preparation of the REF, Council would be required to consult with and seek any relevant licences and or concurrence from other state government agencies. These would include:

- Crown Lands under the Crown Lands Act 1989;
- Department of Primary Industries - Fisheries under the Fisheries Management Act 1994;
- Marine Parks Authority under the Marine Parks Act 1997;
- NSW Office of Water under the Water Management Act 2000;
- Office of Environment and Heritage (National Parks and Wildlife) under the National Parks and Wildlife Act 1974.

3.1.1 Crown Lands Act 1989

Due to the artificial opening works affecting the waterway of Willis Creek and the coastline, it is likely that such works would affect Crown Land. Artificial opening of the entrance will require authority by way of licences from the Crown under Part 4, Division 1 of the Crown Lands Act 1989.

3.1.2 Fisheries Management Act 1994

The objectives of the Fisheries Management Act 1994 are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations. The provisions of Division 3, Part 7 of the Act are likely to be relevant to any works associated with the artificial opening of Willis Creek. The provisions relate to the protection of aquatic habitat. Although flood mitigation works and waterway or foreshore management activities would be precluded from requiring consent under ISEPP, the provisions of the Fisheries Management Act 1994 are still applicable and as part of the REF process concurrence from the Department of Primary Industries (Fisheries) would be required for certain activities. **Table 3.1** outlines the relevant provisions of the Act that would apply to the artificial opening of Willis Creek.

Table 3.1 Activities requiring concurrence under the Fisheries Management Act 1994

Fisheries Management Act 1994	Sections 198-202	Concurrence is required from the Minister, Department of Primary Industries (Fisheries) for dredge and reclamation works on defined water land. The nature of artificial opening would constitute dredge works and also potentially reclamation works in watered land. Hence a permit and concurrence from s required prior to commencement of any works.
	Sections 219-220	Concurrence is required when barriers to the movement of fish including water course crossings are to be constructed or modified. Any proposed artificial opening is unlikely to create a barrier to the movement of fish. However such specifics would need to be confirmed within the REF.
	Sections 204-205	Any artificial opening works would likely be restricted to the sand berm. Any works must not affect mangroves or other protected marine vegetation. If marine vegetation would be harmed by relevant works / activities, a permit must be sought from the Minister before works commence. Clause 205 (2) states that <i>A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part.</i> The REF would need to determine if artificial opening works are likely to affect mangroves or other protected marine vegetation.
	Schedules 4, 4A, 5 and 6	The REF prepared for works associated with artificial opening would need to consider any presence of local threatened aquatic habitat for flora or fauna. Thus Key Threatening Processes (KTPs) would need to be considered in preparation of the REF. The following KTPs may be relevant and required consideration: <ul style="list-style-type: none"> ▪ <i>Degradation of native riparian vegetation along NSW water courses.</i> ▪ <i>Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.</i>

3.1.3 Marine Parks Act 1997

As Willis Creek forms park of the Solitary Islands Marine Park, Council would be required to obtain a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 in order to undertake any works on land affected by the Marine Park and any associated zoning. Preparation of the REF would need to consider these factors and seek the relevant concurrence / permit.

3.1.4 Water Management Act 2000

A controlled activity approval under the Water Management Act 2000 (WM Act) is required for certain types of developments and activities that are carried out in or near a river, lake or estuary (water land). Under the WM Act, a controlled activity means:

- the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
- the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or
- the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- the carrying out of any other activity that affects the quantity or flow of water in a water source.

Artificial opening of Willis Creek would constitute a controlled activity under the WM Act. However under the Water Management (General) Regulation 2011, Clause 38 Controlled activities—public authorities, states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.*

Although Coffs Harbour City Council would be exempt from requiring a Controlled Activity Approval, Clause 37, *Condition applying to all exemptions under this Subdivision*, of the Regulations states: *An exemption conferred under this Subdivision is subject to the condition that the person by whom the relevant controlled activity is carried out must comply with applicable requirements (if any) of the Minister that are published in the Gazette, or notified in writing to the person, for the purposes of this clause and that are for the protection of:*

- (a) *the waterfront land on which the activity is carried out, or*
- (b) *any river, lake or estuary to which that land has frontage.*

3.1.5 National Parks and Wildlife Act 1974

The Willis Creek system falls within the Coffs Coast Regional Park. The park was created through a partnership of Council and the National Parks and Wildlife Service (now within OEH). The National Parks and Wildlife Act 1974 applies if the park is a reserve made under the Act. The Park's management is guided by a Trust Board. Preparation of an REF for artificial opening works would need to determine whether or not the park is a reserve under the Act and hence consultation / concurrence are required with OEH / National Parks and Wildlife Service. Consultation with the Trust Board would be required whether or not the park is affected by the Act. The REF would also need to consider any management plan that has been prepared for the park.

3.2 Summary of Potential Approvals

Works / activities for the purpose of flood mitigation or waterway / foreshore management (to address an extreme water quality issue) would be permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed works / activities (e.g. artificial opening of the entrance to Willis Creek estuary). The REF needs to be consistent with the adopted CZMP and entrance management policy for Willis Creek estuary.

Preparation of the REF will involve consultation with relevant state government agencies. This will confirm the necessary approvals and licences required for artificial opening of the entrance. Preliminary assessment indicates the following approvals and licences may be necessary:

- a license from the Department of Crown Lands under the Crown Lands Act 1989;
- a permit and concurrence from the Minister, Department of Department of Primary Industries (Fisheries) under the Fisheries Management Act 1994 pursuant to Sections 198-202 for dredge and reclamation works on defined water land (the nature of artificial opening would constitute dredge works and also potentially reclamation works); and
- a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 as Willis Creek forms park of the Solitary Islands Marine Park.

The Willis Creek system falls within the Coffs Coast Regional Park, which was created through a partnership of Council and the National Parks and Wildlife Service. Consultation with the National Parks and Wildlife Service and Trust Board is required to determine if any approvals are required under the National Parks and Wildlife Act 1974.

It is noted that a Controlled Activity Approval under the Water Management Act 2000 is not required due to the Water Management (General) Regulation 2011, Clause 38 Controlled activities - public authorities, which states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.* However, Council is still required to follow any applicable guidelines of NSW Office of Water under the Water Management Act 2000.

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Artificial Opening Procedure

4.1 Decision Making Process

This policy presently only recommends artificial opening of the Willis Creek estuary entrance in the event of extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the creek system. However, the decision to initiate an artificial opening event will be based on assessment of each individual circumstance of an extreme water quality issue with consideration of:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue; and
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the creek.

As noted in **Section 2.3**, this policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. Determining what constitutes an extreme water quality issue would include reference to water quality monitoring results for Willis Creek to determine if the issue is 'outside' normal water quality variations for the creek system.

The general decision making process / procedure for determining if artificial opening is to be employed to address an extreme water quality issue is shown in the flow chart in **Illustration 4.1** and involves:

- Following warning of potential extreme water quality issues Council's designated officer will alert relevant state government agencies of the issues and potential for an artificial opening event;
- Council's designated officer will then conduct a site assessment and/or review of water quality monitoring data to determine in consultation with relevant state government agencies if artificial opening is an appropriate response;
- If artificial opening is considered an appropriate response Council's designated officer will initiate deployment of Council's personnel and machinery to the entrance and direct when and where artificial opening is to be initiated. Ideally, the artificial opening should be initiated during a falling tide and shortly after the tide turns from high to low (if possible around a spring tide when tidal fluctuations are larger).

4.2 Responsibilities for Artificial Opening

Coffs Harbour City Council is responsible for artificial opening of the entrance.

4.3 Monitoring

When artificial openings have been carried out, monitoring of the entrance should be undertaken to determine the efficiency of the opening. For each artificial opening event, the following data will be tested / recorded:

- prior to opening:
 - testing of water quality parameters relevant to the specific water quality issue;
 - survey water level of creek prior to opening;
- date and time of opening;
- survey water levels of creek over 24 hours following opening;

- testing of water quality parameters relevant to the specific water quality issue over 24 hours and at appropriate intervals following 24 hours after the opening;
- location and length of excavation;
- approximate width and depth of initial channel;
- ocean swell conditions (wave height and direction);
- preceding rainfall;
- date of closure;
- digital photographs.

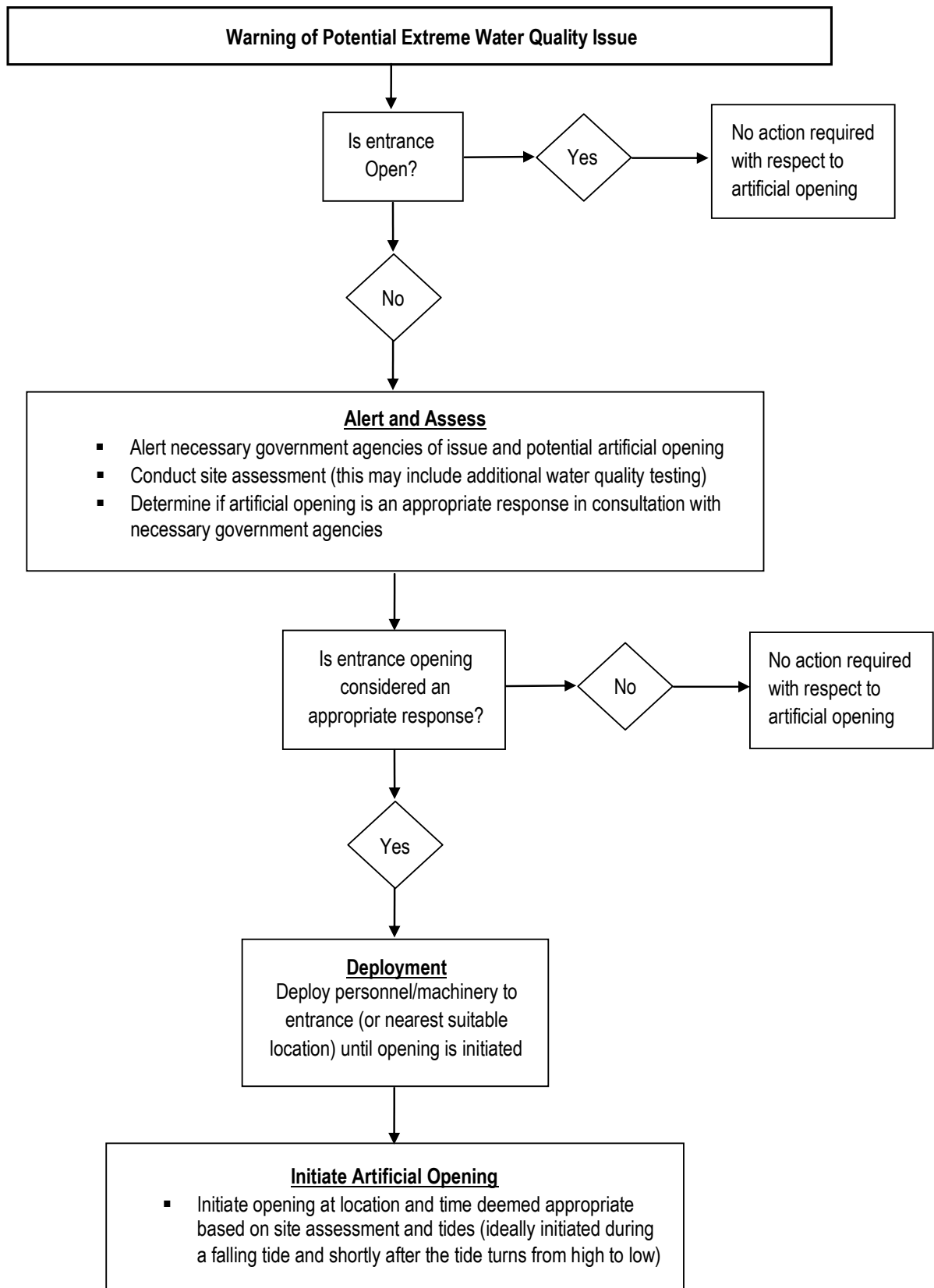


Illustration 4.1 Artificial Opening Decision Making Flowchart

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Policy Updates

5.1 Review and Update of this Policy

This Policy and the associated REF should be reviewed every five years or in response to:

- legislation changes; and
- any other significant factors relevant to artificial opening of the entrance of Willis Creek estuary.

Review of the policy will include analysis of all monitoring data collected over that period to assess if the assumptions and procedures outlined in the current policy and REF are correct or appropriate. This will include a review of changes to climate change and sea level rise predictions and consequent impacts to this policy.

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Acronyms

AHD	Australian Height Datum
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CHLEP	Coffs Harbour Local Environmental Plan
CZMP	Coastal Zone Management Plan
ICOLL	Intermittently Closed and Open Lake and Lagoon
ISEPP	State Environmental Planning Policy (Infrastructure), 2007
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory
PS	Pump Station
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy



Darkum Creek Estuary Coastal Zone Management Plan

Draft for Public Exhibition



Coffs Harbour City Council has prepared this document with financial assistance from the NSW Government through the Office of Environment and Heritage. This document does not necessarily represent the opinions of the NSW Government or the Office of Environment and Heritage.

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Coastal Zone Management Plan Darkum Creek Estuary Draft for Public Exhibition

Prepared for: Coffs Harbour City Council and
Office of Environment and Heritage
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- E Summary of Development of Management Objectives and Issues

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Executive Summary

This draft Coastal Zone Management Plan (CZMP) describes proposed actions to be implemented by Coffs Harbour City Council, other public authorities and the private sector to address priority management issues for the Darkum Creek estuary. The area addressed by this CZMP comprises the Darkum Creek waterway and tributaries, foreshores and the catchment draining to the estuary up to the tidal limit of the creek and its tributaries. The CZMP also considers issues associated with the wider catchment upstream of the tidal limit.

Darkum Creek is a relatively small and remote coastal estuary and is part of the Solitary Islands Marine Park. Darkum Creek is an Intermittently Closed and Open Lakes and Lagoon (ICOLL) meaning the entrance naturally alternates between being open or closed to the ocean. The entrance is predominantly closed.

There is significant water-based activity with kayaking, canoeing and fishing in the creek. The Woolgoolga Returned Services Golf Course adjoins a large section of Darkum Creek. The primary land-based recreational activity aside from golf is generated by the coastal walk which is facilitated by the pedestrian footbridge across the creek. The bridge enables a continuous pedestrian and cycle route which follows the coastline and connects the residential communities of Arrawarra in the north to Woolgoolga in the south. The walk offers an easy, convenient and safe pedestrian corridor through a generally undisturbed and attractive natural coastal setting.

The total catchment area of Darkum Creek is relatively small and comprises State Forest, banana plantations and blueberry farms in the upper limits of the catchment, large areas of cleared agricultural land in the mid-catchment. The Woolgoolga Returned Services Golf Course comprises a large portion of the estuary catchment. The Safety Beach residential area is situated in the southern portion of the estuary catchment. The eastern fringe of the estuary catchment is located in the Coffs Coast Regional Park.

Identification of key estuary management issues and development of management strategies has been undertaken based on technical studies and consultation with the community and key stakeholder organisations. Consultation has included community workshops in 2010 and 2011, a community survey in 2011.

Estuary Management Issues

The key estuary management issues for the estuary relate to:

- management of sediment, nutrient and other pollutant inputs from the catchment;
- protecting the native riparian vegetation from threats such as uncontrolled access and environmental weeds which reduce the ecological value and potentially impact upon bank stability, recreational amenity and aesthetics;
- climate change impacts (particularly sea level rise and consequent lake water level increases) on the estuarine ecology and water quality;
- preserving the natural values of the estuary and maintaining low key recreational activities such as kayaking, fishing, and bush walking with a minimal the level of support and infrastructure; and
- increased flooding risks to properties and infrastructure caused by sea level rise.

Estuary Management Strategies

A range of potential management strategies have been developed, prioritised and detailed to address the key issues. These strategies are summarised in the following Implementation Schedule. The key management strategies include:

- continue educational and incentive schemes that address the management of soil resources and pesticide / herbicide / fertiliser use in agricultural activities, encourage establishment of vegetated riparian zones on farm watercourses;
- ensuring grounds management practices at Woolgoolga Returned Services Golf Course are complementary with the creeks natural values. This may involve formalising a defined edge between the fairways and the creek foreshores if necessary to reduce mowing/maintenance impacts on the riparian buffer;
- control significant land modification activities on rural lands by enforcing development consent where required under Council's Local Environmental Plan to enforce erosion and sediment controls for significant earthworks;
- a weed management strategy which targets priority environmental weeds in high value riparian areas;
- raising awareness in the local community of the importance of native riparian vegetation and aquatic habitats along the banks and foreshore of Darkum Creek;
- maintain the existing minimum level of access and recreational activity to preserve the natural values of the creek environment by providing simple additional infrastructure where necessary to support and enhance existing low levels of passive recreational activity. Undertake restoration works on an as-needs basis to sustain the significant and dominant natural values of the estuary environment; and
- incorporate discrete interpretive signage to enhance visitor appreciation and enjoyment of the site's natural values.
- implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise;
- continuing the Ecohealth monitoring program for Darkum Creek; and
- implementing a formal Entrance Management Policy for Darkum Creek with the aim to minimise interference with the natural opening and closing processes of the creek entrance whilst mitigating the impacts of future sea level rise induced flooding of properties and infrastructure.

Implementation Schedule

The proposed management strategy actions are detailed in the following Implementation Schedule. Included in the schedule is:

- the lead agency responsible for executing the strategy action (other relevant support agencies are included in the strategy action details in the main body of the CZMP);
- the timeframe for implementing the strategy action. The year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP (refer to strategy action details in the main body of the CZMP with respect to monitoring of each action);
- The strategy actions are listed in general order of priority with a specific priority assigned to each strategy action in terms of "very high", "high", "medium" or "low" priority.

Prior to implementation of the Darkum Creek estuary strategy actions Council will need to review to ensure consistency with the Coastal Zone Management Plan for the Coffs Harbour coastline and consistency with the Regional Park Management Plan.

Implementation Schedule

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
Strategy 1 - Stormwater Management and Catchment Pollutants						
1.1	Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities	DPI – Agriculture NSW	Year 1	\$5,000 per workshop for preparation, materials and delivery.	<ul style="list-style-type: none"> ▪ Caring for Our Country ▪ CHCC Environmental Levy ▪ NRCMA ▪ OEH - Environmental Education Grants 	High
1.2	Encourage horticultural landowners to uptake incentives program for Best Practice Management	NRCMA	Years 1 – 5	<ul style="list-style-type: none"> ▪ Staff budget time for coordinating uptake of the incentives program ▪ \$20,000 pa for incentives funding from CHCC Environmental Levy ▪ \$20,000 pa for incentives funding from NRCMA. 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ NRCMA – Best Practice Management Horticultural Program 	Very High
1.3	Stormwater management for urban development	CHCC	Review policy and guidelines every 5 years	Part of Council's operational budget	n/a	Medium
1.4	Woolgoolga Returned Services Golf Course – ensure maintenance practices are complementary with the creeks natural values	CHCC	Years 1 – 5	Part of Council's operational budget for initial consultation	Caring for Our Country for any necessary planting / establishment of defined maintenance boundary	Very High

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
1.5	Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management	NRCMA	Years 1 – 5	Part of cost listed in Strategy Action 1.2.	Same funding as listed in Strategy Action 1.2.	Very High
1.6	Control land modification activities on rural lands	CHCC	Year 1	Unknown additional staffing resources and additional costs to Council's operational budget	n/a	Very High
Strategy 2 - Riparian Vegetation						
2.1	Raise awareness in the local community of the importance of native riparian vegetation and aquatic habitats along the banks and foreshore of Darkum Creek	CHCC	Years 1 - 2	Staff time Minimal cost for distribution of existing materials	<ul style="list-style-type: none"> ▪ CHCC operating budget ▪ MPA - SIMP operating budget ▪ NSW Estuary Management Program 	Medium
2.2	Develop a weed management strategy which prioritises riparian areas and priority weeds to be targeted	CHCC	Years 1 - 2	Strategy development ~ \$5,000 if done external to CHCC.	NRCMA will fund the development of a recognised NRM Plan up to a total cost of \$5,000.	Very High
2.3	Undertake primary weed control in priority areas using specialist bush regeneration contractors	CHCC	Years 2 – 5	Subject to Weeds Management Strategy under Strategy Action 2.2 If external contractors are to be used, funds required is subject to the Weed Management Strategy but	<ul style="list-style-type: none"> ▪ NRCMA funding for implementation of recognised NRM Plans. ▪ Environmental Trust Restoration and 	Very High

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
				initially estimated at 200 hours per year @ \$35/hr (\$7,000/yr) over 5 years.	Rehabilitation grants. <ul style="list-style-type: none"> ▪ Grants through NSW Government for weed control works on Crown Lands. ▪ CHCC Environmental Levy. 	
2.4	Foster a local Bushcare group to undertake the secondary control or follow-up maintenance of areas treated by contractors	CHCC	Long term commitment required to support community groups	Dependent on activities, but generally limited to provision of tools, consumables, and support.	Support available through Coffs Landcare Network. Funding available through NRCMA where a recognised NRM plan exists (such as that formed under Strategy Action 2.2) any other grants available from time to time such as Environmental Trust Community Bush Regeneration and/or Restoration and Rehabilitation Grants.	Medium
Strategy 3 – Water Quality						
3.1	Minimise domestic pet faecal inputs to the waterway	CHCC	Years 2 – 3	Staff time Installation of units \$1500 p/unit Maintenance of units \$1000 per unit	CHCC Environmental Levy	Low

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
				p/annum		
Strategy 4 - Urban Development - Strategy Action 1.3 (Stormwater management for urban development) is considered adequate to address this issue. No further actions are proposed to address this issue.						
Strategy 5 – Aquatic Habitats - The following actions from other strategies are considered adequate to address the issue of loss of aquatic habitats:						
<ul style="list-style-type: none"> ▪ Strategy Action 1.4 Woolgoolga Returned Services Golf Course – ensure maintenance practices are complementary with the creeks natural values; ▪ Strategy Action 2.1 to raise awareness in the local community of the importance of aquatic habitats along the and foreshore of Darkum Creek; ▪ Strategy 1 actions to reduce the inputs of sediment from the catchment to maximise the opportunities for the recruitment of seagrass to the system. 						
Strategy 6 – Climate Change Impacts on Water Quality						
Addressing current issues in accordance with Strategy 1 actions will be the best preparation for the impacts of climate change on water quality. No further actions are proposed to address this issue.						
Strategy 7 - Recreational Use						
7.1	Maintain the existing minimum level of access and recreational activity to preserve the natural values of the creek environment	CHCC	Ongoing	Staff time	CHCC operating budget	High
7.2	Incorporate additional interpretive signage within the estuary area	CHCC	Years 1 – 2	\$2,000 for signage	<ul style="list-style-type: none"> ▪ CHCC operating budget ▪ Caring for Our Country ▪ CHCC Environmental Levy 	Medium
Strategy 8 - Climate Change Impacts on Estuary Ecology						

Strategy Action No.	Description	Lead Agency (refer to strategy details for related agencies)	Timeframe	Cost	Potential Funding Sources	Priority
8.1	Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise	CHCC	Years 1 – 2	Staff time	CHCC operating budget	High
Strategy 9 - Water Quality Monitoring						
9.1	Continue to implement the Ecohealth water quality monitoring program for Darkum Creek	CHCC	Ongoing	\$20,000 every 4 years	<ul style="list-style-type: none"> ▪ CHCC operating budget ▪ MPA - SIMP: in kind assistance 	Medium
<p>Strategy 10 – Visual Amenity - The following actions from other strategies are considered adequate to address the issue of preserving and enhancing the visual amenity of Darkum Creek estuary:</p> <ul style="list-style-type: none"> ▪ Strategy Action 1.4 Woolgoolga Returned Services Golf Course – ensure maintenance practices are complementary with the creeks natural values; ▪ Strategy Action 2.3 to develop a weed management strategy which prioritises riparian areas and priority weeds to be targeted which will assist in maintaining the existing natural character of the estuary; ▪ Strategy Action 7.1 to provide simple additional infrastructure where necessary to support and enhance existing low levels of passive recreational activity and undertake restoration works on an as-needs basis to sustain the significant and dominant natural values of the estuary environment; ▪ Strategy Action 7.2 to address the need for interpretive information to enhance visitor enjoyment and appreciation of the creek’s natural values. 						
Strategy 11 - Entrance Management						
11.1	Address flooding risks that have the potential to trigger artificial opening of the entrance in the future	CHCC	Years 1 –5 for audit and assessment	Audit and assessment: \$10,000 Augmentation works:	NSW Government Estuary Management Program	Low

Strategy Action No.	Description	Lead Agency <i>(refer to strategy details for related agencies)</i>	Timeframe	Cost	Potential Funding Sources	Priority
			Years 5 – 25 for relocate, replace or modify essential services and assets	dependant on proposed works		
11.2	Prepare a Review of Environmental Factors for artificial opening of the entrance to Darkum Creek estuary	CHCC	Years 1 – 5	Staff time	CHCC operating budget	Low
11.3	Refine, adopt and implement Darkum Creek Entrance Management Policy	CHCC	Years 1 – 5	Staff time for adoption of policy.	CHCC operating budget	Low
11.4	Raise community awareness of the natural opening and closing regime of Darkum Creek	CHCC	Years 1 – 5	Included in the costs in Strategy Action 7.2	Caring for Our Country	Low

Introduction

This document presents a draft Coastal Zone Management Plan (CZMP) for Darkum Creek estuary. The primary purpose of this CZMP is to describe proposed actions to be implemented by Coffs Harbour City Council, other public authorities and the private sector to address priority management issues for the Darkum Creek estuary. These management issues relate to:

- risks to public safety and built assets;
- pressures on estuary health; and
- community uses of the estuary.

The area addressed by this CZMP comprises the Darkum Creek waterway and tributaries, foreshores and the catchment draining to the estuary up to the tidal limit of the creek. The CZMP also considers issues associated with the wider catchment upstream of the tidal limit. The Darkum Creek estuary is shown below and the extents of this area are mapped overleaf in **Illustration I.1**.



Source: NSW Office of Environment and Heritage

Plate I.1 Aerial Image of Darkum Creek Estuary (in foreground)

Background

In 2010, Coffs Harbour City Council (Council) and Office of Environment and Heritage (OEH) engaged GeoLINK in association with Aquatic Science and Management and GECO Environmental to develop a CZMP for Darkum Creek estuary. Council's Coastal Estuary Management Advisory Committee's goal for the CZMP is to "to assist Council in achieving an integrated, balanced, responsible and ecologically sustainable use of the Darkum Creek Estuary."

Information shown is for illustrative purposes only



Geographical Extent of Coastal Zone Management Plan

Coastal Zone Management Plan - Darkum Creek Estuary
1616414

Illustration I.1

Development of this draft CZMP has included the following preliminary phases: literature and information review; technical study of the relationship between the estuary processes, external influences and issues of concern; community uses assessment and development of key management objectives and issues. These preliminary studies are reported in the following documents:

- *Data Compilation and Estuary Processes Study – Darkum Creek, Woolgoolga Lake and Willis Creek* (GeoLINK et al., 2011a); and
- *Estuary Management Study – Darkum Creek* (GeoLINK et al., 2011b).

Summaries of these preliminary phases are contained in:

- **Appendix C** – summary of literature and information review and technical study of estuary processes;
- **Appendix D** – summary of community uses assessment; and
- **Appendix E** – summary of development of key management objectives and issues.

Consultation

Community and stakeholder consultation was undertaken to gain input to the development of management action for Darkum estuary. Consultation has included community workshops in 2010 and 2011, a community survey in 2011 and liaison with relevant stakeholders.

Addressing Coastal Management Principles

The notes below describe how this CZMP has considered the relevant Coastal Management Principles as detailed in the *Guideline for Preparing Coastal Zone Management Plans* (DECCW, 2010).

Principle 1: *The Plan will consider the objects of the Coastal Protection Act 1979 and the goals, objectives and principles of the NSW Coastal Policy 1997 and the NSW Sea Level Rise Policy Statement 2009.*

The NSW Coastal Policy deals with population and economic growth whilst protecting the natural, cultural, heritage and spiritual values of the coastal environment. The policy has a strong focus on the principles of Ecologically Sustainable Development. The NSW Coastal Protection Act 1979 aims to protect, enhance, maintain and restore the environment with concern for both the natural and built environments. These principles formed the basis of development and prioritisation of management strategies for Darkum Creek estuary.

The benchmarks and guidelines in the *NSW Sea Level Rise Policy Statement 2009* have been considered in development of the entrance management policy, and in relation to climate change impacts on estuary ecology, hydrodynamics and community infrastructure.

Principle 2: *Optimise links between plans relating to the management of the coastal zone.*

Development of this CZMP including the literature review component has considered Council's Coastal Processes and Hazard Definition Study and Coastal Zone Management Study for the coastline, Council's Climate Change Mitigation and Adaptation Action Plan and other studies and management plans related to Darkum Creek estuary.

Principle 3: *Involve the community in decision-making and make coastal information publicly available.*

As indicated above, community consultation was undertaken to gain input to the development of management action for Darkum Creek estuary including community workshops in 2010 and 2011, and a community survey in 2011 and liaison with relevant stakeholders.

Principle 4: *Base decisions on the best available information and reasonable practice; acknowledge the interrelationship between catchment, estuarine and coastal processes; adopt a continuous improvement management approach.*

The estuary processes study component of the CZMP considered the above issues. Development of management strategies has included a continuous improvement management approach such as the measures outlined in respect to climate change impacts on flooding to minimise the future need for artificial opening events.

Principle 5: *The priority for public expenditure is public benefit; public expenditure should cost effectively achieve the best practical long-term outcomes.*

Development of strategies and priorities has included consideration of public expenditure.

Principle 6: *Adopt a risk management approach to managing risks to public safety and assets; adopt a risk management hierarchy involving avoiding risks where feasible and mitigation where risks cannot be reasonably avoided; adopt interim actions to manage high risks while long-term options are implemented.*

This principle is not directly applicable to the issues for the Darkum Creek estuary.

Principle 7: *Adopt an adaptive risk management approach if risks are expected to increase over time, or to accommodate uncertainty in risk predictions.*

This principle is not directly applicable to the issues for the Darkum Creek estuary.

Principle 8: *Maintain the condition of high value coastal ecosystems; rehabilitate priority degraded coastal ecosystems.*

Development and prioritisation of strategies has considered the above approach such as management of environmental weeds which has been prioritised for riparian vegetation classified as either 'good' or 'very good' condition.

Principle 9: *Maintain and improve safe public access to beaches and headlands consistent with the goals of the NSW Coastal Policy.*

This principle is not directly applicable to the issues for Darkum Creek estuary, however, actions under Strategy 7 address the provision of recreational infrastructure.

Principle 10: *Support recreational activities consistent with the goals of the NSW Coastal Policy.*

Strategy 7 in this CZMP directly addresses recreational activities related to Darkum Creek estuary.

Key Values of Darkum Creek Estuary

The natural settings of the estuaries and coast within the Mid North Coast are a feature that attracts visitors and locals to the area. Darkum Creek is in keeping with this natural setting, and forms part of the network of bushland settings along the coast and estuaries and are of local and broader significance due to its proximity to residential community of Safety Beach. The creek is part of the Solitary Islands Marine Park and is zoned as a Habitat Protection Zone up to the tidal limit.

Darkum Creek is a relatively small and remote coastal estuary and offers the following recreational values:

- significant water-based activity including kayaking, canoeing and fishing in the creek;
- the significant riparian vegetation promotes a sense of seclusion and enhances the natural experience for water-based activities such as canoeing;

- a coastal walk which is facilitated by the pedestrian footbridge over the creek enabling a continuous pedestrian and bicycle route following the coastline and connecting the residential communities of Arrawarra in the north to Woolgoolga in the south; and
- to the east of the footbridge is a corridor of undisturbed natural vegetation following the southern downstream section of the creek to its mouth, which is part of the Coffs Coast Regional Park. This area comprises dense coastal vegetation and contains no known tracks, and is likely to attract people seeking quiet recreational opportunities such as bird watching and bushwalking.

Darkum Creek offers a predominantly undisturbed natural environment that forms an integral and important component of the natural settings along the coastline. It offers the following scenic values:

- the creek and its foreshores contribute significantly to the character and amenity of the surrounding residential communities;
- the creek has short reaches and heavily vegetated foreshores which offer considerable shelter from prevailing winds. The resulting tranquil water combined with the surrounding riparian vegetation offer considerable scenic amenity;
- the creek itself is largely only visible from the footbridge which offers an excellent vantage point in both upstream and downstream directions;
- an attractive long distant view across a downstream reach of the creek is also available from its mouth at Safety Beach; and
- the creek is also likely to be visible through openings in vegetation from the adjoining golf course.

The ecological health of the Darkum Creek estuary is good with respect to water quality, estuarine habitats, riparian vegetation, structural habitat availability for aquatic fauna and the absence of fish kills and algal blooms. The riparian vegetation is mostly intact with over 85% in either good to very good condition. The creek includes significant mangrove habitat showing active recruitment and a small area of saltmarsh in relatively good condition.

The entrance to the Darkum Creek estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons. The predominant state of the Darkum Creek entrance is closed.

Key Management Issues

The key estuary management issues that have been identified relate to:

- sediment, nutrient and other pollutant inputs from the catchment;
- protecting the native riparian vegetation (which is generally in good condition) from threats such as uncontrolled access and environmental weeds which reduce the ecological value and potentially impact upon bank stability, recreational amenity and aesthetics;
- climate change impacts (particularly sea level rise and consequent lake water level increases) on the estuarine ecology and water quality;
- preserving the natural values of the estuary and maintaining low key recreational activities such as kayaking, fishing, and bush walking with a minimal the level of support and infrastructure; and
- increased flooding risks to properties and infrastructure caused by sea level rise.

Key Management Strategies

Key management strategies for Darkum Creek estuary include:

- continue educational and auditing strategies that address the management of soil resources and pesticide / herbicide / fertiliser use in agricultural activities in the upper catchment;
- ensuring grounds management practices at Woolgoolga Returned Services Golf Course are complementary with the creeks natural values. This may involve formalising a defined edge between the

fairways and the creek foreshores if necessary to reduce mowing/maintenance impacts on the riparian buffer;

- incorporating adequate riparian buffer widths into the planning framework for rural properties;
- a weed management strategy which targets priority environmental weeds in high value riparian areas;
- raising awareness in the local community of the importance of native riparian vegetation and aquatic habitats along the banks and foreshore of Darkum Creek;
- provide simple additional infrastructure where necessary to support and enhance existing low levels of passive recreational activity. Undertake restoration works on an as-needs basis to sustain the significant and dominant natural values of the estuary environment; and
- incorporate discrete interpretive signage to enhance visitor appreciation and enjoyment of the site's natural values.
- assessing available corridors for upslope migration of mangrove and saltmarsh colonies in response to sea level rise and making appropriate changes to planning instruments in order to protect saltmarsh and mangroves from future impacts associated with sea level rise;
- a water quality monitoring program for Darkum Creek; and
- implementing a formal Entrance Management Policy for Darkum Creek with the aim to minimise interference with the natural opening and closing processes of the creek entrance whilst mitigating the impacts of future sea level rise induced flooding of properties and infrastructure.

The management strategies in this document are presented in general order of priority (Strategy 1 being the highest priority). Specific priorities have also been assigned to each strategy action in terms of “very high”, “high”, “medium” or “low” priority. The priorities and timeframes provided in this CZMP are indicative and are to be used to guide the order of implementation. Priorities were established in response to:

- the degree to which the management strategies will impact on estuary issues;
- timeframe over which the strategy impacts will extend (the longer the better);
- extent of the estuary addressed by each management strategy;
- community rating of issues addressed by each management strategy (based on a community survey); and
- likely cost of effective implementation of the management strategy.

Coffs Harbour 2030 Plan

The Coffs Harbour 2030 Plan (CHCC, 2009), a strategic plan for the Coffs Harbour community (‘the 2030 Plan’), was adopted by Council in December 2009. The 2030 Plan is driven by the Community Vision 2030 and outlines the steps needed to create a sustainable future for Coffs Harbour LGA. It is the overarching plan that integrates planning and reporting frameworks, while mapping out the community’s aspirations for the future of the Coffs Harbour LGA to 2030 and beyond.

This CZMP is consistent with the aspirations of the Coffs Harbour community as articulated in the 2030 Plan. The 2030 Plan covers five themes including *Moving Around* and *Looking after our Environment* which are more directly applicable to this CZMP. The 2030 Plan outlines outcomes, objectives and actions for each theme. The actions applicable to this CZMP are listed in **Table I.1** below. The final two columns of the table list the CZMP strategy actions that address the listed 2030 Plan strategies.

Table I.1 – Coffs Harbour 2030 Plan

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
MA2 Many of us walk and cycle from place to place	MA2.2 We have constructed an interconnected network of cycle ways, footpaths and	MA 2.2.1 Work in partnership to provide cycle ways and footpaths.	7.1	Existing cycleways and footpaths are generally considered adequate – Strategy

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
	walking tracks that connect our urban communities, hinterland and coastal villages.			7.1 involves maintaining the existing minimum level of access and recreational activity to preserve the natural values of the creek environment
LE1 We understand and value our unique natural environment and its cultural connections	LE1.3 We have many opportunities for nature experiences and learning through improved access to natural areas.	LE1.3.1 Promote connection to the environment through learning in the environment.	2.1	Raise awareness of the importance of native riparian vegetation and aquatic habitats along the banks and foreshore of Darkum Creek
			7.2	Interpretive signage
		LE1.3.2 Create and extend walking trails and other opportunities for environmental experiences.	7.1	Refer to comments above for MA 2.2.1
LE2 We protect and restore our environment to conserve its unique biodiversity for future generations	LE2.1 Our forests, beaches, headlands, ocean, rivers, forested mountain backdrop, plants and animals are conserved for future generations.	LE2.1.1 Ensure land use management policies and practices conserve the region's unique environmental and biodiversity values.	Strategy 1 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities Ensure golf course maintenance practices are complementary with the creeks natural values Urban stormwater management
			Strategy 2 actions	Environmental weed strategy for riparian corridor
		LE2.1.2 Enhance protection of our marine areas and manage for change.	Strategy 1 actions	As above with respect to Strategy 1 actions
			8.1	Buffers to enable aquatic habitats to respond to sea level rise
		LE2.1.3 Maintain and conserve biodiversity through protected reserve systems and other land conservation mechanisms.	8.1	Buffers to enable aquatic habitats to respond to sea level rise
	LE2.1.5 Implement climate change planning, adaptation and mitigation strategies.	8.1	Buffers to enable aquatic habitats to respond to sea level rise	
			Strategy 11	Address increased flooding risks from

<i>Coffs Harbour 2030 Plan</i>			<i>Related CZMP Strategy</i>	
<i>Outcome</i>	<i>Objective</i>	<i>Strategy</i>	<i>Strategy Action No.</i>	<i>Description</i>
			actions	sea level rise that will impact on artificial entrance openings
	LE2.2 We have active programs to restore and improve our environment.	LE2.2.2 Manage our catchments effectively and adaptably.	Strategy 1 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities Ensure golf course maintenance practices are complementary with the creeks natural values Urban stormwater management
		LE2.2.3 Build ecosystem resilience through a system of local and regional habitat corridors.	Strategy 2 actions 5.1	Management of riparian vegetation Buffers to enable aquatic habitats to respond to sea level rise
LE3 We manage our resources and development sustainably.	LE3.1 We are responsible in the use and management of our natural resources and work to reduce our ecological footprint.	LE3.1.2 Use best practice to prevent pollution impacts on our environment.	Strategy 1 actions	Best Practice Management for soil management and pesticide, herbicide and fertiliser use in agricultural activities Ensure golf course maintenance practices are complementary with the creeks natural values Urban stormwater management

Coffs Harbour Coastal Zone Management Plan

Council is preparing a separate Coastal Zone Management Plan that addresses coastal risks along the Coffs Harbour coastline. This coastline plan will define the level of risk from coastal hazards and provide a co-ordinated approach to management of coastal hazards.

Initial review of draft actions proposed in the coastline plan does not indicate any inconsistencies with the Darkum Creek estuary strategy actions. However, prior to implementation of the Darkum Creek estuary strategy actions Council will need to review to ensure consistency with the Coastal Zone Management Plan for the Coffs Harbour coastline.

Coffs Harbour Regional Park Management Plan

Council is also preparing a Regional Park Management Plan. Prior to implementation of the Darkum Creek estuary strategy actions Council will need to review to ensure consistency with the Regional Park Management Plan.

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Strategy 1 - Stormwater Management and Catchment Pollutants

Catchment inputs in the form of stormwater, diffuse runoff and point source inputs are typically the major sources of poor water quality in estuaries and other coastal water bodies. The effects of poor water quality inputs can be magnified in ICOLLs such as Darkum Creek depending on the status of the entrance.

Modelling undertaken during the Darkum Creek Estuary Processes Study (EPS) suggests the major source of sediment and nitrogen inputs is from horticultural and pasture land uses spread throughout the catchment and the golf course. It also suggests that phosphorus input is dominated by horticultural land uses. Careful management of these activities within the catchment may lead to long term improvements in water quality.

Community consultation indicates concern regarding pesticide and herbicide runoff from agricultural activities (mostly blueberry and banana farming). Guidelines for best practice management of soil and water resources on blueberry (NSW DPI 2008a) and banana farms (NSW DPI 2008b) are available and have been used in the past as a basis for workshops and training activities for farmers.

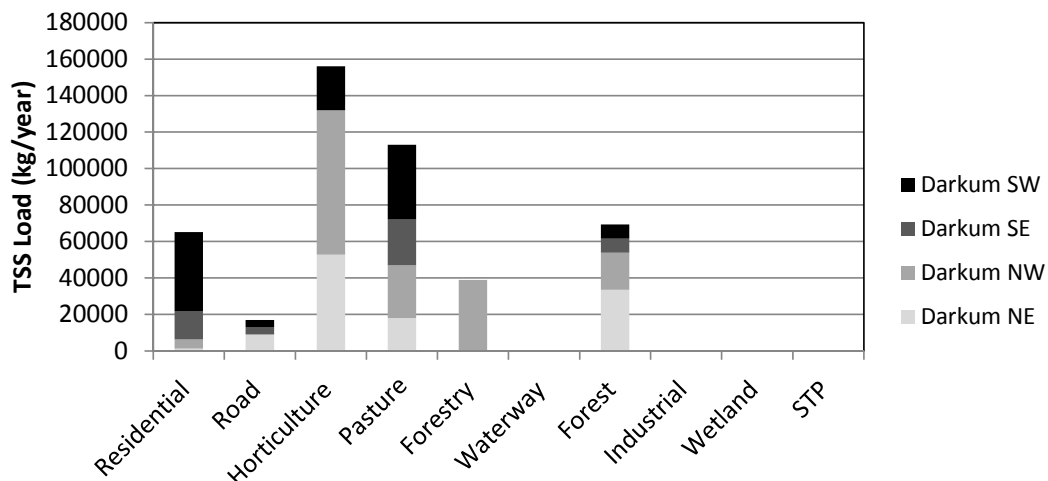


Illustration 1.1 Modelled Total Suspended Sediment Load by Landuse and Subcatchment Area

1.1 Summary of Proposed Actions

- Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities.
- Encourage horticultural landowners to uptake incentives program for Best Practice Management.
- Stormwater management for urban development.
- Woolgoolga Returned Services Golf Course – ensure maintenance practices are complementary with the creeks natural values.
- Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management.
- Control land modification activities on rural lands.

1.1.1 Related Strategies

- **Strategy 2** Riparian Vegetation
- **Strategy 3** Elevated Turbidity, Total Nitrogen and Chlorophyll-a Values
- **Strategy 4** Increased Urbanisation of the Darkum Creek Catchment
- **Strategy 5** Loss of Aquatic Habitats
- **Strategy 6** Water Quality Impacts Associated with Climate Change and Sea Level Rise
- **Strategy 9** Lack of Continuity and Detail in Existing Water Quality Data

1.1.2 Objectives Addressed

- Improve Water Quality;
- Protect and Enhance Aquatic Habitats; and
- Restore Terrestrial Habitats of High Ecological or Conservation Value by Removing Threats and Through Targeted Rehabilitation

1.2 Details of Proposed Actions

Strategy Action 1.1				
Educational strategies to address soil management and pesticide, herbicide and fertiliser use in agricultural activities.				
Background:				
Community consultation indicates concern that agricultural activities (mostly blueberry and banana farming) may be negatively impacting water quality in Darkum Creek via inputs of sediment, nutrients and agricultural chemicals.				
A campaign of awareness targeting rural landholders is considered an appropriate way of addressing these concerns, improving agricultural practices and having a positive effect on water quality in Darkum Creek. Workshops run by Coffs Harbour Regional Landcare targeting fertiliser use on blueberry farms are an example of recent initiatives that could be expanded upon. Workshops could be based upon existing guidelines (NSW DPI 2008a & b) and utilise the expertise of NSW DPI (Agriculture) staff from the Coffs Harbour region.				
Specific Tasks				
Develop and deliver a series of workshops aimed at blueberry and banana farmers in the catchment that describe:				
<ul style="list-style-type: none"> ▪ strategies to reduce erosion, such as contour alignment of rows, installation of trafficable cross banks at regular intervals, establishment of groundcovers, adequate riparian buffer widths on rural properties and the use of subsurface drainage; ▪ strategies to maintain and monitor soil moisture such that irrigation is always used in the most efficient manner; ▪ strategies to maximise the efficiency of fertiliser, herbicide and pesticide use and application, such that the overall use is minimised and concentrations in runoff can be minimised; and ▪ strategies to minimise the risk of accidental spillage of fertiliser, herbicides and pesticides such as appropriate storage, transport and disposal; 				
Responsible Agencies	Timeframe1	Cost	Potential Funding Sources	Monitoring
Lead Agency: DPI – Agriculture	Year 1	\$5,000 per workshop for	▪ Caring for Our Country	Delivery of workshops is an appropriate

NSW		preparation, materials and delivery.	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ NRCMA ▪ OEH - Environmental Education Grants 	benchmark.
Related Agencies: <ul style="list-style-type: none"> ▪ CHCC; ▪ NRCMA; ▪ Landcare. 				

Strategy Action 1.2
Encourage horticultural landowners to uptake incentives program for Best Practice Management

Background:

Community consultation indicates concern that agricultural activities (mostly blueberry and banana farming) may be negatively impacting water quality in Darkum Creek via inputs of sediment, nutrients and agricultural chemicals.

The Northern Rivers Catchment Management Authority (NRCMA) provides funding for landholders in specific horticultural industries to assist with the adoption of Best Management Practices for soil health in high priority landscapes including the Woolgoolga area. The targeted horticultural industries include blueberry, banana, macadamia, vegetable and coffee growers and growers of other perennial horticulture crops.

Eligible project activities include, but are not limited to improvements to soil condition / soil health through application of mulch, organic matter, compost, cover crops, minimum tillage, use of crop residues etc. or other biological farming techniques; soil conservation works such as runoff controls, diversion banks, waterways or other erosion control earthworks; and, establishment / improvement of ground cover to stabilise soil.

Successful applications are those that contribute to the soil health targets of the NRCAP, use the Best Management Practice techniques outlined in the Horticulture BMP Guidelines (eg. *Soil and Water Management Practices for Blueberry growers in Northern NSW, 2008*) and have in-kind contributions from the landholder with an ongoing commitment to maintaining the project.

The program is funded by Caring for our Country and the NSW Government's Catchment Action NSW.

Specific Tasks

Council, NRCMA and Regional Landcare to promote and coordinate uptake of the incentives program amongst horticultural landowners.

Responsible Agencies	Timeframe1	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ NRCMA Related Agencies: <ul style="list-style-type: none"> ▪ CHCC; ▪ Landcare; ▪ DPI – Agriculture NSW 	Years 1 – 5	<ul style="list-style-type: none"> ▪ Staff budget time for coordinating uptake of the incentives program ▪ \$20,000 pa for incentives funding from CHCC Environmental Levy 	<ul style="list-style-type: none"> ▪ CHCC Environmental Levy ▪ NRCMA – Best Practice Management Horticultural Program 	CHCC to report annually on uptake numbers and implemented measures

		<ul style="list-style-type: none"> ▪ \$20,000 pa for incentives funding from NRCMA. 		
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Strategy Action 1.3
Stormwater management for urban development

Background:
Existing urban areas do not form a large proportion of the estuary catchment. The newer residential area of Safety Beach drains to a constructed stormwater management control pond. The older areas of Safety Beach include grassed swale drainage systems that provide treatment of road and allotment runoff. While no specific stormwater management improvements are considered necessary for existing areas, it is recommended that contemporary WSUD principles and the treatment benefits of the existing roadside grass swales in the older section of Safety Beach are considered in any strategies relating to potential adoption of kerb and gutter systems.

New development areas have the potential to reduce the quality of catchment runoff during and after the construction phase. It is important that controls placed on new developments are sufficient and enforced to ensure no negative net impact upon water quality.

Council currently has a contemporary policy and associated guidelines addressing stormwater management for new development (Coffs Harbour City Council Water Sensitive Urban Design (WSUD) Policy, 2009). These guidelines are consistent with current best-practice management measures in the industry. Therefore, this estuary management plan recommends continued implementation of Council’s policy and guidelines for stormwater management and ongoing updating of the policy and guidelines in line with developments in the stormwater management industry. No additional strategies are considered necessary in respect to controlling stormwater management for new development.

Specific Tasks

- Ongoing updating of Council’s Water Sensitive Urban Design (WSUD) Policy (2009) and associated guidelines in line with developments in the stormwater management industry.



Responsible Agencies	Timeframe1	Cost	Potential Funding Sources	Monitoring
CHCC	Review policy and guidelines every 5 years	Part of Council’s operational budget	n/a	Review policy and guidelines every 5 years

Strategy Action 1.4
Woolgoolga Returned Services Golf Course – ensure maintenance practices are complementary with the creeks natural values

Background:
The Woolgoolga Returned Services golf course adjoins a large section of the Darkum Creek waterway and comprises a large portion of the estuary catchment. Therefore it is important that grounds management

practices such as fertiliser application are carefully managed to avoid impacts on the estuary.

Potential water quality impacts associated with runoff from the golf course will also be mitigated with the maintenance of an adequate riparian buffer width between the golf course fairways and the creek. Consideration also needs to be given to drainage lines from the golf course.

Specific Tasks

Liaise with management of the golf course:

- To ensure that grounds management practices such as fertiliser application are carefully managed to avoid impacts on the estuary;
- Recommend the installation new riparian planting and a defined edge between the fairways and the creek foreshores if necessary to reduce mowing/maintenance impacts on the riparian buffer and to protect existing and newly planted riparian vegetation;
- Consider any improvements to drainage lines intersecting the golf course (such as revegetation with native species) to assist with water quality improvements for Darkum Creek.

Responsible Agencies	Timeframe1	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 5	Part of Council's operational budget for initial consultation	Caring for Our Country for any necessary planting / establishment of defined maintenance boundary	After 5 years: audit the riparian edge of the golf course to assess effectiveness of any measures; and liaise with golf course management re: fertiliser application practices

Strategy Action 1.5

Encourage horticultural landowners to establish vegetated riparian zones on farm watercourses via the incentives program for Best Practice Management

Background:

When looked at over the whole state of NSW, water quality data shows that the condition of an ICOLL degrades significantly once natural vegetation is lost from more than half of the catchment (Haines 2008). Clearly increased urban and agricultural development can result in negative impacts on waterways within the catchment. However, making provisions for adequate riparian buffer widths throughout a catchment can result in a number of benefits to receiving waters, such as reduced sediment and nutrient loads. It can also serve greater environmental purposes such as provision of wildlife corridors between alternative habitats.

Generally, the urbanised tributaries of Woolgoolga Lake are provided with vegetated riparian buffers of a minimum of 10 to 20 m width. The Processes Study indicates that riparian vegetation in the study area is predominately in moderate to good condition (GeoLINK *et al.*, 2011a). However, some tributaries in the upper catchment in horticultural areas are lacking any vegetated riparian buffer as indicated in the following plate.

NSW DPI recommend a minimum buffer of 50 m between watercourses and greenhouse horticulture in its handbook for managing land use conflict issues on the NSW North Coast (Learmonth, *at. al.*, 2007). The handbook



recommends minimum buffer distances between watercourses and grazing land or non-greenhouse horticulture to be based on 'best practice management'.

An indication of what may be considered 'best practice management' is provided in NSW Office of Water recommendations for vegetated riparian zone widths – these widths should contain fully structured native vegetation (including groundcovers, shrubs and trees). These recommended widths are based on watercourse order as classified under the Strahler System of ordering watercourses and based on current 1:25 000 topographic maps (see table below). The width of the riparian zone should be measured from the top of the highest bank and on both sides of the watercourse. Based on the table below a minimum 10 metre wide vegetated riparian zone on either side of the watercourses is recommended in the upper tributaries.

Type of watercourse	Width of CRZ
Any first order watercourse and where there is a defined channel where water flows intermittently or any 'river' not identified on a topographic map	10 metres
<ul style="list-style-type: none"> ■ any permanently flowing first order watercourse, or ■ any second order watercourse and where there is a defined channel where water flows intermittently or permanently.	20 metres
Any third order or greater watercourse, where there is a defined channel and where water flows intermittently or permanently. Includes estuaries, wetlands and any parts of rivers influenced by tidal waters.	20 - 40 metres ¹

¹ merit assessment based on riparian functionality of the river, lake or estuary, the site and long-term land use.

Source: NSW Office of Water, 2011

It is considered that the best approach to establishing a vegetated riparian zone in the upper tributaries on rural land is via the incentives program for Best Practice Management for horticultural landowners in **Strategy Action 1.2**. Therefore no additional actions or tasks are proposed.

Responsible Agencies	Timeframe¹	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ■ NRCMA Related Agencies: <ul style="list-style-type: none"> ■ CHCC ; ■ Landcare; ■ DPI. 	Years 1 – 5	Part of cost listed in Strategy Action 1.2 .	Same funding as listed in Strategy Action 1.2 .	Part of reporting as described for Strategy Action 1.2 .

Strategy Action 1.6

Control land modification activities on rural lands

Background:

Land disturbance associated with the construction, installation or maintenance of buildings, roads, or other infrastructure creates the potential for increased levels of soil erosion and consequent sediment pollution of waterways.

There has been significant development of the greenhouse horticulture industry in the rural area of Woolgoolga. Development of this industry can involve significant earthworks associated with the construction of building pads for greenhouse structures. These earthworks create the potential for significant sediment

pollution of waterways without proper erosion and sediment control measures.

Past development of the greenhouse horticulture industry has generally proceeded without the requirement for development consent. There have been reported incidences where significant erosion and sediment control issues have occurred in association with construction of greenhouse structures. These incidences have been addressed under the Protection of the Environment Operations Act 1997. It is considered that a more proactive approach by Council to ensuring implementation of proper erosion and sediment control measures will provide a better outcome. This can be achieved through the development consent approach utilising relevant provisions from the proposed Standard Instrument Local Environment Plan (SiLEP) such as Clause 7.7 Earthworks of the draft SiLEP (2012).

Specific Tasks

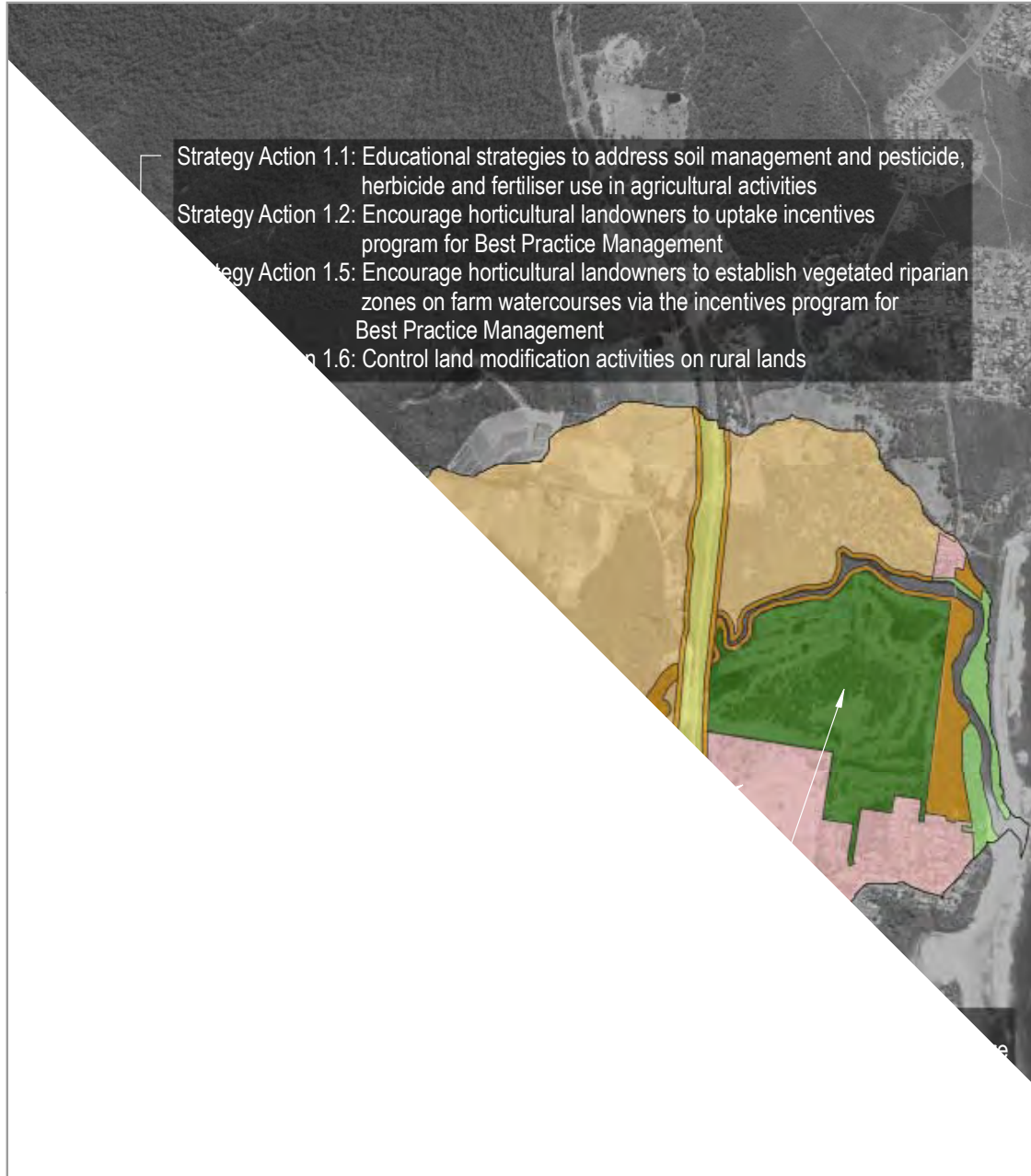
- Educate rural land holders about the above provisions / requirement for development consent in timing with the adoption of the proposed SiLEP;
- With respect to enforcing the provisions of the proposed SiLEP relevant to the above issues, Council is to undertake the following tasks when issues are brought to Council's attention:
 - investigate the requirement for consent for development captured by the relevant SiLEP provisions;
 - investigate compliance with development conditions in regard to erosion and sediment control measures;
 - investigate compliance where development has occurred without consent (and not been exempt development under the SiLEP or SEPP (Exempt and Complying Development Codes) 2008; and
 - utilise the provisions of the Protection of the Environment Operations Act 1997 to enforce erosion and sedimentation control where poorly managed earthworks pose a risk to, or have impacted, the environment.

Responsible Agencies	Timeframe1	Cost	Potential Funding Sources	Monitoring
CHCC	Year 1	Unknown additional staffing resources and additional costs to Council's operational budget	n/a	Review development application / consent numbers and comparison with hothouse development based on aerial imagery

Note: 1. Timeframe: the year relates to the time following adoption of this CZMP eg. "Years 2 – 5" indicates the strategy action should be implemented within 2 to 5 years of adoption of the CZMP

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: July 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



LEGEND

-  Agriculture
-  Rural living
-  State forest
-  Urban
-  Business
-  Open space and public recreation
-  Environmental protection



Strategy 1 - Stormwater Management and Catchment Pollutants

Coastal Zone Management Plan - Darkum Creek Estuary
 1616841

Illustration 1.2

Strategy 2 - Riparian Vegetation

A variety of terrestrial habitats of high conservation value have been identified within the riparian zone of Darkum Creek. These include saltmarsh, mangrove, and casuarinas, melaleuca, and eucalyptus dominated riparian woodlands. The riparian vegetation of Darkum Creek is generally in good to very good condition, however some reaches show signs of disturbance associated with clearing and access mostly in areas adjacent to residential development or the golf course.

Additionally, riparian weed mapping in January 2011 identified the presence of six environmental weed species listed as priority weeds in the *Northern Rivers Invasive Plants Action Strategy 2009-2013 (NRIPAS: Oakwood, 2009)*. Environmental weeds degrade the native riparian vegetation, reducing its ecological value and in some cases potentially impacting upon bank stability and other estuary values including recreational amenity and aesthetics.

The restoration of riparian vegetation is listed among the goals of the NRCMA Catchment Action Plan. Weed management along the riparian corridor of Darkum Creek was identified as a goal during community consultation meetings. Additionally, the Coffs Harbour Settlement Strategy lists the enhancement of riparian corridors as a key strategy for the Woolgoolga area to provide ecological links between coast and hinterland (Coffs Harbour City Council, 2011b).

Strategy 2 is aimed at the protection and rehabilitation of native riparian vegetation communities along Darkum Creek by raising community awareness of the importance of native riparian vegetation along estuaries and by rehabilitating reaches of high ecological or conservation value by removing threats such as weed invasion or inappropriate management practices.

2.1 Summary of Proposed Actions

The following actions are proposed:

- Raise awareness in the local community of the importance of native riparian vegetation along the banks and foreshore of Darkum Creek.
- Develop a weed management strategy which prioritises areas of riparian foreshore to be treated and priority weeds to be targeted.
- Undertake primary weed control in priority areas using specialist bush regeneration contractors.
- Foster a local *Bushcare* group to undertake the secondary control or follow-up maintenance of areas treated by contractors.

It is noted that management of the existing riparian vegetation along the southern foreshore adjacent to the golf course is adequately addressed by **Strategy Action 1.4**.

2.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants (
- **Strategy 10** Recreational Use
- **Strategy 10** Visual Amenity

2.1.2 Objectives Addressed

- Restore terrestrial habitats of high ecological or conservation value by removing threats and through targeted rehabilitation (e.g. riparian vegetation, endangered ecological communities such as Coastal Saltmarsh, Freshwater Wetlands, etc)
- Improve water quality
- Enhance public appreciation of the broader and site specific natural values of the creek environment.
- Maintain and Preserve Existing Natural Characteristics.

2.2 Details of Proposed Actions

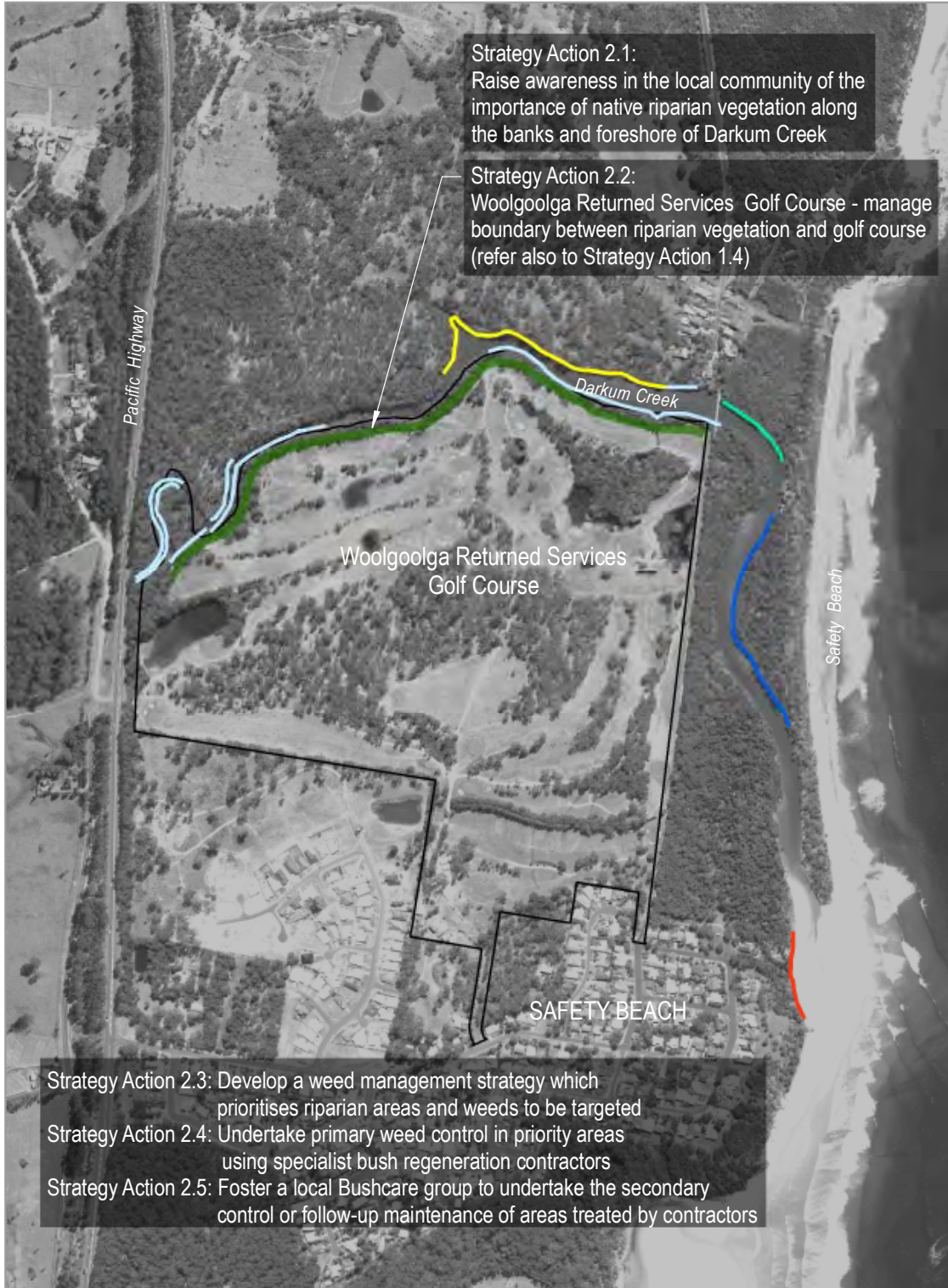
Strategy Action 2.1				
<p>Raise awareness in the local community of the importance of native riparian vegetation and aquatic habitats along the banks and foreshore of Darkum Creek</p>				
<p>Background:</p> <p>There are some residential areas that back onto the Darkum Creek foreshore, particularly around the footbridge. The golf course also adjoins the Darkum Creek foreshore. Landholder actions that may disturb sensitive saltmarsh and mangrove colonies in these areas include mowing, vegetation removal and pruning, creating pathways for access, and drainage activities.</p> <p>This action addresses issues also identified in Strategy 5. Strategy Action 2.1 is also complimentary to Strategy Action 2.4.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Utilise existing resources (eg. fact sheets developed by NSW Office of Environment and Heritage and the NRCMA) to raise awareness in the local community of: <ul style="list-style-type: none"> – Identification of riparian vegetation, mangroves and saltmarsh; – The importance of riparian vegetation, mangroves and saltmarsh to estuarine ecosystems; – Legislation dealing with watercourses and riparian vegetation, mangroves and saltmarsh; – Threats to riparian vegetation, mangroves and saltmarsh; – Invasive weeds that affect riparian zones in the Darkum Creek catchment; and – Strategies to protect and improve the health, distribution and diversity of riparian vegetation, mangroves and saltmarsh along Darkum Creek. Strategies to include encouraging residents to incorporate locally indigenous vegetation in private gardens and to recognise and avoid installing invasive or inappropriate plants; ▪ Compile a list of landholders with properties adjoining the Darkum Creek estuarine foreshore and distribute educational materials among landholders. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: ▪ CHCC Related Agencies: ▪ NRCMA; ▪ Landcare.	Years 1 - 2	Staff time Minimal cost for distribution of existing materials	<ul style="list-style-type: none"> ▪ CHCC operating budget ▪ MPA - SIMP operating budget ▪ NSW Estuary Management Program 	The benchmark for this action is the distribution of materials to landholders adjoining Darkum Creek.

Strategy Action 2.2				
Develop a weed management strategy which prioritises riparian areas and priority weeds to be targeted				
Background:				
<p>Weed mapping undertaken in January 2011 identified the presence of environmental weed species throughout Darkum Creek (GeoLINK <i>et al.</i>, 2011a). The main species identified were groundsel bush, winter cassia, and pink lantana in the mid to upper reaches, and bitou bush, coastal morning glory and ground asparagus in the lower reaches.</p> <p>According to the <i>Northern Rivers Invasive Plants Action Strategy 2009-2013 (NRIPAS; Oakwood, 2009)</i>, groundsel bush is the highest priority (Priority B) invasive weed species mapped during the field assessment. The Strategy also identifies winter cassia and bitou bush (Priority C) and coastal morning glory and ground asparagus (Priority D) as priority weeds in coastal landscapes, and lantana (Priority C) and coastal morning glory (Priority E) in riparian landscapes.</p> <p>Weed control is a long-term and costly management action and so it is recommended that areas with important estuary values be targeted as a priority.</p> <p>Illustration 2.1 identifies reaches where the riparian vegetation has been mapped as being in good to very good condition but where environmental weeds identified as either Priority B or C under the NRIPAS were also identified (ie. in this catchment: groundsel bush, senna/winter cassia, bitou bush, or lantana). These reaches are considered to be the highest priority for weed control for the next 5 years under this CZMP and should be the focus of the Weed Management Strategy for Darkum Creek.</p>				
Specific Tasks				
It is recommended to develop a strategy based on existing mapping which:				
<ul style="list-style-type: none"> ▪ Whether the NRIPAS Priorities are appropriate for this catchment, in particular, whether ground asparagus should be considered a higher priority in the lower reaches in this catchment; ▪ Sets clear objectives for weed management along the estuary over a 5 year timeline; ▪ Identifies priority areas for control efforts; ▪ Defines responsibilities for control works; ▪ Outlines appropriate methods for control works in estuarine environments; ▪ Estimates the number of hours required for primary control works and estimates hours required for maintenance over the 5 year time period; ▪ Outlines a strategy for raising community awareness of actions which can contribute to the spread of environmental weeds along the estuary; ▪ Identifies funding sources; ▪ Sets monitoring and evaluation criteria. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC Related Agencies: <ul style="list-style-type: none"> ▪ NRCMA; ▪ Landcare. 	Years 1 - 2	Strategy development ~ \$5,000 if done external to CHCC.	NRCMA will fund the development of a recognised NRM Plan up to a total cost of \$5,000.	The benchmark for this Action is the development of a recognised NRM Plan for the Management of priority weed species in priority areas of Darkum Creek.

<p>Strategy Action 2.3</p> <p>Undertake primary weed control in priority areas using specialist bush regeneration contractors</p>				
<p>Background:</p> <p>Estuarine and riparian areas are highly sensitive environments. As such, weed control work in these environments needs to be undertaken by specialist bush regenerators with skills in plant identification and knowledge of appropriate methods of control of weeds near waterways (especially where chemical control methods are to be used). In addition, such areas can be hazardous to workers, so it is essential that appropriate OHS strategies are implemented to ensure control works are undertaken in a safe manner.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Priority areas for weed control, species to be targeted, appropriate methods to be used, total available contract hours, and monitoring and evaluation actions/maintenance are to be defined in the Weed Management Strategy developed in Strategy Action 2.2 above. ▪ Priority works should where possible be scheduled into the operations/works plan of Council's Bush Regeneration team, alternatively specialist contractors could be engaged where funding is available 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
<p>Lead Agency:</p> <ul style="list-style-type: none"> ▪ CHCC Weeds Officer to provide oversight <p>Related Agencies:</p> <ul style="list-style-type: none"> ▪ NRCMA; ▪ Landcare 	Years 2 – 5	<p>Subject to development of the Weeds Management Strategy under Strategy Action 2.2 above.</p> <p>If external contractors are to be used, funds required is subject to the Weed Management Strategy but initially estimated at 200 hours per year @ \$35/hr (\$7,000/yr) over 5 years.</p>	<ul style="list-style-type: none"> ▪ NRCMA funding for implementation of recognised NRM Plans. ▪ Environmental Trust Restoration and Rehabilitation grants. ▪ Grants through NSW Government for weed control works on Crown Lands. ▪ CHCC Environmental Levy. 	<p>The benchmark for this Action is the engagement of specialist contractors to control priority weeds in areas identified in the Weed Management Strategy developed in Strategy Action 2.2</p>
<p>Strategy Action 2.4</p> <p>Foster a local Bushcare group to undertake the secondary control or follow-up maintenance of areas treated by contractors.</p>				
<p>Background:</p> <p>The effective control of environmental weeds requires a long-term and consistent approach. To be successful, the initial control works undertaken by the CHCC team or specialist contractors needs to be followed by periodic maintenance to ensure areas cleared of weeds do not become re-infested by regrowth or new weed seedlings. A model that has worked in many parts of the North Coast region has been to support local care groups operating under the Landcare umbrella. Small scale funding and support in the form of insurance coverage and tools is often available through the Landcare network. Group activities are also often part funded via NRCMA small grants (where a recognised NRM Plan exists), via Council environmental levies,</p>				

<p>Environmental Trust grants, etc.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Strategy Action 2.1 outlines proposed tasks designed to raise awareness amongst local residents on the sensitivity of the estuary foreshore area and the impact of environmental weeds in the estuarine/riparian environment. ▪ A small number of landholders along Darkum Creek Road have formed a loosely affiliated care group which may have interests in the creek environment. Further discussions with these community members may assist in establishing an active creek care group, supported by Coffs Landcare, the NRCMA, and CHCC. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
<p>Lead Agency:</p> <ul style="list-style-type: none"> ▪ CHCC <p>Related Agencies:</p> <ul style="list-style-type: none"> ▪ NRCMA; ▪ Landcare 	<p>Long term commitment required to support community groups</p>	<p>Dependent on activities, but generally limited to provision of tools, consumables, and support.</p>	<p>Support available through Coffs Landcare Network. Funding available through NRCMA where a recognised NRM plan exists (such as that formed under Strategy Action 2.2) any other grants available from time to time such as Environmental Trust Community Bush Regeneration and/or Restoration and Rehabilitation Grants.</p>	<p>The benchmark for this action is the successful formation of a Darkum Creek Care group which includes as its activities the long term maintenance of high conservation value riparian vegetation communities.</p>

Information shown is for illustrative purposes only



LEGEND

- Riparian vegetation in good condition but with Bitou Bush present
- Riparian vegetation in good condition but with Groundsel, Winter Cassia and Lantana present
- Riparian vegetation in good condition with Mangrove community but with Groundsel present
- Riparian vegetation in good condition with Mangrove community but with Lantana present
- Riparian vegetation in very good condition but with Bitou Bush present



Strategy 3 – Water Quality

It is common practice to compare water quality measurements with guideline values in order to determine the status of water quality in an aquatic system. For the protection of aquatic ecosystems in coastal waterways such as Darkum Creek the most commonly applied guideline values are described by ANZECC (2000) and for the assessment of estuary condition DECCW (now OEH) developed a set of guideline values based upon the salinity range in the waterway.



Comparison of existing water quality against guideline values revealed that turbidity, total nitrogen and chlorophyll-a measurements are all slightly elevated in Darkum Creek, based upon a limited set of samples and the available guidelines (GeoLINK *et al.* 2011a).

3.1 Summary of Proposed Actions

Elevated levels of turbidity, nitrogen and chlorophyll-a are most likely to be a result of inputs from urban and non-urban areas in the catchment. As there are no point source inputs of sediments and nutrients into Darkum Creek the main strategy available to reduce these pollutants loads is reducing the concentrations of sediments and nutrients in diffuse runoff from rural areas and in stormwater from urban areas. This is adequately addressed in the **Strategy 1** actions of this CZMP. The only additional action proposed is:

- Minimise the input of animal faecal materials into the waterway.

3.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants
- **Strategy 5** Aquatic Habitats
- **Strategy 6** Climate Change Impacts on Water Quality
- **Strategy 9** Water Quality Monitoring

3.1.2 Objectives Addressed

- Protect and Enhance Aquatic Habitats
- Improve Water Quality

3.2 Details of Proposed Actions

Strategy Action 3.1

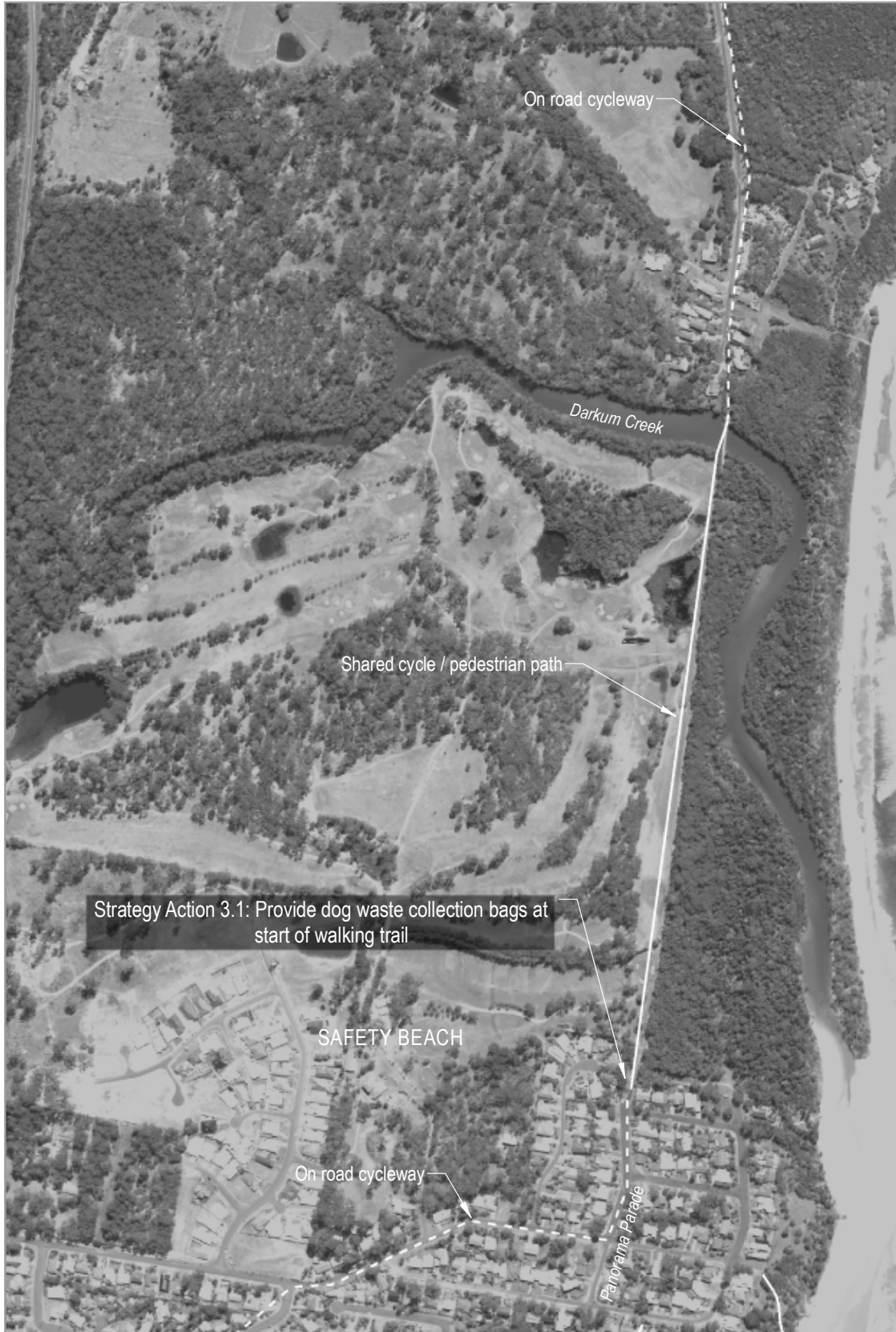
Minimise domestic pet faecal inputs to the waterway.

Background:

Animal faecal material washed into waterways can contribute significantly to nutrient loads (as well as faecal indicator organism concentrations). Whilst the contribution from native animals such as wading birds and mammals that inhabit the riparian zone cannot be controlled a reduction in nutrient contributions from domestic pets can be achieved by responsible pet ownership.

Specific Tasks				
<ul style="list-style-type: none"> ▪ Provide waste collection bags at the heads of walking trails; ▪ Educate pet owners about the effects of pet faecal materials on waterways in ratepayer newsletters and council newspaper advertisements; and ▪ Police council policies with respect to pet ownership. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 2 – 3	Staff time Installation of units \$1500 p/unit Maintenance of units \$1000 per unit p/annum	CHCC Environmental Levy	Release of educational materials and installation of waste collection bag units.

Information shown is for illustrative purposes only



GeoLINK
environmental management and design

Coastal Zone Management Plan - Darkum Creek Estuary
1616846

Strategy 3 - Water Quality

Illustration 3.1

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Strategy 4 - Urban Development

Residential land is a significant contributor of sediment and nitrogen loads to waterways. This indicates that investment into effective stormwater management could be an effective means of improving overall estuary health. Projected future growth in the Woolgoolga area includes a review of urban expansion potential for future residential area over a portion of the golf course adjoining Darkum Creek for long term growth (beyond 2016) (Coffs Harbour City Council, 2011a) – refer to **Plate 4.1** below. There is also possible long term urban expansion area west of the existing highway should population targets be achieved sooner than currently predicted.

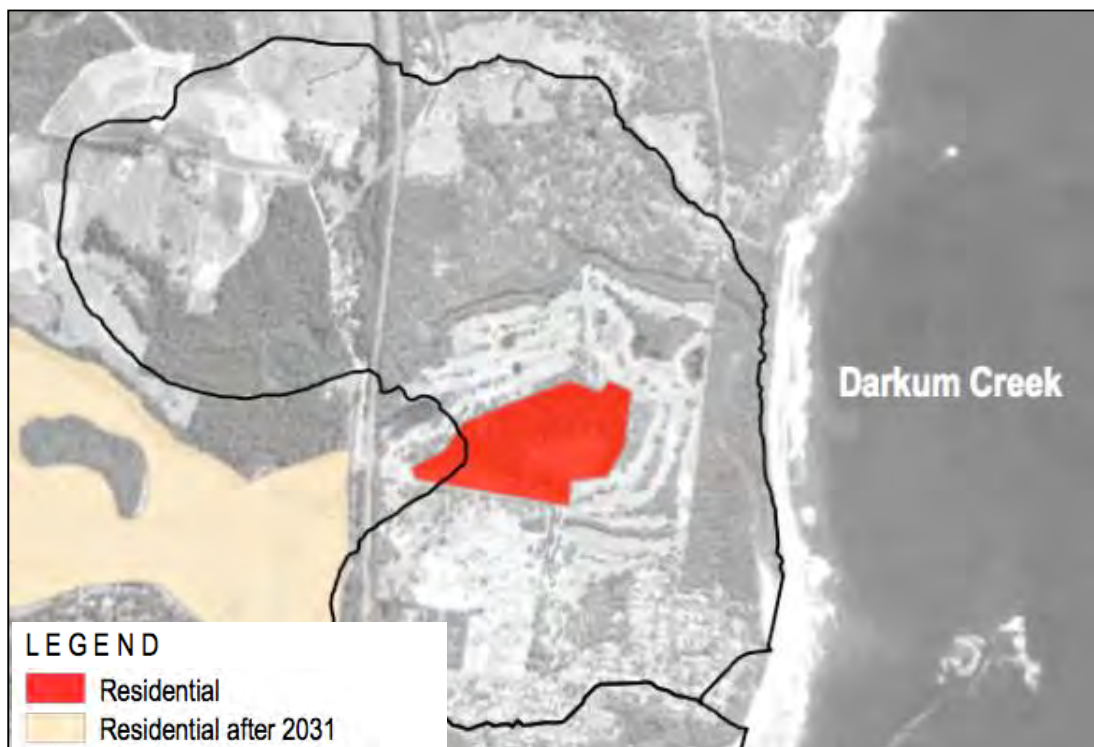


Plate 4.1 Future Growth Areas

New development areas have the potential to reduce the quality of catchment runoff during and after the construction phase. It is important that controls placed on new developments are sufficient and enforced to ensure no negative net impact upon water quality or the hydrology of the catchment.

4.1 Summary of Proposed Actions

Strategy Action 1.3 (Stormwater management for urban development) is considered adequate to address this issue. No further actions are proposed to address this issue.

4.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants
- **Strategy 3** Water Quality

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Strategy 5 - Aquatic Habitats

A decline in the area and condition of seagrass beds, mangroves, saltmarsh and sedge heath communities were identified by CEMAC as possible issues concerning Darkum Creek. Detailed mapping analysis of aquatic habitats (GeoLINK et al. 2011a) shows that seagrass has disappeared from Darkum Creek in recent years and saltmarsh and mangrove habitats show signs of disturbance – refer to **Illustration 5.1**.

The factors causing the decline in the area of seagrass are uncertain. Natural fluctuations in the area of seagrass are a common characteristic of ICOLLs. However, factors commonly associated with seagrass loss that may be present in Darkum Creek include:

- high suspended sediment loads in catchment runoff; and
- natural fluctuations in the position of the marine tidal delta.

The Northern Rivers Catchment Management Authority (NRCMA) Catchment Action Plan (CAP) lists rehabilitation of aquatic habitats among its goals.

5.1 Summary of Proposed Actions

The following actions from other strategies are considered adequate to address the issue of loss of aquatic habitats:

- **Strategy Action 1.4** Woolgoolga Returned Services Golf Course – ensure maintenance practices are complementary with the creeks natural values;
- **Strategy Action 2.1** to raise awareness in the local community of the importance of aquatic habitats along the and foreshore of Darkum Creek;
- **Strategy 1** actions to reduce the inputs of sediment from the catchment to maximise the opportunities for the recruitment of seagrass to the system.

No further actions are proposed.

5.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants
- **Strategy 2** Riparian Vegetation
- **Strategy 3** Water Quality
- **Strategy 6** Climate Change Impacts on Water Quality
- **Strategy 8** Climate Change Impacts on Estuary Ecology

5.1.2 Objectives Addressed

- Protect and Enhance Aquatic Habitats

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Strategy 6 – Climate Change Impacts on Water Quality

Forecast climate change and sea level rise scenarios are likely to result in a number of changes to water quality processes in ICOLLs such as Darkum Creek. Some of the impacts will be direct, such as changes to average water temperature, whilst some will be indirect, following on from changes to physical processes such as hydrodynamics (Haines 2006). Climate change scenarios may also result in an intensification of existing issues with water quality. Addressing current issues in accordance with **Strategy 1** actions will be the best preparation for the impacts of climate change on water quality. No further actions are proposed to address this issue.

6.1 Summary of Proposed Actions

Addressing current issues in accordance with **Strategy 1** actions will be the best preparation for the impacts of climate change on water quality. No further actions are proposed to address this issue.

6.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants
- **Strategy 3** Water Quality
- **Strategy 4** Urban Development
- **Strategy 5** Aquatic Habitats
- **Strategy 8** Climate Change Impacts on Estuary Ecology
- **Strategy 9** Water Quality Monitoring

6.1.2 Objectives Addressed

- Protect and Enhance Aquatic Habitats
- Improve Water Quality

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Strategy 7 - Recreational Use

Darkum Creek is a relatively small and remote coastal estuary with a generally undisturbed and attractive natural setting. The creek is a valuable asset for the local community and provides opportunity for a range of low key recreational activities such as kayaking, fishing, bird watching and bush walking. A path and footbridge cuts a significant corridor through the area providing a continuous pedestrian and cycle route connecting the residential communities of Arrawarra in the north to Woolgoolga in the south – refer to **Illustration 7.1**. Apart from this route there are no other recreational facilities and it is understood that minimal facilities is much favoured by local residents. Accordingly, the objective of this strategy is to preserve the natural values of the estuary and to minimise the level of support required to sustain the existing level of recreational activity.

7.1 Summary of Proposed Actions

- Maintain the existing minimum level of access and recreational activity to preserve the natural values of the creek environment by providing simple additional infrastructure where necessary to support and enhance existing low levels of passive recreational activity. Undertake restoration works on an as-needs basis to sustain the significant and dominant natural values of the estuary environment.
- Incorporate discrete interpretive signage to enhance visitor appreciation and enjoyment of the site's natural values.

7.1.1 Related Strategies

- **Strategy 2** Riparian Vegetation
- **Strategy 11** Loss of Visual Amenity

7.1.2 Objectives Addressed

- Protect and Enhance Aquatic Habitats;
- Preserve the Quiet, Undeveloped, Natural Setting of the Creek Foreshores

7.2 Details of Proposed Actions

Strategy Action 7.1

Maintain the existing minimum level of access and recreational activity to preserve the natural values of the creek environment.

Background:

Existing recreational use of the estuary environment is very low key and is of secondary significance to the site's natural values. The provision of discrete, low key infrastructure to minimise site impacts will ensure the preservation of the natural values while maintaining the existing unspoilt setting for the continued enjoyment of users.

Specific Tasks


- Liaise with bush-walkers, recreational walkers/runners within the area to identify issues associated with preferred access routes;
- Undertake minor path enhancement work such as steps or retaining wall construction to ensure path routes cause minimal environmental and visual impact; and

<ul style="list-style-type: none"> ▪ Undertake weed removal and revegetation work if necessary to restore disturbed areas adjoining the pedestrian and cycle routes 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Ongoing	Staff time	CHCC operating budget	Inspect paths routinely to monitor use levels and possible environmental damage
<p>Strategy Action 7.2 Incorporate additional interpretive signage within the estuary area.</p> <p>Background While not a significant issue, there is a lack of interpretive signage which would otherwise provide visitors with a greater sense of orientation and an enhanced understanding of the site's natural attributes as part of a larger coastal resource.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Install new discrete informational signs and maps at key rest points along the existing shared cycle - footpath and at public vantage points such as the existing footbridge to improve pedestrian legibility, orientation, interpretation and enjoyment of the estuary environment generally. Highlight starting points of tracks with signs or maps for optimal legibility. The design and provision of signs should adopt a consistent theme and form part of a coordinated system developed for all coastal estuaries. Consideration should also be given to incorporating elements from: <ul style="list-style-type: none"> - Strategy Action 2.1 regarding raising awareness in the local community of the importance of native riparian vegetation and aquatic habitats along the banks and foreshore of Darkum Creek. Identification of riparian vegetation, mangroves and saltmarsh; and - Strategy Action 11.4 regarding raising awareness of the natural opening and closing regime of Darkum Creek. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 2	\$2,000 for signage	<ul style="list-style-type: none"> ▪ CHCC operating budget ▪ Caring for Our Country ▪ CHCC Environmental Levy 	Check for preventative and corrective maintenance on an ongoing basis once signs are installed.

Information shown is for illustrative purposes only



LEGEND

 Crown land reserves



GeoLINK
environmental management and design

Coastal Zone Management Plan - Darkum Creek Estuary
1616848

Strategy 7 - Recreational Use

Illustration 7.1

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Strategy 8 - Climate Change Impacts on Estuary Ecology

Under current projections for climate change and associated sea level rise there are likely to be a number of impacts upon estuary ecology. These may include direct impacts upon mangroves and saltmarsh and direct impacts upon fish diversity and abundance.

It is expected that mangroves communities will typically migrate landward in response to higher lake water levels. The distribution and species of mangroves may change due to higher water temperatures (Walsh, 2004a cited in Haines, 2006). Saltmarsh communities are considered to be particularly vulnerable to increases in average lake water levels, as they occupy relatively flat ground near the waters edge. Small changes in sea level will therefore result in extensive inundation (Walsh, 2004a cited in Haines, 2006). Further, landward migration of saltmarsh, mangroves, and other wetland communities in response to rising lake water levels may be restricted by existing development or barriers (e.g. natural elevated banks adjoining the creek) resulting in a loss of habitat (Pittock, 2003; Walsh, 2004b, Gilman, 2004 cited in Haines, 2006).

There may also be indirect impacts upon estuary ecology related to climate change impacts upon water quality. Strategies that will reduce the impacts of forecast climate change scenarios upon water quality are discussed under **Strategy 6**.

8.1 Summary of Proposed Actions

- Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise.

8.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants
- **Strategy 2** Riparian Vegetation
- **Strategy 5** Aquatic Habitats
- **Strategy 6** Climate Change Impacts on Water Quality

8.1.2 Objectives Addressed

- Protect and Enhance Aquatic Habitats
- Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise
- Preserve the Quiet, Undeveloped, Natural Setting of the Creek Foreshores

8.2 Details of Proposed Actions

Strategy Action 8.1

Implement development control provisions to facilitate upslope migration of mangroves and saltmarsh in response to sea level rise.

Background:

Currently, mangroves and saltmarsh in Darkum Creek are mostly located below the 1.5 mAHD contour line and all located below the 2 mAHD contour line. The response of mangroves and saltmarsh colonies to sea

level rise forecasts is likely to be a mixture of sediment accretion (ie, no migration) and upslope migration. The exact balance will be dependent upon a variety of geomorphic, biogeographic and development factors that will vary significantly by location. However, it can be safely assumed that the future total vertical migration of mangroves and saltmarsh is likely to be closely aligned with future total sea level rise (i.e approx. 0.9m by 2100) as the distribution of saltmarsh and mangroves is strongly defined by tidal heights. In areas where upslope migration is made possible by low sloping land, low development pressure and compatible current landuse careful planning for the future may result in improved outcomes.

In addition to buffers allowing the upslope migration of mangroves and saltmarsh it is important to allow horizontal buffers for landward migration of riparian vegetation so that a suitable riparian strip is maintained under sea level rise scenarios. Current best practice suggests that a 40m riparian buffer is suitable for maintaining the environmental integrity of estuaries (see **Strategy Action 1.5** and NSW Office of Water, 2011).

A significant area of the Darkum Creek foreshore where retreat of mangroves and saltmarsh is likely to occur falls within the following areas / zones:

- golf course area which is zoned 6C – Open Space 6C Private Recreation Zone. It is noted that a portion of this area is marked for review for urban expansion potential for future residential area for long term growth (beyond 2016) (Coffs Harbour City Council, 2011a) – refer to **Illustration 7.1**. The area mapped for urban expansion potential appears to be located beyond a horizontal buffer of 40 m landward from the 3 mAHD contour line;
- an area zoned 1A Agriculture Zone on the northern side of Darkum Creek (approximately 450 m upstream of the footbridge); and
- 6A – Open Space and Public Recreation and 7A – Environmental Protection Habitat and Catchment. This is considered an adequate zoning for the protection of vertical and horizontal buffers for the upslope migration of saltmarsh and mangroves resulting from sea level rise over the near future.

In the case that changes to the current zoning of foreshore land around Darkum Creek be proposed or the Coffs Harbour LEP is reviewed, appropriate horizontal and vertical buffers must be protected to ensure the future integrity of mangrove and saltmarsh habitat in addition to a riparian buffer zone. A vertical buffer incorporating the 3 mAHD contour line and a horizontal buffer of 40 m landward from the 3 mAHD contour line will be adequate to preserve the ecological integrity of the system.

Specific Tasks

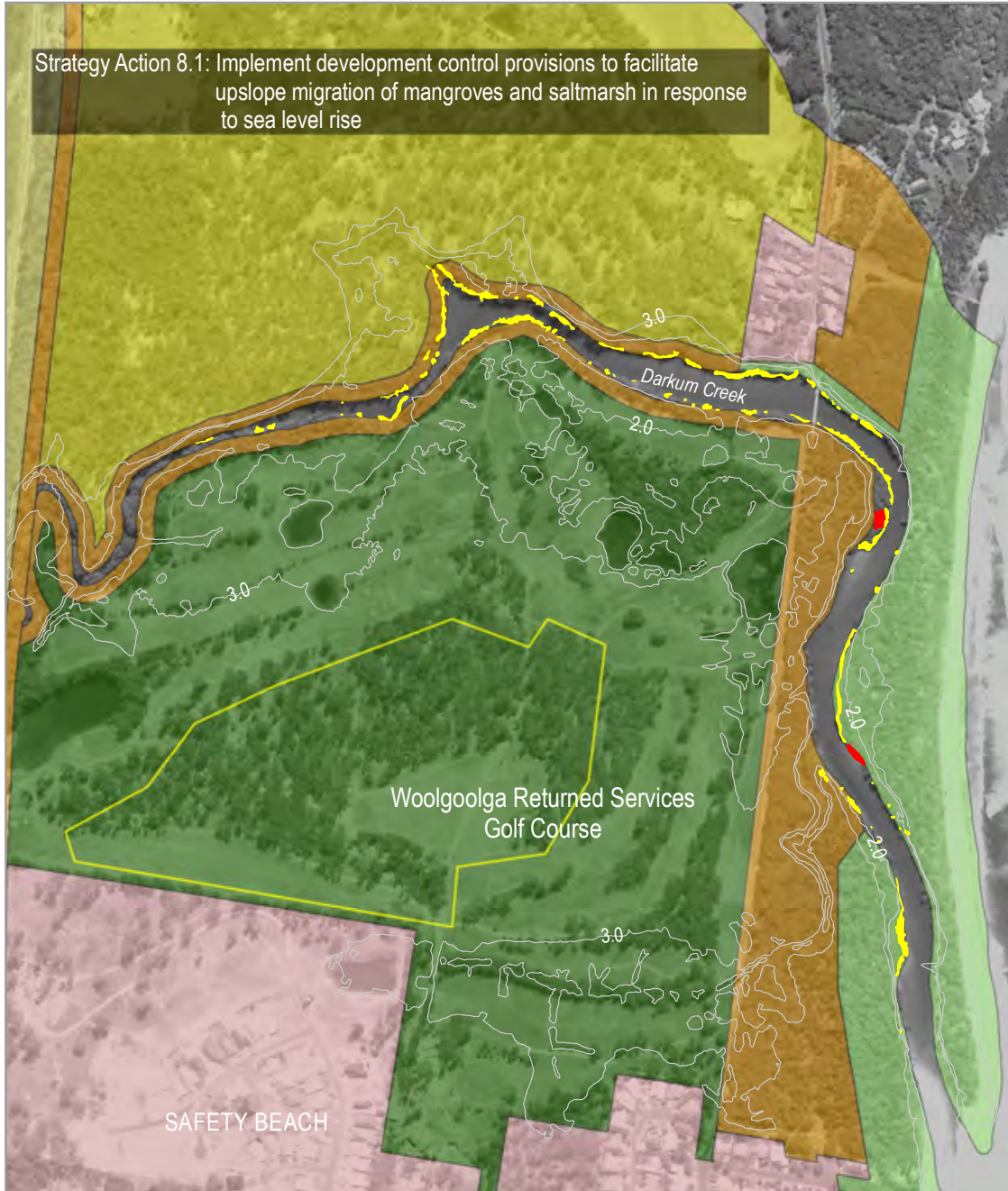
- Map a buffer zone around Darkum Creek incorporating all lands currently zoned 1A, 6A, 6C and 7A falling within 40 m landward of the 3 mAHD contour line.
- Develop Development Control Plan (DCP) provisions for the above buffer zone that controls or limits development within the buffer zone such that potential upslope migration of mangroves and saltmarsh is not impeded.

Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 2	Staff time	CHCC operating budget	Preparation of a report which describes priority potential areas for future colonisation

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: August 2012

Source of base data: Coffs Harbour City Council and Department of Primary Industries

Information shown is for illustrative purposes only



LEGEND

- Saltmarsh (Department of Primary Industries - 2011)
- Mangrove (Department of Primary Industries - 2011)
- Proposed agreed residential growth area
- 1A Rural Agriculture
- 2A Residential Low Density
- 5A Classified Road
- 6A Open Space and Public Recreation
- 6C Open Space Private Recreation
- 7A Environmental Protection Habitat and Catchment
- 7B Environmental Protection Scenic Buffer
- Contour at 2.0 and 3.0 m AHD



Strategy 8 - Climate Change Impacts on Estuary Ecology



Coastal Zone Management Plan - Darkum Creek Estuary
1616851

Illustration 8.1

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Strategy 9 - Water Quality Monitoring

The collection of water quality data is an important aspect of overall estuary management. When collected in a suitable fashion, water quality data informs managers of:

- natural and unnatural processes occurring in the waterway;
- risks to public safety associated with recreational pursuits;
- risks to public safety associated with the consumption of aquatic foods;
- potential risks to aquatic ecosystems;
- trends with respect to the 'health' of the aquatic system; and
- the effects of soil, water and other management strategies put in place throughout the catchment.



The long term dataset available for Darkum Creek is not detailed or consistent enough to provide clear information about a number of the above listed items.

9.1 Summary of Proposed Actions

- Continue to implement the Ecohealth water quality monitoring program for Darkum Creek.

9.1.1 Related Strategies

- **Strategy 1** Stormwater Management and Catchment Pollutants
- **Strategy 3** Water Quality
- **Strategy 6** Climate Change Impacts on Water Quality

9.1.2 Objectives Addressed

- Improve Water Quality
- Improved Monitoring of Water Quality

9.2 Details of Proposed Actions

Strategy Action 9.1				
Continue to implement the Ecohealth water quality monitoring program for Darkum Creek.				
<p>Background:</p> <p>The Ecohealth program outlines a framework for the development of a catchment-based aquatic health monitoring program in the Northern Rivers CMA region to provide consistency in monitoring and reporting, and establish the partnerships required for local and regional participation in the sampling program, identification of appropriate management actions and communication of outcomes. The Ecohealth program integrates information from the NSW Monitoring, Evaluation and Reporting (MER) Program, NSW State of Environment (SoE) reports, and a range of other reporting programs.</p> <p>Darkum Creek is currently included in the Ecohealth water quality monitoring program. However, the combined water quality dataset for Darkum Creek has been identified as lacking in continuity and detail. Continuation of the Ecohealth water quality monitoring program for Darkum Creek will assist in supplementing the current water quality dataset.</p> <p>Specific Tasks</p> <ul style="list-style-type: none"> ▪ Continue to implement the Ecohealth water quality monitoring program for Darkum Creek with a review of: <ul style="list-style-type: none"> – appropriate temporal and spatial scales for sampling; and – a comprehensive list of parameters that will add to the understanding of the health of Darkum Creek; 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
Lead Agency: <ul style="list-style-type: none"> ▪ CHCC Related Agencies: <ul style="list-style-type: none"> ▪ NRCMA; ▪ OEH; ▪ MPA - SIMP 	Ongoing	\$20,000 every 4 years	<ul style="list-style-type: none"> ▪ CHCC operating budget. ▪ MPA - SIMP: in kind assistance 	Reporting every 4 years in line with SoE reporting

Strategy 10 - Visual Amenity

Darkum Creek offers a predominantly undisturbed natural environment that forms an integral and important component of the natural settings along the coastline. In particular, the creek setting offers the following scenic values:

- the creek and its foreshores contribute significantly to the character and amenity of the surrounding residential communities;
- the creek has relatively short reaches and heavily vegetated foreshores which offer considerable shelter from prevailing winds. The resulting tranquil water combined with the surrounding riparian vegetation offer considerable scenic amenity;
- the creek itself is largely only visible from the footbridge which offers an excellent vantage point in both upstream and downstream directions;
- an attractive long distant view across a downstream reach of the creek is also available from its mouth at Safety Beach; and
- the creek is also likely to be visible through openings in vegetation from the adjoining golf course.

The purpose of this strategy is to ensure that the visual amenity afforded by the natural environment of the creek as described above is preserved and enhanced.

10.1 Summary of Proposed Actions

The following actions from other strategies are considered adequate to address the issue of preserving and enhancing the visual amenity of Darkum Creek estuary:

- **Strategy Action 1.4** Woolgoolga Returned Services Golf Course – ensure maintenance practices are complementary with the creeks natural values;
- **Strategy Action 2.3** to develop a weed management strategy which prioritises riparian areas and priority weeds to be targeted which will assist in maintaining the existing natural character of the estuary;
- **Strategy Action 7.1** to provide simple additional infrastructure where necessary to support and enhance existing low levels of passive recreational activity and undertake restoration works on an as-needs basis to sustain the significant and dominant natural values of the estuary environment;
- **Strategy Action 7.2** to address the need for interpretive information to enhance visitor enjoyment and appreciation of the creek's natural values.

No further actions are proposed.

10.1.1 Related Strategies

- **Strategy 2** Riparian Vegetation
- **Strategy 7** Recreational Use

10.1.2 Objectives Addressed

- Protect and Enhance Aquatic Habitats;
- Preserve the Quiet, Undeveloped, Natural Setting of the Creek Foreshores

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Strategy 11 - Entrance Management

Flood level estimates and inundation mapping associated with elevated ocean levels at Darkum Creek estuary indicates there are no properties or infrastructure currently at risk of flooding with the exception of areas of the Woolgoolga Returned Services golf course that adjoin the creek. However, sea level rise caused by climate change will result in higher flood inundation levels within the estuary in the future.

Current inundation levels are likely to increase by a similar amount as sea level rise increases. Adopted sea level rise estimates for NSW are a 0.4 m increase in sea level by 2050 (relative to 1990 levels) and a 0.9 m increase by 2100. Climate change also has the potential to result in an increased frequency of high rainfall events leading to more frequent flooding events.

Current 1 in 100 year flood levels for Darkum Creek are approximately 2.6 m AHD near the footbridge over Darkum Creek and 3.3 m AHD near Panarama Parade (email: M. Robertson, Coffs Harbour City Council, 10/05/2012). These flood levels will potentially increase in the future in response to sea level rise impacts. The increase may be in the order of +0.4 m by 2050 and +0.9 m by 2100. It is noted that coastal inundation levels (elevated ocean water levels during a storm) as reported in the *Coffs Harbour Coastal Processes and Hazards Definition Study* (BMT WBM, 2011a) are similar to these flood levels. It is also noted that probable entrance berm heights reported in the BMT WBM study are:

- in the range of 1.3 m AHD for an 'almost certain' probability (in which case the higher elevated ocean levels would be the influencing factor on flood levels within the estuary for large flooding events); and
- 2.4 m AHD, 2.8 m AHD and 3.3 m AHD as an 'unlikely' probability for the immediate timeframe and the years 2050 and 2100 respectively. These levels are similar to the above 1 in 100 year flood levels for Darkum Creek (near the footbridge).

In consideration of the above levels, it is considered appropriate for the purpose of this strategy to assume flood levels for the estuary will be in the range of:

- 2.6 m AHD near the footbridge over Darkum Creek and 3.3 m AHD near Panarama Parade in the immediate term; with
- Increases in flood levels by up to +0.4 m by 2050 and +0.9 m by 2100 in response to sea level rise impacts.

Higher flood levels resulting from sea level rise and other climate change impacts may present a risk of backyard flooding to some properties in the lower northern portion of Safety Beach in the vicinity of Panarama Parade, Baroona Street and Ocean Links Close. An indication of the approximate extent of flooding is shown by the 3.5 m AHD contour level in **Illustration 11.1** (refer also to Plate C.2 in **Appendix C** for coastal inundation extent in the year 2050). Some sewage pump stations (eg. PS 6 located to the north of Panorama Parade) may also be at risk of flooding. This would potentially lead to sewage overflows entering the creek system.

The objective of this strategy is to minimise or avoid future flooding of properties and infrastructure by appropriate means such as development controls in flood prone areas; artificial opening of the creek entrance where appropriate; flood-proofing infrastructure; etc. A supplementary objective of this strategy is to develop an entrance management policy for the entrance with the aim of maintaining a natural opening / closing regime for the creek entrance. Interference (artificial opening of the entrance) would only be employed for critical situations such as to mitigate and reduce the impacts of flooding on properties and infrastructure adjoining the creek.

11.1 Summary of Proposed Actions

The following actions are proposed:

- Address future flooding risks that have the potential to trigger artificial opening of the entrance;
- Prepare a Review of Environmental Factors for artificial opening of the entrance to Darkum Creek estuary;
- Adopt and implement the Darkum Creek Entrance Management Policy detailed in this CZMP;
- Raise community awareness of the natural opening and closing regime of Darkum Creek.

11.1.1 Related Strategies

There are no directly related strategies.

11.2 Details of Proposed Actions

Strategy Action 11.1				
Address flooding risks that have the potential to trigger artificial opening of the entrance in the future				
Background:				
<p>Increased flood levels resulting from climate change impacts may present a risk of backyard flooding in the future to some properties in the lower northern portion of Safety Beach in the vicinity of Panarama Parade, Baroona Street and Ocean Links Close – refer to Illustration 11.1. Some sewage pump stations (eg. PS 6 located to the north of Panarama Parade) may also be at risk of flooding. There are also some sewer manholes within the golf course property near Ocean Links Close that may be at risk of flooding which could potentially lead to excessive inflow to the local sewerage system and subsequent sewage overflows entering the creek system.</p> <p>The need for artificially opening the estuary entrance for future flood mitigation purposes can be avoided by implementing measures such as removing, relocating or otherwise managing items of low-lying infrastructure at risk of flooding which necessitates artificial openings. The intention of this objective is to minimise the need for interference to the natural opening / closing regime of the lake entrance.</p>				
Specific Tasks				
<ul style="list-style-type: none"> ▪ undertake and audit of low-lying infrastructure and properties to identify key services and assets vulnerable to sea level rise impacts around Darkum Creek which have the potential to necessitate artificial opening of the entrance (eg. sewer PS 6, sewer manholes within the golf course property near Ocean Links Close and properties in the lower northern portion of Safety Beach in the vicinity of Panarama Parade, Baroona Street and Ocean Links Close). Develop appropriate strategies where necessary for flood-proofing, relocation, replacement or modification of these services, assets and properties. ▪ Flood-proof, relocate, replace or modify essential services, assets and properties where appropriate to reduce potential for disruption and/or the need for artificial opening of the entrance. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	<p>Years 1 –5 for audit and assessment</p> <p>Years 5 - 25 for relocate, replace or modify essential services and assets</p>	<p>Audit and assessment: \$10,000</p> <p>Augmentation works: dependant on proposed works</p>	NSW Government Estuary Management Program	Implementation of this action is an appropriate benchmark

Strategy Action 11.2				
Prepare a Review of Environmental Factors for artificial opening of the entrance to Darkum Creek estuary				
Background:				
<p>Darkum Creek is an ICOLL system that is predominantly closed. The entrance opens and closes to the ocean naturally in a constant but irregular cycle depending on fluvial, tidal and wave processes. Artificial opening of ICOLL's can have significant negative impacts on water quality, fish and other ecological communities.</p> <p>There are no records of artificial opening of the entrance being used in the past. Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant need for artificial opening for the purpose of flood mitigation. Nevertheless, a formal entrance management policy for Darkum Creek is required in accordance with OEH <i>Guidelines for Preparing Coastal Zone Management Plans</i> (DECCW, 2010).</p> <p>Works / activities for the purpose of flood mitigation or waterway / foreshore management (to address an extreme water quality issue) would be permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed works / activities (e.g. artificial opening of the entrance to Darkum Creek estuary). The REF needs to be consistent with the adopted CZMP and entrance management policy for Darkum Creek estuary.</p>				
Specific Tasks				
Prepare an REF for artificial opening of the entrance to Darkum Creek estuary in consultation with relevant state government agencies. The REF will confirm the necessary approvals and licences required for artificial opening of the entrance.				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 5	Staff time	CHCC operating budget	Implementation of this action is an appropriate benchmark.
Strategy Action 11.3				
Refine, adopt and implement Darkum Creek Entrance Management Policy				
Background:				
<p>The development of an entrance management policy is a requirement for Coastal Zone Management Plans for ICOLL's under the OEH <i>Guidelines for Preparing Coastal Zone Management Plans</i> (DECCW, 2010). Therefore a policy has been drafted with the aim to:</p> <ul style="list-style-type: none"> ▪ minimise interference with the natural opening and closing regime for the estuary; ▪ address extreme water quality issues in the estuary; ▪ minimise flooding of properties and infrastructure from elevated water levels in the estuary. 				
Specific Tasks				
<ul style="list-style-type: none"> ▪ Refine the Darkum Creek Entrance Management Policy outlined in this CZMP (refer to Appendix A) based on the outcomes of the REF under Strategy Action 11.1; ▪ Adopt and implement the Darkum Creek Entrance Management Policy. 				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring

CHCC	Years 1 – 5	Staff time for adoption of policy.	CHCC operating budget	Implementation of this action is an appropriate benchmark.
Strategy Action 11.4				
Raise community awareness of the natural opening and closing regime of Darkum Creek.				
Specific Tasks				
To assist with establishing broad based community understanding and support for the entrance management policy for Darkum Creek it is recommended that development of interpretive signage under Strategy Action 7.2 considers the inclusion of information on the natural opening and closing regime of Darkum Creek.				
Responsible Agencies	Timeframe	Cost	Potential Funding Sources	Monitoring
CHCC	Years 1 – 5	Included in the costs in Strategy Action 7.2	Caring for Our Country	Implementation of this action is an appropriate benchmark.

Information shown is for illustrative purposes only

- Strategy Action 11.1: Address future flooding risks that have the potential to trigger artificial opening of the entrance
- Strategy Action 11.2: Prepare a Review of Environmental Factors for artificial opening of the entrance to Darkum Creek estuary
- Strategy Action 11.3: Adopt and implement Darkum Creek Entrance Management Policy
- Strategy Action 11.4: Raise community awareness of the natural opening and closing regime of Darkum Creek



LEGEND

- Contour at 3.5 m AHD
- Sewer pump station 6



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Acronyms

AHD	Australian Height Datum
ANZECC	Australia and New Zealand Environment Conservation Council
APZ	Asset Protection Zone
ASS	Acid sulfate soils
CAP	Catchment Action Plan
CCA	Comprehensive Coastal Assessment
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CMSS	Catchment Management Support System
DO	Dissolved Oxygen
DPI	NSW Department of Primary Industries
EMS	Estuary Management Study
ICOLL	Intermittently Closed and Open Lake and Lagoon
LGA	Local Government Area
MER	Monitoring Evaluating and Reporting
MHL	Manly Hydraulics Laboratory
MPA	Marine Parks Authority
NRCMA	Northern Rivers Catchment Management Authority
NRIPAS	Northern Rivers Invasive Plants Action Strategy 2009-2013
OEH	Office of Environment and Heritage, NSW Department of Premier & Cabinet
OEH – PWG	Office of Environment & Heritage – Parks & Wildlife Group
SIMP	Solitary Islands Marine Park
TN	Total Nitrogen
TP	Total Phosphorus
TSS	Total Suspended Solids
WSUD	Water Sensitive Urban Design

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Appendix A

Entrance Management Policy Darkum Creek Estuary

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Entrance Management Policy

Darkum Creek Estuary

Draft for Public Exhibition

Prepared for: Coffs Harbour City Council and
Office of Environment and Heritage
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Introduction

1.1 Reason for this Policy

The entrance to the Darkum Creek estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Many ICOLL's are manually or artificially opened to the ocean by authorities to 'drain' the estuary for a range of reasons, often to reduce the impacts of flooding around the estuary foreshores. However, artificially opening ICOLL's can impact on estuary health. Therefore a policy is required to outline to Council if and when the entrance to Darkum Creek estuary should be artificially opened.

1.2 The Purpose of this Policy

The purpose of this policy is to provide Council with criteria for initiating an artificial opening event and a procedure for artificial opening of the entrance of Darkum Creek estuary.

1.3 Policy Statement

The Darkum Creek Entrance Management Policy aims to:

- minimise interference with the natural opening and closing regime for Darkum Creek estuary;
- minimise flooding of properties and infrastructure from elevated water levels in the estuary; and
- provide a procedure to address extreme water quality issues in the estuary;
- detail procedures and responsibilities for artificial opening of the estuary entrance; and
- details procedures for monitoring following an artificial opening event.

This policy will be implemented by Coffs Harbour City Council in consultation with the appropriate NSW Government agencies.

1.4 Area to Which this Policy Applies

The area covered by this policy is shown in **Illustration 1.1**. This policy applies to the catchment of the estuary which comprises the waterway, foreshores and land adjacent to the estuary up to the tidal limit of the tributary creeks and the extent of the drainage catchment directly contributing to the estuary waterways. The area relevant to this policy also includes the proposed access route along Woolgoolga Beach for excavator access to the estuary entrance.

1.5 Policy Context

This policy has been prepared as part of the Coastal Zone Management Plan (CZMP) for Darkum Creek estuary. CZMP's for estuaries are prepared in accordance with Part 4A of the *Coastal Protection Act 1979* and the *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010). These guidelines require CZMP's for ICOLL's to include an entrance management policy.

A range of NSW legislation and policies are relevant to estuary management and the establishment of any entrance management policy and subsequent artificial opening procedures.

There may be a range of statutory approvals / licensing requirements that need to be sought in order to undertake entrance management activities, for example artificial opening. A range of approvals may be required due to potentially different land tenures, zonings and statutory provisions. These provisions may include Crown Lands licence under the NSW Crown Lands Act 1989, concurrence from NSW Fisheries for dredge and reclamation work on defined water land under the NSW Fisheries Management Act 1994, or other approvals and licences under the National Parks and Wildlife Act 1974 or the Marine Parks Act 1997.

In addition, the Environmental Planning and Assessment Act 1979 establishes the framework for development control and assessment in NSW. Certain activities may require approval under this Act and associated State Environmental Planning Policies (SEPP) (e.g. SEPP (Infrastructure) 2007). Certain works or activities may either require development consent or be exempt from requiring consent. In the case where works or activities may be exempt from requiring consent, a Review of Environmental Factors (along with all other relevant approvals / licences) would be required under Part 5 of the EP&A Act before works / activities can be carried out. This is addressed more fully in **Section 3** of this policy.

Information shown is for illustrative purposes only



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Darkum Creek Entrance Management Policy
1616533

Area to Which This Policy Applies

Illustration 1.1

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Background

2.1 Entrance Management Issues

Darkum Creek is an ICOLL system that is predominantly closed. There are no records of artificial opening of the entrance being used in the past. Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant present need for artificial opening for the purpose of flood mitigation.

However, sea level rise caused by climate change will result in higher flood inundation levels within the estuary in the future. Current inundation levels are likely to increase by a similar amount as sea level rise increases. Adopted sea level rise estimates for NSW are a 0.4 m increase in sea level by 2050 (relative to 1990 levels) and a 0.9 m increase by 2100. Climate change also has the potential to result in an increased frequency of high rainfall events leading to more frequent flooding events.

This may present a risk of backyard flooding to some properties in the lower northern portion of Safety Beach in the vicinity of Panorama Parade, Baroona Street and Ocean Links Close – refer to **Illustration 2.1**. Some sewage pump stations (eg. PS 6 located to the north of Panorama Parade) may also be at risk of flooding. This would potentially lead to sewage overflows entering the creek system.

2.2 Flood Mitigation

2.2.1 Mitigation for Major Flood Events

No flood study exists for Darkum Creek however flood levels for 1 in 100 year event were estimated as part of the Estuary Processes Study (GeoLINK *et al.*, 2011a). The flood level estimates are shown below in **Table 2.1**. **Illustration 2.1** shows the 3.0 m AHD contour level to provide context for the estimated flood levels.

Table 2.1 Estimates of Flood, Ocean, and Berm Levels for Darkum Creek Entrance

	Levels (m AHD)		
	Immediate	2050	2100
Flood - 1 in 100 year storm event	2.6 ¹	3.0 ²	3.5 ³
Elevated Ocean Levels - 1 in 20 year event ⁴	2.5	2.9	3.5
Elevated Ocean Levels - 1 in 100 year event ⁵	2.7	3.1	3.7
Entrance Berm Height – Almost Certain ⁵	1.3	1.3	1.3
Entrance Berm Height – Unlikely ⁵	2.4	2.8	3.3

- Notes: 1. Flood level at footbridge (email: M. Robertson, Coffs Harbour City Council, 10/05/2012);
 2. Immediate flood level plus 0.4m sea level rise. Source: GeoLINK *et al.* (2011a);
 3. Immediate flood level plus 0.9m sea level rise. Source: GeoLINK *et al.* (2011a);
 4. Source: BMT WBM (2011);
 5. Based on Woolgoolga Lake entrance berm heights sourced from BMT WBM (2011).

It is important to note the flood levels for major events (shown above) are likely to be independent of any artificial entrance opening works. This is due to the effect of the elevated ocean water levels which would 'over-ride' any impact of an open entrance. This can be seen by comparing the elevated ocean levels in **Table 2.1** with the estimated berm heights at the entrance. The data in **Table 2.1** shows the entrance berm heights to be significantly less than the elevated ocean levels. Therefore, artificially opening the estuary entrance will not have any impact on major (1 in 100 year) flood levels.

Therefore, as flood levels for major events are independent of entrance conditions, there is no benefit to artificially opening the estuary entrance for flood mitigation purposes for major events.

2.2.2 Mitigation for Minor Flood Events

No flood study exists for Darkum Creek however it is reasonable to assume that minor flood levels will be less than 2.5 m AHD for present conditions (this equates to a 1 in 20 year elevated ocean level). The extent of inundation at this flood level is indicated by the 2.5 m AHD contour in **Illustration 2.1**. It can be seen that this flood level does not impact on residential properties or sewer pump stations. The only impact on sewer infrastructure at this flood level is potential inundation of sewer manholes within the golf course property near Ocean Links Close. This latter issue could be rectified by sealing the manhole cover against floodwater inflow or raising the manhole cover. It is noted that sewer pump station No.6 (PS 6) is located at a level of approximately 3.2 m AHD.

Therefore, there is no benefit to artificially opening the estuary entrance for flood mitigation purposes for present conditions to address minor flood events as there are no residential properties or infrastructure presently at risk.

2.3 Water Quality

Artificially opening estuary entrances is often carried out as a 'quick fix' to redress water quality problems stemming from other causes such as inadequate stormwater treatment from urban areas or inadequate erosion control measures in the catchment. Best practice for estuary management is based on addressing the source of the water quality issues rather than treating the symptoms by artificially opening entrances to 'flush' an estuary. The CZMP for Darkum Creek estuary includes strategies to address the source of current water quality issues.

Water quality data examined in the Estuary Processes Study for Darkum Creek (GeoLINK *et al.*, 2011) indicates that physico-chemical water quality data collected from Darkum Creek shows a high degree of variability, a common and defining feature of ICOLLs. Comparison of existing water quality against guideline values revealed that turbidity, total nitrogen and chlorophyll-a measurements are all slightly elevated in Darkum Creek, based upon a limited set of samples and the available guidelines (GeoLINK *et al.* 2011a). These slightly elevated readings would not warrant an artificial opening event. Therefore, there is no need for artificial opening of the entrance to improve water quality under 'normal' conditions.

Nevertheless, there may be instances where artificial opening is justified to address extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the creek system. However, it is not considered practical to include triggers to address a broad range of potential water quality scenarios. A range of factors would need to be considered during a water quality crisis, such as:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue;
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the creek.

This policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. It is recommended that any water quality crisis is assessed on an individual basis.

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: July 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



LEGEND

- Contour at 2.5 m AHD
- Sewer pump station 6



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 environmental management and design

Darkum Creek Entrance Management Policy
 1616533

Contour Levels Indicative of Minor Flood Levels

Illustration 2.1

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Approvals

3.1 Statutory Provisions

The area of Darkum Creek and any proposed entrance management works would be located within the Coffs Harbour LGA. The actual water body of Darkum Creek is not zoned, but identified as "Creeks" under the Coffs Harbour Local Environmental Plan (CHLEP) 2000. Land immediately adjacent to and surrounding the defined water body of Darkum Creek is zoned as 6A Open Space and Public Recreation (6A zoning affects land adjoin the entrance) and 7A Environmental Protection Habitat and Catchment under the CHLEP 2000.

Specifically, for the purpose of flooding mitigation works, Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out by or on behalf of a public authority on any land and precludes them from requiring development consent. Clause 50 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land.*
- (2) *A reference in this clause to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with flood mitigation work:*
- (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *environmental management works.*

Specifically, for the purpose of waterway or foreshore management activities, Clause 129 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out by or on behalf of a public authority on any land and precludes them from requiring development consent.

Waterway or foreshore management activities means:

- (a) *riparian corridor and bank management, including erosion control, bank stabilisation, resnagging, weed management, revegetation and the creation of foreshore access ways, and*
- (b) *instream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes, and*
- (c) *coastal management and beach nourishment, including erosion control, dune or foreshore stabilisation works, headland management, weed management, revegetation activities and foreshore access ways, and*
- (d) *coastal protection works, and*
- (e) *salt interception schemes to improve water quality in surface freshwater systems, and*
- (f) *installation or upgrade of waterway gauging stations for water accounting purposes*

Clause 129 of ISEPP 2007 states the following:

Development permitted without consent

- 1) *Despite clause 129A, development for the purpose of waterway or foreshore management activities may be carried out by or on behalf of a public authority without consent on any land.*
- (1A) *To avoid doubt, subclause (1) does not permit the subdivision of any land.*
- (2) *In this clause, a reference to development for the purpose of waterway or foreshore management activities includes a reference to development for any of the following purposes if the development is in connection with waterway or foreshore management activities:*
- (a) *construction works,*

- (b) routine maintenance works,
- (c) emergency works, including works required as a result of flooding, storms or coastal erosion,
Note. Emergency coastal protection works within the meaning of the Coastal Protection Act 1979 are excluded from the operation of the EP&A Act and therefore are not development to which this clause applies.
- (d) environmental management works.

(2A) *The following provisions apply in relation to the carrying out of new coastal protection works by or on behalf of a public authority on the open coast or entrance to a coastal lake:*

- (a) *if a coastal zone management plan is in force in relation to the land on which the development is to be carried out—the public authority (or person carrying out the works on behalf of the public authority) must consider the provisions of that plan before carrying out the development,*
- (b) *if a coastal zone management plan is not in force in relation to the land on which the development is to be carried out—the public authority (or person carrying out the works on behalf of the public authority) must:*
 - (i) *notify the Coastal Panel before carrying out the development, and*
 - (ii) *take into consideration any response received from the Coastal Panel within 21 days of the notification.*

(2B) *For the purposes of subclause (2A):*

new coastal protection works means coastal protection works other than:

- (a) *the placement of sand (including for beach nourishment) or sandbags, or*
- (b) *the replacement, repair or maintenance of any such works.*

Although flood mitigation works and waterway and foreshore management activities would be permitted without consent on any land, the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council would be required to prepare a REF for any proposed relevant works or activities, e.g. artificial opening of Darkum Creek. The REF would outline the nature and extent of the proposal, what would be the trigger and determining factors for proceeding with relevant works / activities such as artificial opening and identify and address any potential environmental effects which may result from such works. Hence the REF would also include mitigation measures and safeguards for the protection of the environment during relevant works / activities. The REF would need to be consistent with the adopted CZMP and entrance management policy for Darkum Creek.

In conjunction with preparation of the REF, Council would be required to consult with and seek any relevant licences and or concurrence from other state government agencies. These would include:

- Crown Lands under the Crown Lands Act 1989;
- Department of Primary Industries - Fisheries under the Fisheries Management Act 1994;
- Marine Parks Authority under the Marine Parks Act 1997;
- NSW Office of Water under the Water Management Act 2000;
- Office of Environment and Heritage (National Parks and Wildlife) under the National Parks and Wildlife Act 1974.

3.1.1 Crown Lands Act 1989

Due to the artificial opening works affecting the waterway of Darkum Creek and the coastline, it is likely that such works would affect Crown Land. Artificial opening of the entrance will require authority by way of licences from the Crown under Part 4, Division 1 of the Crown Lands Act 1989.

3.1.2 Fisheries Management Act 1994

The objectives of the Fisheries Management Act 1994 *are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.* The provisions of Division 3, Part 7 of the Act are likely to be relevant to any works associated with the artificial opening of Darkum Creek. The provisions relate to the protection of aquatic habitat. Although flood mitigation works and waterway or

foreshore management activities would be precluded from requiring consent under ISEPP, the provisions of the Fisheries Management Act 1994 are still applicable and as part of the REF process concurrence from the Department of Primary Industries (Fisheries) would be required for certain activities. **Table 3.1** outlines the relevant provisions of the Act that would apply to the artificial opening of Darkum Creek.

Table 3.1 Activities requiring concurrence under the Fisheries Management Act 1994

Fisheries Management Act 1994	Sections 198-202	Concurrence is required from the Minister, Department of Primary Industries (Fisheries) for dredge and reclamation works on defined water land. The nature of artificial opening would constitute dredge works and also potentially reclamation works in watered land. Hence a permit and concurrence from s required prior to commencement of any works.
	Sections 219-220	Concurrence is required when barriers to the movement of fish including water course crossings are to be constructed or modified. Any proposed artificial opening is unlikely to create a barrier to the movement of fish. However such specifics would need to be confirmed within the REF.
	Sections 204-205	Any artificial opening works would likely be restricted to the sand berm. Any works must not affect mangroves or other protected marine vegetation. If marine vegetation would be harmed by relevant works / activities, a permit must be sought from the Minister before works commence. Clause 205 (2) states that <i>A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part.</i> The REF would need to determine if artificial opening works are likely to affect mangroves or other protected marine vegetation.
	Schedules 4, 4A, 5 and 6	The REF prepared for works associated with artificial opening would need to consider any presence of local threatened aquatic habitat for flora or fauna. Thus Key Threatening Processes (KTPs) would need to be considered in preparation of the REF. The following KTPs may be relevant and required consideration: <ul style="list-style-type: none"> ▪ <i>Degradation of native riparian vegetation along NSW water courses.</i> ▪ <i>Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.</i>

3.1.3 Marine Parks Act 1997

As Darkum Creek forms park of the Solitary Islands Marine Park, Council would be required to obtain a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 in order to undertake any works on land affected by the Marine Park and any associated zoning. Preparation of the REF would need to consider these factors and seek the relevant concurrence / permit.

3.1.4 Water Management Act 2000

A controlled activity approval under the Water Management Act 2000 (WM Act) is required for certain types of developments and activities that are carried out in or near a river, lake or estuary (water land). Under the WM Act, a controlled activity means:

- the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
- the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or

- the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- the carrying out of any other activity that affects the quantity or flow of water in a water source.

Artificial opening of Darkum Creek would constitute a controlled activity under the WM Act. However under the Water Management (General) Regulation 2011, Clause 38 Controlled activities—public authorities, states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.*

Although Coffs Harbour City Council would be exempt from requiring a Controlled Activity Approval, Clause 37, *Condition applying to all exemptions under this Subdivision*, of the Regulations states: *An exemption conferred under this Subdivision is subject to the condition that the person by whom the relevant controlled activity is carried out must comply with applicable requirements (if any) of the Minister that are published in the Gazette, or notified in writing to the person, for the purposes of this clause and that are for the protection of:*

- (a) *the waterfront land on which the activity is carried out, or*
- (b) *any river, lake or estuary to which that land has frontage.*

3.1.5 National Parks and Wildlife Act 1974

The Darkum Creek system falls within the Coffs Coast Regional Park. The park was created through a partnership of Council and the National Parks and Wildlife Service (now within OEH). The National Parks and Wildlife Act 1974 applies if the park is a reserve made under the Act. The Park's management is guided by a Trust Board. Preparation of an REF for artificial opening works would need to determine whether or not the park is a reserve under the Act and hence consultation / concurrence are required with OEH / National Parks and Wildlife Service. Consultation with the Trust Board would be required whether or not the park is affected by the Act. The REF would also need to consider any management plan that has been prepared for the park.

3.2 Summary of Potential Approvals

Works / activities for the purpose of flood mitigation or waterway / foreshore management (to address an extreme water quality issue) would be permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed works / activities (e.g. artificial opening of the entrance to Darkum Creek estuary). The REF needs to be consistent with the adopted CZMP and entrance management policy for Darkum Creek estuary.

Preparation of the REF will involve consultation with relevant state government agencies. This will confirm the necessary approvals and licences required for artificial opening of the entrance. Preliminary assessment indicates the following approvals and licences may be necessary:

- a license from the Department of Crown Lands under the Crown Lands Act 1989;
- a permit and concurrence from the Minister, Department of Department of Primary Industries (Fisheries) under the Fisheries Management Act 1994 pursuant to Sections 198-202 for dredge and reclamation works on defined water land (the nature of artificial opening would constitute dredge works and also potentially reclamation works); and
- a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 as Darkum Creek forms park of the Solitary Islands Marine Park.

The Darkum Creek system falls within the Coffs Coast Regional Park, which was created through a partnership of Council and the National Parks and Wildlife Service. Consultation with the National Parks and Wildlife Service and Trust Board is required to determine if any approvals are required under the National Parks and Wildlife Act 1974.

It is noted that a Controlled Activity Approval under the Water Management Act 2000 is not required due to the Water Management (General) Regulation 2011, Clause 38 Controlled activities - public authorities, which states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.* However, Council is still required to follow any applicable guidelines of NSW Office of Water under the Water Management Act 2000.

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Artificial Opening Procedure

4.1 Decision Making Process

This policy presently only recommends artificial opening of the Darkum Creek estuary entrance in the event of extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the creek system. However, the decision to initiate an artificial opening event will be based on assessment of each individual circumstance of an extreme water quality issue with consideration of:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue; and
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the creek.

As noted in **Section 2.3**, this policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. Determining what constitutes an extreme water quality issue would include reference to water quality monitoring results for Darkum Creek to determine if the issue is 'outside' normal water quality variations for the creek system.

The general decision making process / procedure for determining if artificial opening is to be employed to address an extreme water quality issue is shown in the flow chart in **Illustration 4.1** and involves:

- Following warning of potential extreme water quality issues Council's designated officer will alert relevant state government agencies of the issues and potential for an artificial opening event;
- Council's designated officer will then conduct a site assessment and/or review of water quality monitoring data to determine in consultation with relevant state government agencies if artificial opening is an appropriate response;
- If artificial opening is considered an appropriate response Council's designated officer will initiate deployment of Council's personnel and machinery to the entrance and direct when and where artificial opening is to be initiated. Ideally, the artificial opening should be initiated during a falling tide and shortly after the tide turns from high to low (if possible around a spring tide when tidal fluctuations are larger).

4.2 Responsibilities for Artificial Opening

Coffs Harbour City Council is responsible for artificial opening of the entrance.

4.3 Monitoring

When artificial openings have been carried out, monitoring of the entrance should be undertaken to determine the efficiency of the opening. For each artificial opening event, the following data will be tested / recorded:

- prior to opening:
 - testing of water quality parameters relevant to the specific water quality issue;
 - survey water level of creek prior to opening;
- date and time of opening;
- survey water levels of creek over 24 hours following opening;

- testing of water quality parameters relevant to the specific water quality issue over 24 hours and at appropriate intervals following 24 hours after the opening;
- location and length of excavation;
- approximate width and depth of initial channel;
- ocean swell conditions (wave height and direction);
- preceding rainfall;
- date of closure;
- digital photographs.

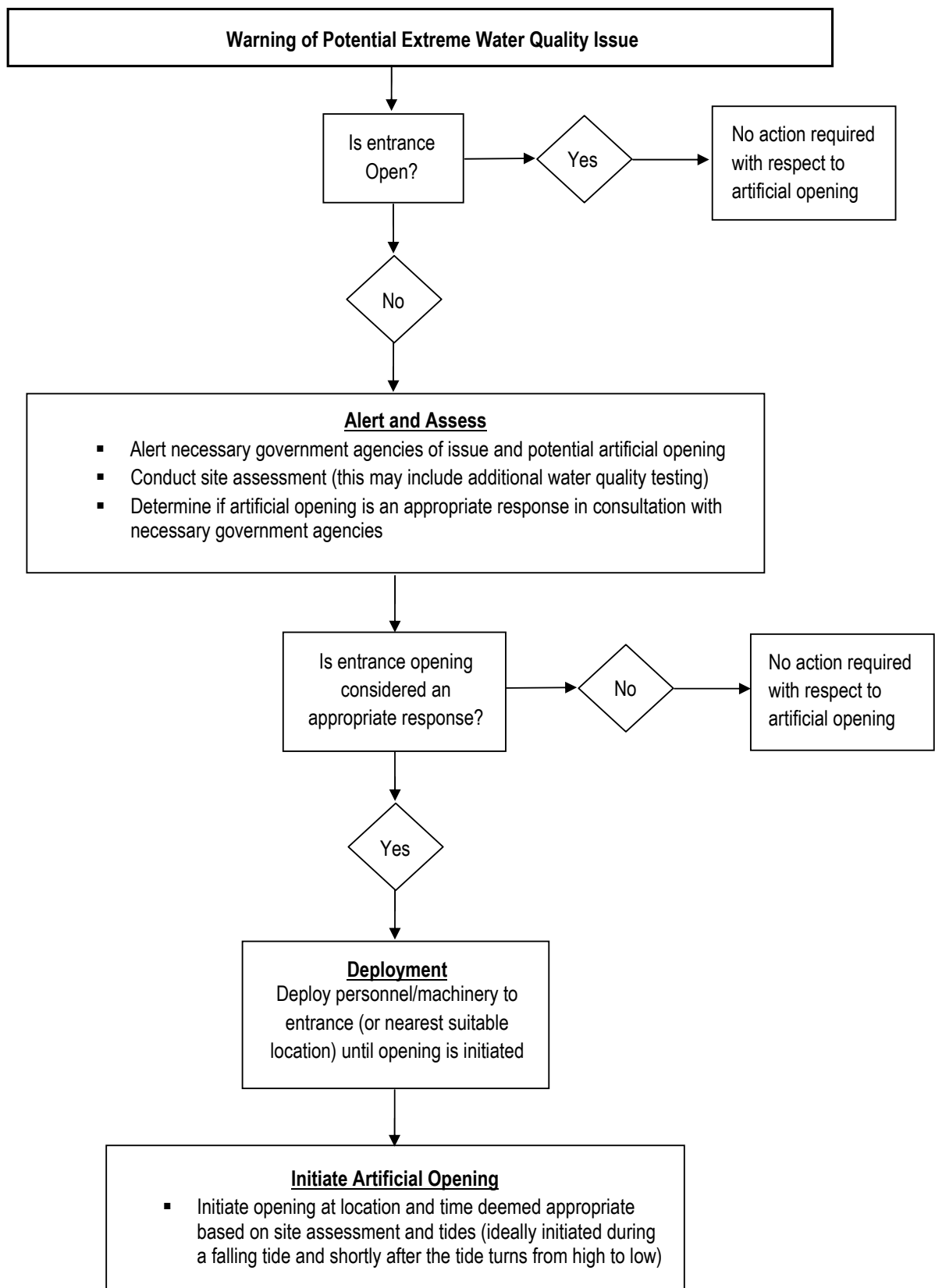


Illustration 4.1 Artificial Opening Decision Making Flowchart

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Policy Updates

5.1 Review and Update of this Policy

This Policy and the associated REF should be reviewed every five years or in response to:

- legislation changes; and
- any other significant factors relevant to artificial opening of the entrance of Darkum Creek estuary.

Review of the policy will include analysis of all monitoring data collected over that period to assess if the assumptions and procedures outlined in the current policy and REF are correct or appropriate. This will include a review of changes to climate change and sea level rise predictions and consequent impacts to this policy.

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Acronyms

AHD	Australian Height Datum
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CHLEP	Coffs Harbour Local Environmental Plan
CZMP	Coastal Zone Management Plan
ICOLL	Intermittently Closed and Open Lake and Lagoon
ISEPP	State Environmental Planning Policy (Infrastructure), 2007
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory
PS	Pump Station
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy

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Appendix B

Funding Sources

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Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
<p>Various – jointly administered by Northern Rivers Catchment Management Authority (NRCMA)</p>	<ul style="list-style-type: none"> ▪ Various – jointly administered by NRCMA 	<ul style="list-style-type: none"> ▪ Community capacity targets. These include targets with respect to the awareness, knowledge and skills of the community in relation to Natural Resource Management, and the levels of engagement of the community. These are specifically: <ul style="list-style-type: none"> ▪ CCB1, Awareness knowledge and skills; ▪ CCB2, Community engagement; and ▪ CCB3, Community support. ▪ Land use planning targets. The relevant land use planning targets relate to aboriginal cultural integration in the planning process, environmental assets and significant farmland protection, landuse conflict within and adjacent to key environmental and farming assets and the integration of natural resource assets into planning. They are specifically; <ul style="list-style-type: none"> ▪ LUP1, Aboriginal cultural integration; ▪ LUP2, Environmental assets/rural production areas; ▪ LUP3, Land use conflict and key natural resources; and ▪ LUP4, Natural resource integration. ▪ Biodiversity targets. These targets relate to the area of land under secure conservation management, habitat connectivity, the mitigation of threats to biodiversity, threatened species management, sustainable management of terrestrial and aquatic ecosystems and habitat rehabilitation and revegetation. The targets are; <ul style="list-style-type: none"> ▪ B1, Secure conservation management; ▪ B2, Habitat connectivity; ▪ B3, Biodiversity threat mitigation; ▪ B4, Threatened species; ▪ B5, Biodiversity management and enhancement; and ▪ B6, Habitat rehabilitation and revegetation. ▪ 	<p>Funding (General): http://www.northern.cma.nsw.gov.au/get-involved/funding</p> <p>Current Funding Opportunities: http://www.northern.cma.nsw.gov.au/get-involved/funding</p>

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		<ul style="list-style-type: none"> ▪ Water targets. These targets relate to the integrated management of urban water cycles and community education about and monitoring of water resources. The targets are; <ul style="list-style-type: none"> ▪ W1, River structure riparian vegetation and fish passage; ▪ W2, Urban water cycle management; ▪ W3, Water information and education; and ▪ W4, Aquifer health and river flow. ▪ ▪ Coastal targets. The relevant coastal targets relate to the management and assessment of coastal lakes and estuaries. The targets are; <ul style="list-style-type: none"> ▪ C1, Coastline; and ▪ C2, Estuaries and coastal lakes. ▪ ▪ Marine targets. The relevant marine targets relate to management practices that reduce threats to and impacts on the marine environment. The targets are; <ul style="list-style-type: none"> ▪ M1, Marine research and planning; ▪ M2, Best practice; ▪ M3, Marine protected areas; and ▪ M4, Improved marine environment management practices. ▪ ▪ Soil and land resource targets. The most relevant of the soil and land targets relates to the area of high risk acid sulfate soils under active management. The complete list of targets is; <ul style="list-style-type: none"> ▪ L1, Soil health; ▪ L2, Acid sulphate soils; and ▪ L3, Soil conservation/remediation. ▪ 	
Caring for Our	Jointly administered by the Australian Government:	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to achieve an environment that is healthy, better protected, well-managed, resilient 	http://www.nrm.gov.au/index.html

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Country	<ul style="list-style-type: none"> ▪ Department of Agriculture, Fisheries and Forestry; and ▪ Department of Sustainability, Environment, Water, Population and Communities 	<p>and provides essential ecosystem services in a changing climate.</p> <p>Priorities:</p> <ul style="list-style-type: none"> ▪ the National Reserve System; ▪ biodiversity and natural icons; ▪ coastal environments and critical aquatic habitats; ▪ sustainable farm practices; ▪ natural resource management in northern and remote Australia; and ▪ community skills, knowledge and engagement. 	
Estuary Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to provide support to councils to improve the health of NSW estuaries; and ▪ understand the potential risks from climate change. <p>Support provided to councils under these programs includes financial assistance to:</p> <ul style="list-style-type: none"> ▪ prepare estuary management plans and supporting studies; ▪ carry out projects to improve estuary health. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ updating estuary plans to consider climate change impacts, including sea level rise ▪ estuary health monitoring and improvement ▪ focusing on high-hazard coastal areas and stressed estuaries. <p>Grant offers are subject to availability of funds for each financial year and State-wide priorities. Funding of up to 50% of a project's costs will normally be offered for successful grant applications.</p>	<p>http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm</p>

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Coastal Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to provide support to local councils to manage the risks from coastal hazards such as coastal erosion, ▪ and to restore degraded coastal habitats. <p>Support provided to councils under these programs includes financial assistance to:</p> <ul style="list-style-type: none"> ▪ prepare coastline, and coastal zone management plans and supporting studies ▪ carry out projects to reduce risks associated with coastal hazards and improve coastal environments. <p>▪ updating coastal hazard studies to incorporate sea-level rise benchmarks</p> <p>▪ focusing on high-hazard coastal areas and stressed estuaries.</p> <p>Grant offers are subject to availability of funds for each financial year and State-wide priorities. Funding of up to 50% of a project's costs will normally be offered for successful grant applications.</p>	http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm
Floodplain Management Program	NSW Department of Environment and Heritage	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ to reduce the impacts of flooding and flood liability on communities; and ▪ to reduce private and public losses resulting from floods, utilising ecologically positive methods wherever possible. <p>Priorities:</p> <p>Provides financial support to councils and eligible public land managers to:</p> <ul style="list-style-type: none"> ▪ make informed decisions on managing flood risk by preparing floodplain risk management plans (and associated background studies) under the floodplain risk management process; ▪ implement floodplain risk management plans to reduce flood risk to both existing and future development, and reduce losses through a range of property, flood and response modification measures as outlined in the manual; and ▪ provide essential information to the State Emergency Service to enable the effective preparation and implementation of local flood plans to deal with flood emergency response. <p>Assistance under the program is normally offered by the State Government providing \$2 for</p>	http://www.environment.nsw.gov.au/coasts/InfoCoastEstFloodGrants.htm

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Environmental Trust Grants	NSW Department of Environment and Heritage	<p>every \$1 provided by the council.</p> <ul style="list-style-type: none"> ▪ to encourage and support restoration and rehabilitation projects; ▪ to promote research into environmental problems of any kind; ▪ to promote environmental education in both the public and private sectors; ▪ to fund the acquisition of land for the national parks estate; ▪ to fund the declaration of areas for marine parks and for related purposes; ▪ to promote waste avoidance, resource recovery and waste management (including funding enforcement and regulation and local government programs); ▪ to fund environmental community groups; and ▪ to fund the purchase of water entitlements for the purpose of increasing environmental flows for the State's rivers and restoring or rehabilitating major wetlands. <p>Relevant Programs:</p> <ul style="list-style-type: none"> ▪ the urban sustainability program funds projects carried out by local councils in partnership with the community that protect and restore the urban environment; ▪ the lead environmental community groups program provides administrative funds for environmental organisations that work with their communities to conserve the environment; ▪ the environmental restoration and rehabilitation program funds projects that restore or rehabilitate degraded areas, or protect important ecosystems and habitats, prevent or minimise future environmental damage and enhance the quality of specific environmental resources; ▪ the environmental education program supports projects that increase commitment to protecting the environment and promoting sustainable behaviour; ▪ the environmental research program funds projects managed by educational institutions and government agencies that research local solutions to environmental problems and ways of operating that are less harmful to the environment; ▪ the eco schools program funds schools so they can involve their students and the community in developing and implementing environmental management projects; ▪ the protecting our places program supports projects that restore or rehabilitate Aboriginal land or land that is culturally significant to Aboriginal people, or that educate 	http://www.environment.nsw.gov.au/grants/envtrust.htm

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		Aboriginal and other communities about the environment.	
Grants to Voluntary Environment Heritage Organisations (GVEHO)	Australian Government: Department of Sustainability, Environment, Water, Population and Communities	Objectives: <ul style="list-style-type: none"> help eligible community based environment and heritage organisations to value, conserve and protect Australia's natural environment and historic heritage by assisting with their administrative funding. 	http://www.environment.gov.au/about/programs/gveho/index.html
		Priorities: <ul style="list-style-type: none"> funds provided may be used to assist with salaries and salary on-costs for executive and administrative staff; office accommodation rental; electricity, gas, phone and other similar charges; essential office supplies and equipment; staff and volunteer training; photocopying and printing costs; and travel costs incurred on behalf of the organisation. 	
NSW Recreational Fishing Trusts	NSW Department of Primary Industries	Objectives: <ul style="list-style-type: none"> projects that improve recreational fishing in NSW; anyone can apply for funding from the Recreational Fishing Trusts, including fishing clubs and organisations, universities, councils, community groups, individuals and so on. Joint applications are also encouraged. funding applications must relate to the improvement of recreational fishing. 	http://www.dpi.nsw.gov.au/fisheries/recreational/licence-fee/apply-for-funds
		Priorities: <ul style="list-style-type: none"> recreational fisheries enhancement; angler education and information; research on recreational fishing; recreational fisheries access and facilities; and recreational fisheries sustainability 	
NSW Maritime Infrastructure Program: Better Boating Program Regional	NSW Transport Maritime	Objectives: <ul style="list-style-type: none"> the Better Boating Program provides waterways infrastructure for the benefit of the boating community and the marine sector on New South Wales waterways; the BBP provides individual grant contributions to proponents such as Local Government, State agencies, boating organisations and community groups for the 	http://www.maritime.nsw.gov.au/mpd/infra_program.html

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Infrastructure Grants		<p>development of public boating infrastructure.</p> <p>Priorities: Consideration for BBP funding will only be given to those projects that are:</p> <ul style="list-style-type: none"> ▪ principally infrastructure works of a lasting nature; ▪ intended to greatly improve current amenities (or addresss the lack thereof); ▪ located in a readily accessible public area with unrestricted public access; ▪ for use of or available to, a broad cross-section of the public boating community; ▪ situated either on public land or land owned by the Local Council, the Crown or NSW Maritime; ▪ able to be commenced within 6 months of the approval of the grant and be completed within 18 months from this approval date. It should be noted that any funding grants not utilised within that period may be withdrawn; ▪ supported in writing by key stakeholders, including the Local Council; ▪ able to meet the Program's criteria for assessment and are submitted by the nominated closing date. 	
Raising National Water Standards Program	Australian Government: National Water Commission	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ support for projects that are improving Australia's national capacity to measure, monitor and manage our water resources. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ funds are directed at activities across three strategic investment areas: <ul style="list-style-type: none"> - advancing the implementation of the National Water Initiative - improving integrated water management across Australia - improving knowledge and understanding of our water resources. ▪ more than 175 Raising National Water Standards projects have been funded under the following themes: <ul style="list-style-type: none"> - water accounting - emerging water markets - water planning and management - knowledge and capacity building 	<p>http://www.nwc.gov.au/ www/html/347- introduction-to- rnws.asp</p>

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
		<ul style="list-style-type: none"> - irrigation and other rural water - water-dependent ecosystems - integrated urban water management - groundwater - northern rivers - national assessment of water resources - Northern Australia water futures assessment 	
Country Towns Water Supply and Sewage Program	NSW Department of Primary Industries Office of Water	<p>Objectives:</p> <ul style="list-style-type: none"> ▪ a major government reform program that provides management, technical and financial support to local water utilities (LWUs) in the provision of water supply and sewerage services to country towns in NSW. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ management assistance through the Best-Practice Management of Water Supply and Sewerage Guidelines. ▪ technical assistance through: <ul style="list-style-type: none"> - regular inspections and advice on water and sewage treatment works operational problems - conducting water supply and sewerage operator training seminars/ courses - pre commissioning inspections of Fluoridation Plants and technical assistance to NSW Health to enable councils to comply with requirements under the Fluoridation of Public Water Supplies Act 1957 and in certification of fluoridation officers. - ongoing LWUs dam safety inspections and mentoring/ training of operators - ongoing LWUs liquid trade waste discharge approvals - conducting regional trade waste regulation courses - providing help desk services. ▪ financial assistance through grants to local water utilities towards the capital cost of works to address the backlog in water supply and sewerage infrastructure. 	http://www.water.nsw.gov.au/Urban-water/Country-town-water/default.aspx
Job Services	Australian Government:	Objectives:	http://www.deewr.gov.a

Fund Name	Funding Body(ies)	Objectives and Priorities	Web Address
Australia – New Enterprise Incentive Scheme (NEIS)	Department of Education, Employment and Workplace Relations	<ul style="list-style-type: none"> ▪ to give young people, aged 17 to 20 years, quality training and experience through structured and supervised projects that focus on areas where natural environmental conservation work and cultural heritage restoration is required ▪ to contribute to high priority conservation projects, to promote environmental, conservation and natural heritage outcomes and through this benefit the community and the environment and ▪ to contribute to NEIS participants': <ul style="list-style-type: none"> - personal development, including teamwork and leadership skills - skill development and training through activities that are structured and sequential in their learning outcomes - strengthened connections with the community through relationships, participation and contribution to the community; and - improved career and employment prospects through accredited training and on-the-project training. <p>Priorities:</p> <ul style="list-style-type: none"> ▪ DEEWR provides funding for NEIS teams to work on projects which focus on areas where environmental and heritage restoration and conservation are needed ▪ participants in the NEIS programme work in teams from a central or regional location and may undertake projects in remote locations ▪ each project has a community focus and is developed in consultation with community representatives and ▪ participants undertake accredited training which enable them to complete project tasks, and increases their capacity to move into employment or further training at the end of their placement. 	u/Employment/JSA/EmploymentServices/Pages/NEIS.aspx

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Appendix C

Summary of Estuary Processes Study

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Darkum Creek is an Intermittently Closed and Open Lakes and Lagoon (ICOLL). Darkum Creek is a relatively small and remote coastal estuary. There is significant water-based activity with kayaking, canoeing and fishing in the creek. The primary land-based recreational activity is generated by the coastal walk which is facilitated by the pedestrian footbridge across the creek. The bridge enables a continuous pedestrian and bicycle route which follows the coastline and connects the residential communities of Arrawarra in the north to Woolgoolga in the south. The walk offers an easy, convenient and safe pedestrian corridor through an attractive coastal setting.

The total catchment area of Darkum Creek is relatively small at approximately 6 km². The catchment comprises State Forest, banana plantations and blueberry farms in the upper limits of the catchment, large areas of cleared agricultural land in the mid-catchment with some medium to large areas of forested agricultural land in the mid to lower catchment. The tidal limit of Darkum Creek is located near the existing Pacific Highway. The creek is part of the Solitary Islands Marine Park and is zoned as a Habitat Protection Zone up to the tidal limit.

The Woolgoolga Returned Services golf course adjoins a large section of Darkum Creek and comprises a large portion of the estuary catchment. The Safety Beach residential area is situated in the southern portion of the estuary catchment. The eastern fringe of the estuary catchment is located in the Coffs Coast Regional Park.

The key findings and recommendations of the *Data Compilation and Estuary Processes Study – Darkum Creek, Woolgoolga Lake and Willis Creek* (GeoLINK *et al.*, 2011) is summarised below for Darkum Creek.

C.1 Hydrodynamics

C.1.1 Hydrodynamic States and Entrance Behaviour

Darkum Creek generally has a closed entrance. Aerial photography from 1943 to 2011 indicates the entrance is open approximately 40% of the time (it is noted that the interpretation is not precise as the frequency of photographs is inadequate for this task). No artificial opening of the Darkum Creek entrance has been recorded. Council does not have any opening protocol for the creek.

Conductivity levels indicate that Darkum Creek is subject to regular seawater ingress. This is assumed to be related to periods of tidal behaviour restricted to higher stages of the tide during spring tide cycles that wash over the entrance berm. This results in a small rise and fall in water levels in the creek lagoon.

The estuary entrance location is relatively stable based on the aerial photography dating back to 1943.

A 2004 hydrographic survey of Darkum Creek indicates the entrance berm height was in the range of 1.7 to 1.9 m AHD. The entrance was closed at the time of the survey.

C.1.2 Coastal Processes and Inundation

The long term shoreline recession on Safety Beach from coastal processes and sea level rise is not likely to be significant (approximately 20 m recession) as indicated in to **Plate C.1**. The yellow and red dashed lines in **Plate C.1** refer to the unlikely and rare scenarios for beach recession for the year 2050.

Flooding within Darkum Creek as a result of elevated ocean levels during storms will be exacerbated by sea level rise – refer to **Plate C.2**. The inundation extents around Darkum Creek are generally limited to areas of the golf course.

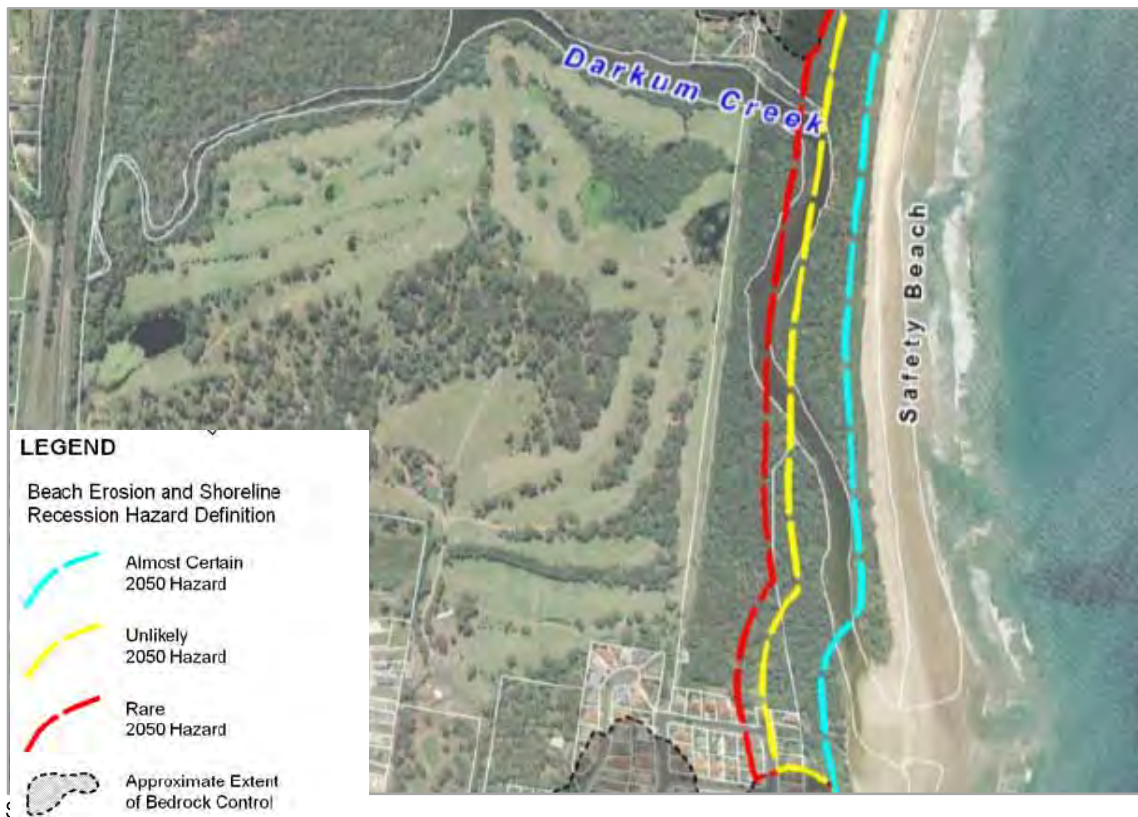
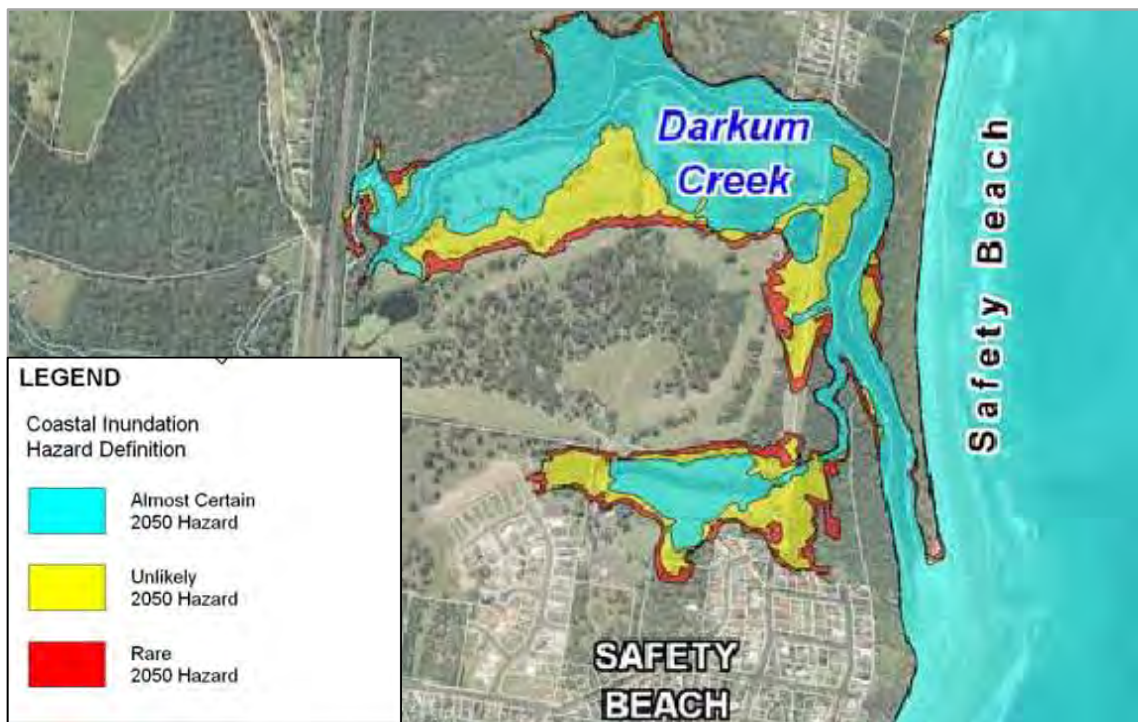


Plate C.1 Beach Erosion and Shoreline Recession Mapping for the Year 2050



Source: BMT WBM (2010b)

Plate C.2 Coastal Inundation Mapping for the Year 2050

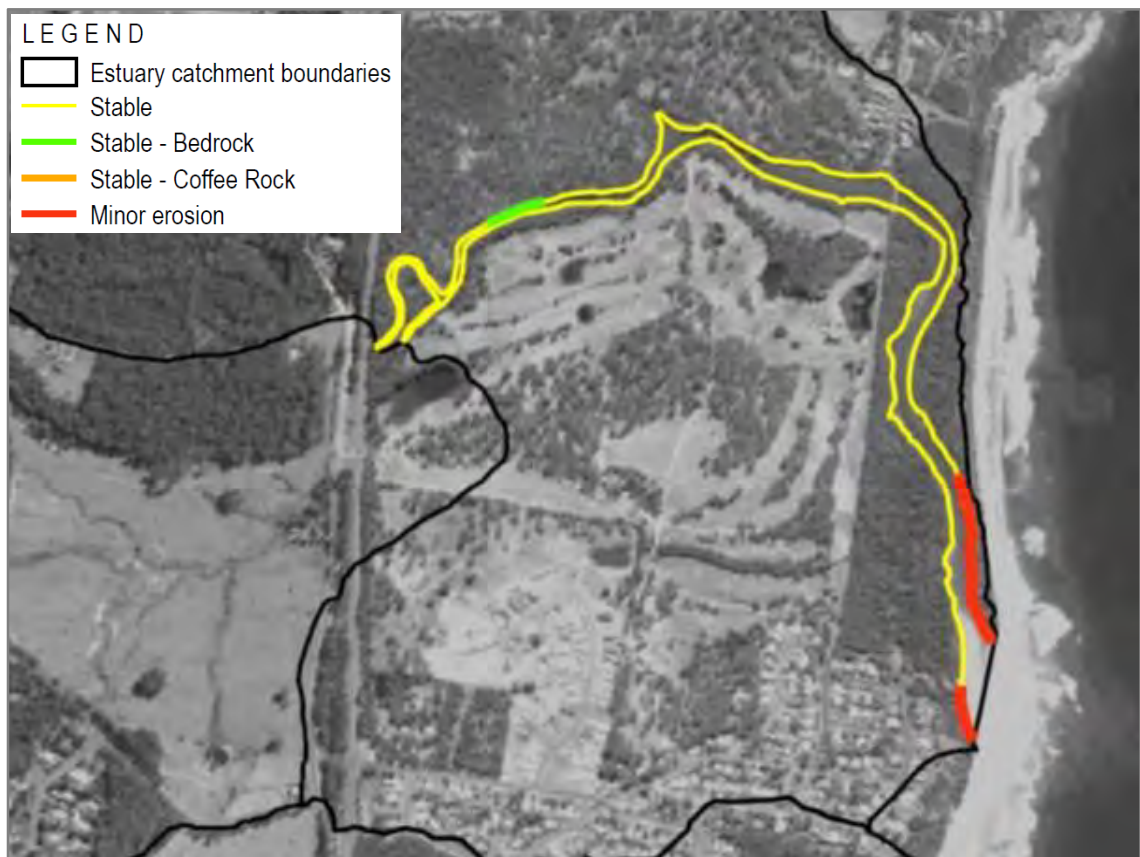
C.2 Geomorphology and Sediment Dynamics

C.2.1 Bank Erosion

Bank erosion is not a significant issue in the Darkum Creek estuary with no moderate or severe erosion identified and minor erosion only occurring on 9% of estuary banks - predominantly in the marine tidal delta (refer to **Plate C.3** and **C.4**). The remaining banks are naturally stable (i.e. stable without the use of erosion protection works).



Plate C.3 Bank Erosion - scour and undercutting, lower Darkum Creek – left bank (looking north)



Source: GeoLINK *et al.* (2011)

Plate C.4 Bank Erosion Severity (mapped January 2011)

C.3 Water Quality Processes

Physico-chemical data collected from Darkum Creek shows a high degree of variability, a common and defining feature of ICOLLs. Median turbidity readings exceed ANZECC (2000) guidelines and DECCW MER guidelines.

Chemical water quality is poorly represented in the available dataset for Darkum Creek, however, median concentrations of Total Nitrogen (TN) exceed ANZECC (2000) default guideline values. In both cases Dissolved Organic Nitrogen (DON) is the dominant form present. Darkum Creek does not appear to be phosphorus enriched.

With respect to biological water quality, a large number of faecal indicator organism samples have been collected, but only a small number of chlorophyll-a samples have been collected from Darkum Creek. Faecal indicator organism samples indicate that the waters of Darkum Creek for the period sampled are generally safe for primary contact recreation. Chlorophyll-a concentrations indicate that Darkum Creek has a slightly elevated but not alarming trophic status.

A Catchment Management Support System (CMSS) model was set up to assess nutrient and sediment loads from the Darkum Creek catchment. The results indicate that horticultural land uses are the main contributor of sediment, nitrogen and phosphorus but that land under pasture and residential areas also contribute significant levels of sediment and nitrogen.

C.4 Ecological Processes

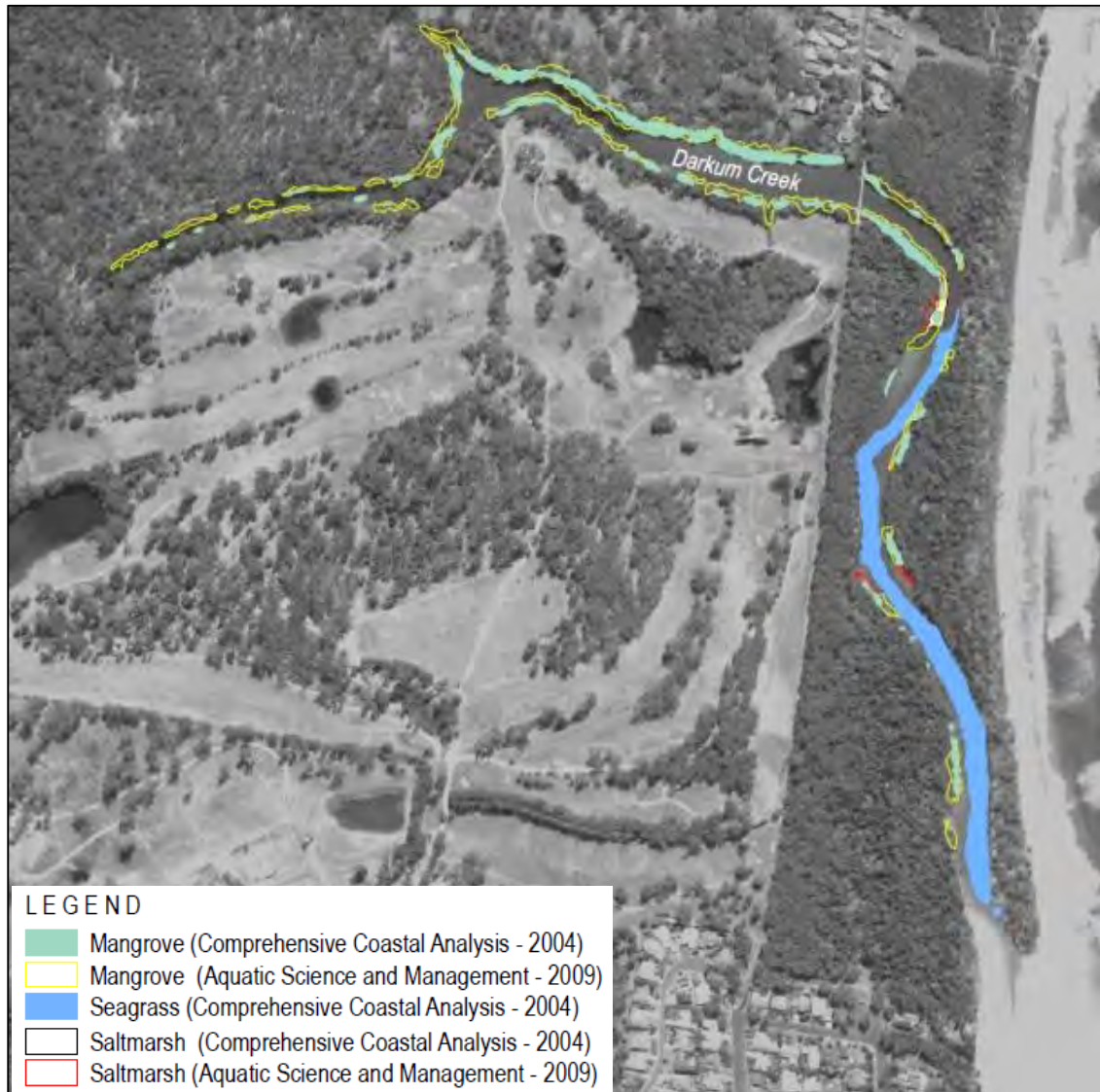
C.4.1 Estuarine Habitat

The entrance area of Darkum Creek offers little structured aquatic habitat. The benthic material is sand. The position of the channel and banks is dynamic in this part of the creek and as a result vegetation is largely absent from these features for most of the time.

The central channel of Darkum Creek (the creek length predominantly shown in **Plate C.5**) is a long section of relatively homogenous aquatic habitat availability. The following habitat features distinguish the central channel:

- the benthic material is a patchy mixture of sand, mud and gravel. Most of the benthos is below the typical low tide level, meaning intertidal habitats are sparse;
- mixed species of mangroves grow along the creek bank as wide bands and scattered individuals for most of the length of the estuarine region.
- there are two small patches saltmarsh habitat present in the central channel, dominated by marine rush (*Juncus kraussii*) and salt couch (*Cynidolon dactylon*);
- there were no submerged aquatic macrophytes, such as seagrass or algae, actively growing at the time of the survey. During the CCA survey (DPI 2006) a significant patch of seagrass (*Halophila sp.*) was mapped at the entrance – refer to **Plate C.5**. This particular species is known to be dynamic in its occurrence and distribution. It is quite possible that when conditions are optimal that it will reoccur in a similar part of the creek;
- snags are a key habitat type in Darkum Creek, particularly along the central channel. Fallen trees along the bank and logs in the middle of the channel are common occurrences. Along with mangrove pneumatophores and gravel beds, snags represent most of the in-stream structural habitat for fish and invertebrates in Darkum Creek; and
- the other features of the central channel that provide habitat value are reeds and rushes (mostly common reed (*Phragmites australis*) and river club rush (*Schoenoplectus validus*)) and the root balls and overhanging branches of riparian vegetation.

The upper estuary zone of Darkum Creek is limited to the short section where the channel narrows dramatically. The key differences in this zone are the lack of mangroves, narrower channel and steeper banks. Riparian vegetation is dominated by rushes and reeds amongst swamp oak (*Casuarina glauca*) and paperbark (*Melaleuca quinquinerva*) forest. Overhanging vegetation and root balls in the bank create structured habitat. The benthic material in this upper part of the creek is a patchy mixture of gravel and mud.



Source: GeoLINK *et al.* (2011)

Plate C.5 Bank Erosion Severity (mapped January 2011)

C.4.2 Aquatic Fauna

The central regions of the creek contain the most diverse and abundant benthic macroinvertebrate fauna. A survey of fish species was undertaken with relatively few animals from a small number of taxa collected. No threatened aquatic species have been individually reported from Darkum Creek.

C.4.3 Riparian Vegetation

Riparian vegetation through the study area is generally in good to very good condition (87% of surveyed banks) – refer to **Plate C.6**. Saltmarsh and mangrove habitats are in good condition and mangroves are widely dispersed with evidence of consistent recruitment. The riparian corridor is largely intact.



Source: GeoLINK *et al.* (2011)

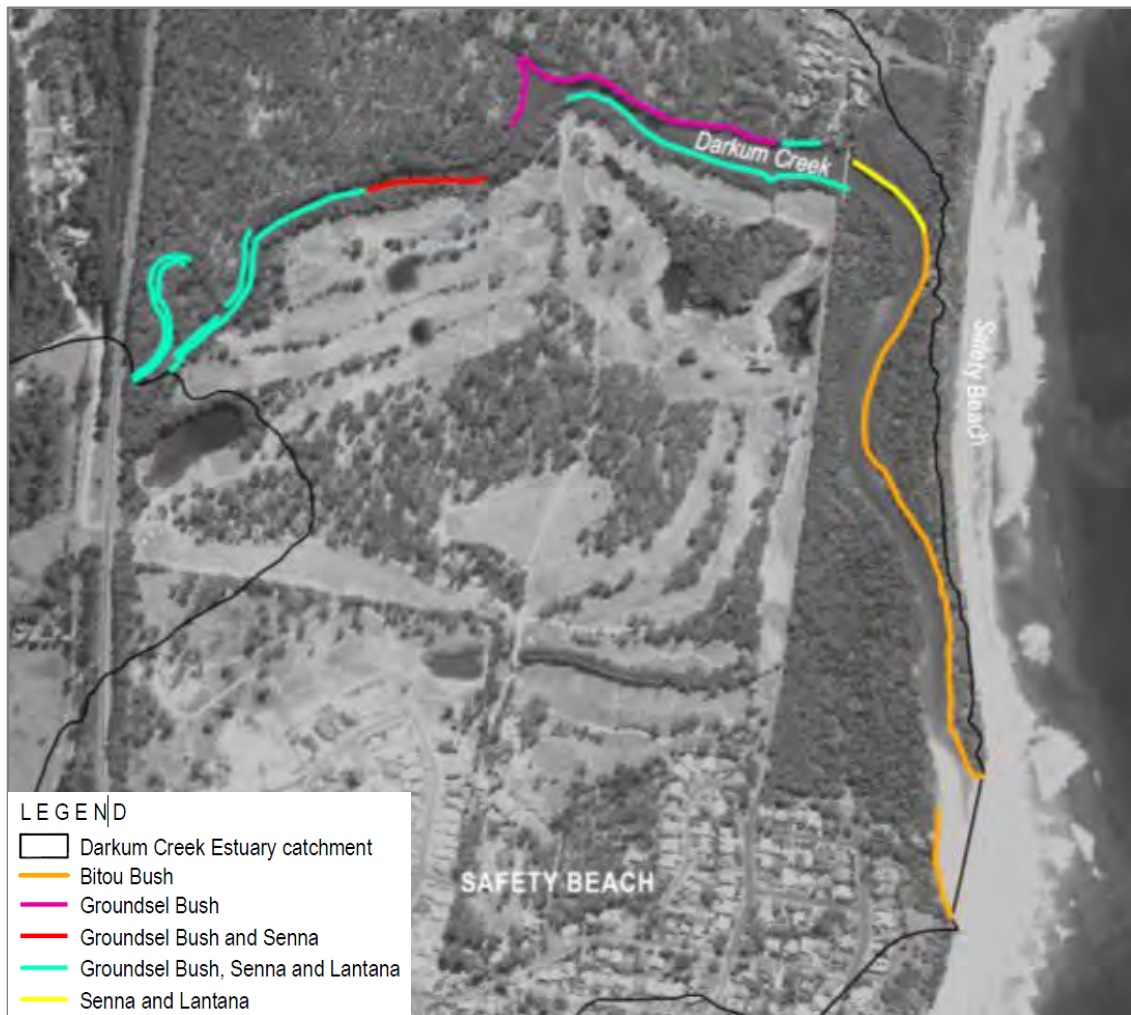
Plate C.6 Riparian Vegetation Condition (mapped January 2011)

The distributions of major weeds along the estuary have been mapped – refer to **Plate C.7**. Four of the mapped invasive weed species are listed as Priority B or C in coastal or riparian landscapes under the Northern Rivers Invasive Weed Strategy 2009-2013. It is recommended that priorities and appropriate strategies for weed control and riparian regeneration be determined in the EMP.

C.4.4 Estuary Health

In general, the health of Darkum Creek is good:

- water quality is generally acceptable for the protection of aquatic ecosystems;
- saltmarsh and mangrove habitats are in good condition and mangroves are widely dispersed with evidence of consistent recruitment;
- the riparian corridor is largely intact;
- there are many snags throughout the estuary providing valuable structural habitat;
- there is no evidence of fish kills, pest invasions or algal blooms; however
- fish and macroinvertebrate populations are scarce and lack diversity.



Source: GeoLINK *et al.* (2011)

Plate C.7 Distribution of Priority B and Priority C Invasive Weed Species (mapped January 2011)

C.5 Climate Change and Sea Level Rise

Climate change is projected to include an increased frequency of hot days, increased intensity and frequency of extreme daily rainfall events and droughts, changes to sea levels and changes in the occurrence of intense storm events. Climate change projections at the local scale for the Coffs Harbour area are described in a report by BMT WBM (2010a). The climate change projections for the Coffs Harbour area (relative to the 1977 to 2007 period) include the following:

- evaporation: decreases in summer and spring and increases in autumn and winter;
- temperature: decreases in average temperatures for summer, autumn and spring and increases in winter;
- Extreme Hot Days: significant increases in the annual number of extreme hot days;
- Average Rainfall: increases in annual totals and seasonal totals except for decreases in autumn totals for the Coffs Harbour area;
- High Rainfall Events: increases in frequency of high rainfall events in summer and autumn;
- Sea Level Rise: 0.4 m increase in mean sea level by 2050 and 0.9 m increase by 2100 (relative to 1990 mean sea levels); and

- Wave Climate: future wave climate will be similar to the present or within the variability of the existing wave climate. However, the Coffs Harbour Coastal Processes and Hazards Definition Study (BMT WBM, 2010b) investigated the possibility of a permanent shift from the existing south easterly wave climate to a more easterly wave climate with average wave height remaining the same.

C.5.1 Climate Change and Sea Level Rise Impacts on Estuary Processes

General estuary processes that will be impacted by climate change include (after Haines, 2006 and 2008; Mackenzie *et al.*, 2009):

- coastal processes and interactions with estuary entrances: e.g. a landward and upward shift in entrance channels in response to sea level rise;
- hydrodynamics: changes in water level and altered tidal prisms due to changes to entrance conditions; impacts of altered rainfall and evaporation patterns;
- sediment dynamics: changes to ingress of marine sediment due to changes to entrance conditions and changes to sediment derived from catchment runoff in response to an increase in high rainfall events;
- water quality: changes to water temperature and sediment dynamics and subsequent changes to chemical and physical processes in the estuary; and
- ecology: the impacts of increased water levels and altered hydrodynamics, sediment dynamics and water quality on ecological processes.



Appendix D

Summary of Community Uses Assessment

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Community consultation aims to discover community aspirations and gain stakeholder input to the Project to ensure that the Estuary Management Plan is accepted by the community as a coherent, practical and achievable plan.

D.1 Initial Community Workshop

A community workshop was held at Woolgoolga Community Centre on 14 September 2010. The purpose of the Initial Community Workshop was to gain input on community values, issues and objectives for the three estuaries. Approximately 30 people attended the workshop.

Council and the consultant team (GeoLINK / GECO Environmental / Aquatic Science and Management) provided an introduction on the Estuary Management Plan process. The attendees then formed five groups to discuss and compile a list of key issues and goals for the estuaries. Following the group work a representative from each group summarised their key issues and goals. A final question time was undertaken before the workshop concluded.

The key focus of the attendees was generally Woolgoolga Lake, however some specific comments relating to Darkum Creek were provided. The main issues arising from the workshop related to the need for improved water quality and reduced sedimentation in Woolgoolga Lake and an entrance management protocol to assist these two issues.

The various goals and issues developed by the group work are summarised below. A copy of the notes from each group is attached. The comments below refer to Woolgoolga Lake except where noted otherwise.

D.1.1 Goals:

- water quality in Darkum Creek was considered by some attendees as clean and the goal was to maintain this rating;
- a protocol for opening the entrance;
- foreshore management;
- water quality monitoring;
- weeds along riparian corridor;
- improved terrestrial and aquatic habitats;

D.1.2 Issues:

- Address water quality issues associated with runoff from rural lands and urban areas (nutrients, herbicides, pesticides, sediment and organic matter);
- Increased urbanisation in Darkum Creek catchment impacting on estuary health;
- Fire management was expressed as a concern by one group;

Some concerns were also expressed in relation to the estuary management planning process in regard to:

- public availability (and ease of access) of documentation; and
- scepticism as to whether management plan actions will be undertaken and the timeframe of actions.

D.2 Community Survey

A community survey was undertaken over a two month period from April to May 2011, encompassing a school holiday period to provide opportunity to capture input from the widest possible catchment of users. The surveys were located at Council offices, local outlets in the estuary catchments such as caravan parks, newsagents and post offices. In addition, a web survey was made available through the website.

The survey data is summarised below. The total number of completed surveys received was 50. Note that Questions 6 and 8 apply to the Woolgoolga Lake Estuary and have therefore not been included.

1. Where are respondents from?

Sixty percent of respondents were from the Woolgoolga area, 22 % from Safety Beach and 16 % from elsewhere in the Coffs Harbour Council area. One respondent was from outside the Coffs Harbour Council area at the time of completing the survey.

2. How often do you visit use Darkum Creek?

94% of total respondents indicated they visit or use the Darkum Creek estuary. Respondents visiting Darkum Creek on a daily basis made up 23% of the total respondents, with a few times a year the next highest response at 22%.

3. Indicate how you use the estuary:

Survey results indicate the main use of the Darkum Creek estuary is walking, with 64% of total respondents identifying this use. Bird-watching, fishing and dog walking were the next most significant uses, identified by 26-28% of respondents. Swimming, picnicking and boating were identified by 12-18% of respondents. 6% of respondents listed other uses including kayaking, biking and hunting.

4. Indicate your level of concern for the following estuary-related issues:

The estuary issues of most concern that apply to Darkum Creek estuary, identified by 66% of respondents was water quality issues associated with runoff from agricultural lands and urban areas. The estuary issue of least concern that apply to Darkum Creek, identified by 24-30% of respondents were:

- loss of foreshore habitat (e.g. seagrass, mangroves, wetlands) due to higher lake/creek water levels from sea level rise; and
- protection of cultural heritage areas on the lake / creek foreshores.

5. Indicate the importance you place on the following estuary related goals:

The estuary goals of most importance, identified by 76-82% of respondents were:

- improved water quality;
- improved aquatic habitat within the lake and creeks to support fish stocks, crustaceans, etc; and
- improved runoff control in urban areas of the catchment.

The estuary goals of least importance that apply to Darkum Creek, identified by 18% of respondents was providing a buffer area around the shorelines to allow for 'retreat' of aquatic habitat (e.g. seagrass, mangroves) in response to rising lake / creek water levels from sea level rise.

7. Use of motor boats in the estuary:

Seventy-six percent of respondents indicated they do not support the use of motor boats, and 22% of respondents indicated they do support the use of motor boats in the Darkum Creek, Woolgoolga Lake and Willis Creek estuaries. 6% of respondents indicated that they would support the use of motor boats in the Darkum Creek estuary, with canoes with a mini outboard motor considered the most suitable.

D.3 Stakeholder Consultation

The organisations listed below were consulted to obtain initial input to the study:

- NSW Department of Environment, Climate Change and Water
- NSW Department of Environment, Climate Change and Water – Environmental Protection Authority
- NSW Department of Environment, Climate Change and Water – Parks and Wildlife Group
- Solitary Islands Marine Park Authority
- Primary Industries (Fisheries) – Industry and Investment NSW
- Northern Rivers Catchment Management Authority - Coffs Harbour

- Department of Planning - Grafton
- NSW Department of Water
- Land and Property Management Authority
- NSW Maritime
- Roads and Traffic Authority
- Coffs Coast Tourism Association
- Local Aboriginal Land Council – Coffs Harbour
- Gumbular-Julipi Elders Council, c/o Coffs Harbour Local Aboriginal Land Council
- Woolgoolga Surf Life Saving Club
- Coffs Harbour Historical Society and Museum Inc.
- Landcare
- Woolgoolga Chamber of Commerce Industry & Tourism Inc
- Let's Save Woolgoolga Lake
- Coffs Harbour City Council
- Garby Elders
- Jim Stevens
- Woolgoolga Returned Services Golf Club

Input received from various organisations has been incorporated into the assessment of the relevant issues in the EMS. The issues are summarised below.

Table D.1 Consultation Correspondence

Stakeholder
Department of Planning (DoP)
The DoP refers to the following documents for consideration in preparing the CZMP: <ul style="list-style-type: none"> ▪ Mid North Coast Regional Strategy; and ▪ SEPP 71 – Coastal Protection.
The DoP raises the issue of future sea level changes and its consideration in planning for coastal areas. The DoP refers to the following documents and guidelines for consideration in preparing the CZMP: <ul style="list-style-type: none"> ▪ NSW Sea Level Rise Policy Statement; ▪ NSW Coastal Planning Guideline: Adapting to Sea Level Rise; ▪ Coastal Risk Management; and ▪ Flood Risk Management.

D.4 Final Community Workshop – Development of Strategies

A community workshop was held at Woolgoolga Community Centre on 13 October 2011 for the three estuaries (Darkum Creek, Woolgoolga Lake, and Willis Creek). The purpose of the workshop was to gain community input into the development of management strategies to ensure appropriate strategies have been developed, and to assist with identifying priorities. Approximately 30 people attended the workshop.

Council and the consultant team (GeoLINK / GEKO Environmental / Aquatic Science and Management) provided an introduction on the key issues for the estuaries. The attendees then formed six groups to develop a list of key management strategies targeting the key issues for the estuaries. The output of the six groups are summarised in the following table. Following the group work a representative from each group summarised their strategies and reasoning. A final question time was undertaken before the workshop concluded.

The key focus of the attendees was generally Woolgoolga Lake, however some strategies such as catchment pollutant strategies related to all three estuaries. The main strategies generally aligned and supported the strategies that were being developed by the consultant team. The main strategies developed by the six groups are included:

- catchment pollutant strategies particularly with respect to rural runoff;
- management of environmental weeds and protection of riparian areas;
- urban stormwater management;
- sewerage overflows;
- dredging of the entrance;
- maintaining and enhancing existing walking trails; and
- prevent new development in areas affected by increased water / flood levels from sea level rise.

Table D.2 Management Strategies Developed in Community Workshop on 13 October 2011

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Stormwater and Catchment Inputs	<ul style="list-style-type: none"> ▪ Education and address policing / fining ▪ Erosion due to building and bad farming practices (eg. Blueberry / bananas) ▪ Sewerage inspections ▪ Dog excrement: place "poo bags" at head of walking tracks and police this / fines ▪ Council and NPWS to enforce "Animals Act". 	<ul style="list-style-type: none"> ▪ Eliminate or reduce top soil erosion / runoff from entering Poundyard Creek from construction and rural activities eg. blueberries 	<ul style="list-style-type: none"> ▪ Ongoing monitoring of water quality from all waterways and action taken to correct any silt or chemical imbalances ▪ In rural areas ensure a minimum buffer zone of 22 m along all waterways to trap sediment runoff 	<ul style="list-style-type: none"> ▪ Address the issue of erosion from orchards ▪ Campaign awareness for residents in the catchment (rural and urban) 	<ul style="list-style-type: none"> ▪ Buffer zones to 30 m along waterways ▪ Construct nitrogen traps / filter zones ▪ Address litter from children ▪ Inspection of sewerage especially Poundyard Ck 	<ul style="list-style-type: none"> ▪ Stormwater treatment devices implemented on all outlets and regularly serviced ▪ Water quality monitoring ▪ Audit agricultural practices ▪ Fish sampling for water quality monitoring
Impacts to foreshores	<ul style="list-style-type: none"> ▪ Seek funding for protection of riparian areas ▪ Support for volunteer groups for removal of rubbish and regeneration activities ▪ Council implement / supplies facilities (eg. common green skip bins) for landowners / caravan parks to remove green waste to prevent illegal dumping ▪ Wooden barriers / bollards and planting to define boundary to prevent mowing encroachment to native bushland 	<ul style="list-style-type: none"> ▪ Removal of noxious weeds eg. mile-a-minute and morning glory 	<ul style="list-style-type: none"> ▪ Educate residents and council workers on detrimental effects of mowing and other foreshore gardening activities on native riparian vegetation ▪ Develop and implement a management plan to keep lantana and other environmental weeds out of the foreshore areas ▪ Develop and implement an erosion management strategy 	<ul style="list-style-type: none"> ▪ Bollard the western end of the Woolgoolga Lake picnic area to eliminate vehicle access and a sign erected to prohibit cars, bikes onto the lake foreshores ▪ Campaign to control noxious weeds on the edges of Woolgoolga Lake ▪ A campaign to eliminate the camphor laurel problem that is developing along these creeks in the upper reaches 	<ul style="list-style-type: none"> ▪ Address illegal mowing, tree removal, and use of fertilisers ▪ Requires more landcare, neighbourhood and weed management groups ▪ Bush regeneration at TAFE ▪ Re-establish buffer zones ▪ Council get rid of green bins and place mulch around trees ▪ Promote / educate community regarding composting / worm 	<ul style="list-style-type: none"> ▪ Address weeds – lantana, asparagus fern (CMA, School, Community) – continue spraying; ▪ Mangroves – implement colonisation study (CMA, schools).

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
				<ul style="list-style-type: none"> ▪ Keep natural, no rock walls, no retaining walls, no sandbags 	farms	
Flooding	Council to revise: <ul style="list-style-type: none"> ▪ stormwater planning ▪ level of outlets for sewerage or relocating outlets ▪ relocation of housing at risk from flooding 	<ul style="list-style-type: none"> ▪ Address sewerage pumping stations overflow in heavy rains ▪ Keep stormwater drains cleared 	<ul style="list-style-type: none"> ▪ Rebuild and vegetate southern dune peninsula (near Caravan Park) by pumping sand from sedimentation area. This should improve any flooding problems in Woolgoolga Lake 	<ul style="list-style-type: none"> ▪ Have to maintain vegetation corridors within the catchment to slow run-off and reduce intensity of flooding, particularly when setting up new developments ▪ To alleviate the flooding of foreshore, removing the silt from the estuary mouth (dredging and sand pumping) Council should setup regular maintenance of clearing sand build-up by way of earth moving equipment after dune erosion. Push the sand back onto the southern dune entrance and beachfront ▪ Stop removing branches and tree trunks from waterways 	<ul style="list-style-type: none"> ▪ Odour issues from pump station at end of Young Street ▪ Convert kerb and guttering to dish drains and local grasses and plants ▪ Install retention basin and sedimentation traps ▪ Promote stormwater infiltration devices on properties 	<ul style="list-style-type: none"> ▪ Manually open Woolgoolga Lake mouth in storm events ▪ Public notification (paper) of water quality following flood events.

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
Sedimentation	<ul style="list-style-type: none"> ▪ Holding ponds higher up the catchment ▪ Do not remove or install large logs (natural damming) to slow water flow, catch sediment and provide fish / aquatic habitat. 	<ul style="list-style-type: none"> ▪ Dredging to remove sediment from bottom of lake 	Refer to Flooding comments.	<ul style="list-style-type: none"> ▪ Reinstate the natural northern lake entrance by removing the retaining wall ▪ Bulldoze the sand; ▪ Dredge the entrance to remove sand ▪ Return to contour planting in agriculture on the catchment hills (eg. blueberry farms) 	<ul style="list-style-type: none"> ▪ Re-establish riparian vegetation using neighbourhood group eg Sunset Lakes ▪ Utilise sediment traps and biological solutions to address sediment runoff ▪ Increase riparian buffer near sports oval by reclaiming 10 – 20 m on east of oval ▪ Increase riparian buffer along Darkum Creek within Golf Course 	<ul style="list-style-type: none"> ▪ Runoff and marine silts are considered the issue ▪ Water depth varies depending on mouth status ▪ Dredging is considered to be temporary relief (optic cable maybe impacted by dredging)
Recreation	<ul style="list-style-type: none"> ▪ Prevent 4WD entry / damage to environment ▪ No new walking tracks to be put in ▪ Maintain and enhance existing walking tracks so that public stay on tracks ▪ NPWS to prevent and police / fine 4WD's on beach 	<ul style="list-style-type: none"> ▪ No further trail networks are needed ▪ Bank erosion at the picnic area of the lake needs to be addressed 	<ul style="list-style-type: none"> ▪ Existing trail networks which are retained should be converted to boardwalks to prevent erosion ▪ Where trail (where boardwalks) are set back from waterways, then the land between can be developed as a catchment / erosion control zone for runoffs to ease siltation and erosion 	<ul style="list-style-type: none"> ▪ Walking trails on the cemetery side of the lake need fixing as it is washed out and dangerous ▪ Very important to keep and expand the walking trails so residents and visitors can enjoy the waterways 	<ul style="list-style-type: none"> ▪ Close off unnecessary trails ▪ Make clear signage – interpretation ▪ Retain only necessary well-walked trails ▪ Stop 4WDs / motorbikes on trails 	<ul style="list-style-type: none"> ▪ Pathways – adequate quantity but quality poor (fix steps / drainage – north shore, Safety Beach) ▪ Upgrade to “in-ground”, permanent well-constructed eg Port Macquarie Headland Walk.

ISSUES	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
			<ul style="list-style-type: none"> Educational signage at key points of each waterway on the importance of these as a natural environment. 			
Climate Change and sea level rise	<ul style="list-style-type: none"> No new developments in flood prone areas as designated by Coffs Coastal Zone Management Plan Protection (by zoning) of existing native riparian habitat 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Council to identify and publicise those properties which will be affected by climate change and flooding events and develop and implement property prevention measures 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Make retreat areas for animals and plants Households to use water retention strategies No new development in river / lake / sea level rise areas. 	<ul style="list-style-type: none"> No comment
Other	<ul style="list-style-type: none"> More active policing / fining of regulations by NPWS and Council Use signs and education avenues eg. in schools, social media, tv and papers Container legislation – 10c for return of bottles and cans to prevent litter 	<ul style="list-style-type: none"> The poor condition of Woolgoolga Lake Bridge is considered an eyesore 	<ul style="list-style-type: none"> No comment 	<ul style="list-style-type: none"> Community Dune Care Groups should have to seek approval from Council and community before performing strategies and so-called improvements to the lake and foreshores, in particular pruning has been done which leaves a lot to be desired Ugly shade-cloth fences on beach front etc unnecessary and for long periods. 	<ul style="list-style-type: none"> Teach people to look at rivers for health, deterioration and regeneration, street education All new development to be required to be 40% under indigenous vegetation 	<ul style="list-style-type: none"> No superfluous signage – if a must, eco-friendly and reduce (maintain) education signs to a minimum



Appendix E

Summary of Development of Management Objectives and Issues

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E.1 Values

E.1.1 Local and Regional

The natural settings of the estuaries and coast within the Mid North Coast area are a feature that attracts visitors and locals to the area. Darkum Creek is in keeping with this natural setting, and forms part of the network of bushland settings along the coast and estuaries and are of local and broader significance due to its proximity to residential community of Safety Beach.

Key values of the estuary include its natural setting and recreational opportunities including the walking and cycling track, adjacent golf course, and water based activities including canoeing and fishing.

The creek is part of the Solitary Islands Marine Park and is zoned as a Habitat Protection Zone up to the tidal limit. The eastern fringe of the estuary catchment is located in the Coffs Coast Regional Park, forming a well-defined corridor of undisturbed natural vegetation following the downstream section of the creek to its mouth.

E.1.2 Cultural Heritage

The Woolgoolga area was (and continues to be) inhabited by the Gumbayngirr people prior to European Settlement. Records show that artefact finds are located within the Darkum Creek catchment. The cultural values of these Aboriginal sites within the Darkum Creek catchment area require sensitive consideration and preservation.

Europeans moved into the Woolgoolga area from the 1870s. Aerial photographs indicate rural land use within the upper Darkum Creek catchment commenced between 1943 and 1964. Land clearing and initial development of the Safety Beach residential area also occurred during this period. More significant land clearing for rural land use in the upper catchment (west of the existing Pacific Highway) occurred between 1964 and 1974 whilst residential development of Safety Beach continued to expand. Native vegetation in the current golf course area was cleared between 1974 and 1984, which is the most significantly visual change for the estuary catchment in the aerial photography records. Further land clearing for rural land use continued in the upper estuary catchment up to 1994. Residential development expanded further after 2000. There has also been significant replacement of banana cultivation and grazing land with blueberry farms and controlled environment horticulture ('hothouses') since 2004.

The *Coffs Harbour Coastal Processes and Hazards Definition Study Draft Report*, prepared by WBM, indicates that sand mining leases existed and sand mining may have occurred at Safety Beach (Darkum Creek estuary catchment area).

E.1.3 Recreational Values

Darkum Creek is a relatively small and remote coastal estuary and offers the following recreational values:

- significant water-based activity including kayaking, canoeing and fishing in the creek;
- the significant riparian vegetation promotes a sense of seclusion and enhances the natural experience for water-based activities such as canoeing;
- a coastal walk which is facilitated by the pedestrian footbridge over the creek enabling a continuous pedestrian and bicycle route following the coastline and connecting the residential communities of Arrawarra in the north to Woolgoolga in the south; and
- to the east of the footbridge is a corridor of undisturbed natural vegetation following the southern downstream section of the creek to its mouth, which is part of the Coffs Coast Regional Park. This area comprises dense coastal vegetation and contains no known tracks, and is likely to attract people seeking quiet recreational opportunities such as bird watching and bushwalking.

E.1.4 Scenic Values

Darkum Creek offers a predominantly undisturbed natural environment that forms an integral and important component of the natural settings along the coastline. It offers the following scenic values:

- the creek and its foreshores contribute significantly to the character and amenity of the surrounding residential communities;

- the creek has short distant reaches and heavily vegetated foreshores which offer considerable shelter from prevailing winds. The resulting tranquil water combined with the surrounding riparian vegetation offer considerable scenic amenity;
- the creek itself is largely only visible from the footbridge which offers an excellent vantage point in both upstream and downstream directions
- an attractive long distant view across a downstream reach of the creek is also available from its mouth at Safety Beach; and
- the creek is also likely to be visible through openings in vegetation from the adjoining golf course.

E.1.5 Hydrodynamic Values

The entrance to Darkum Creek is predominantly closed resulting in relatively consistent water levels in the creek. There are small fluctuations associated with over-washing of the entrance berm during higher tides and fluctuations associated with varying inflow from the catchment. The relatively consistent water levels would assist in supporting water-based activities such as canoeing.

E.1.6 Water Quality Values

The water quality measurements collected from Darkum Creek show high variability, particularly the physicochemical aspects. This is a typical feature of ICOLLs. However, in general the waters of Darkum Creek:

- are generally well oxygenated;
- tend to have low to moderate turbidity, which in combination with shallow waters can lead to high productivity and support aquatic vegetation;
- are relatively low in bioavailable nutrients;
- are suitable for primary contact recreation;
- are suitable for protection of aquatic ecosystems (with the exception of slightly elevated chlorophyll-a concentrations, moderate turbidity measurements and slightly elevated TN concentrations); and
- receive a relatively low load of sediment and nutrients from the catchment, according to modelling undertaken as part of the Estuary Processes Study (GeoLINK et al, 2011).

To the knowledge of the author there have been no algal blooms or fish kills reported from Darkum Creek.

E.1.7 Ecological Values

Ecological characteristics of Darkum Creek that can be considered values include:

- the general health of the Darkum Creek estuary is good with respect to water quality, estuarine habitats, riparian vegetation, structural habitat availability and the history of fish kills and algal blooms;
- The riparian vegetation of Darkum Creek is mostly intact and in good (52%) to very good (35%) condition. Riparian vegetation filters overland flows, stabilises banks, provides structural habitat for fish and contributes to the overall productivity of the estuary;
- Significant (1.4 ha) mangrove habitat made up of three species, some showing active recruitment. Mangroves are an important primary producer driving the overall productivity of the system, provide structural habitat for fish and invertebrates and stabilise banks and sediment;
- A small area of saltmarsh in relatively good condition;
- A variety of structural habitats including snags, root balls and overhanging banks;
- Reeds and rushes are common along the margins of the central channel and upper creek, contributing to productivity, habitat value and bank stability;
- A variety of benthic materials potentially offering habitat for diverse organisms;
- Fish and invertebrates that provide a resource for recreational fishers. Commonly targeted species include flathead and mudcrabs; and
- A pleasant and attractive environment created by the combination of the above features.

E.2 Management Objectives

E.2.1 Entrance Conditions and Hydrodynamics Objectives

E.2.1.1 Promote Natural Entrance Opening / Closing Processes

Darkum Creek is an ICOLL system that is predominantly closed. The entrance opens and closes to the ocean naturally in a constant but irregular cycle depending on fluvial, tidal and wave processes. Artificial opening of ICOLL's can have significant negative impacts on water quality, fish and other ecological communities.

There are no records of artificial opening of the entrance being used in the past. Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant need for artificial opening for the purpose of flood mitigation. Nevertheless, a formal entrance management policy will be developed for Darkum Creek in accordance with OEH *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010) which requires EMPs for ICOLLS to include such a policy.

The objective of the entrance management policy will be to maintain a natural opening / closing regime for the creek entrance. Interference (artificial opening of the entrance) would only be employed for critical situations such as to mitigate and reduce the impacts of flooding on properties and infrastructure adjoining the creek.

E.2.1.2 Minimise Flooding of Properties and Infrastructure

Flood level estimates for Darkum Creek and inundation mapping associated with elevated ocean levels indicates there are no properties or infrastructure currently at risk of flooding with the exception of areas of the Woolgoolga Returned Services golf course that adjoin the creek system. However sea level rise will result in higher inundation levels within the creek system in the future. Therefore the objective is to minimise or avoid future flooding of properties and infrastructure around the creek by appropriate means such as development controls for future development in flood prone areas; artificial opening of the creek entrance where appropriate; flood-proofing infrastructure; etc.

E.2.2 Bank Stability and Sedimentation Objectives

Bank erosion and estuary sedimentation are not significant issues in the Darkum Creek estuary (GeoLINK *et al.*, 2011). Although 9% of banks surveyed were recorded with minor erosion, all such banks occurred in the lower reaches of the estuary where the channel runs adjacent to the beach dune. As the banks in this location are essentially composed of sands with little cohesion they are highly susceptible to wash and, when the entrance is open, tidal flow. The situation in Darkum Creek estuary is somewhat compounded by the degradation of the dune vegetation in the lower reaches, with vegetative cover reduced and significant infestations of bitou bush and ground asparagus, particularly on the seaward bank. It is considered that no specific objectives for addressing bank stability or sedimentation in the Darkum Creek estuary are required. However, the objective for restoring terrestrial habitats (Section E.2.3.2) addresses issues related to riparian weed management in this location.

E.2.3 Ecological, Habitat and Biodiversity Objectives

E.2.3.1 Protect and Enhance Aquatic Habitats

The Northern Rivers Catchment Management Authority (NRCMA) Catchment Action Plan (CAP) lists rehabilitation of aquatic habitats among its goals. Improving the state of aquatic habitats in Darkum Creek was also raised as a goal during community consultation.

Analysis of estuarine habitat extent indicates a certain species of seagrass (*Halophila*) has disappeared from Darkum Creek in recent years. This species is known to disappear and recolonise more than other species of seagrass. This may have occurred due to normal fluctuations in water quality and the relatively unstable nature of the sand bed in this reach. Nevertheless, the potential for seagrass re-colonisation in Darkum Creek may be enhanced through a variety of strategies.

The significant bands for mangrove and the small saltmarsh habitats in Darkum Creek appear to be in good condition. A further objective of the Darkum Creek Estuary Management Plan is to protect these communities from disturbance.

E.2.3.2 Restore terrestrial habitats of high ecological or conservation value by removing threats and through targeted rehabilitation (e.g. riparian vegetation, endangered ecological communities such as Coastal Saltmarsh, Freshwater Wetlands, etc)

Managing the influence of weeds along the riparian corridor of Darkum Creek was identified as a goal during community consultation. Restoration of riparian vegetation is also listed among the goals of the NRCMA CAP. Additionally, the Coffs Harbour Settlement Strategy lists the enhancement of riparian corridors as a key strategy for the Woolgoolga area to provide ecological links between coast and hinterland (Coffs Harbour City Council, 2011b). A variety of terrestrial habitats of high conservation value have been identified within Darkum Creek estuary. The main threat to the integrity and viability of some of these habitats in the Darkum Creek estuary is weed invasion. This management objective is aimed at the rehabilitation of sites with high ecological or conservation value where degradation (such as weed infestation) has occurred.

E.2.3.3 Make Provisions for the Ecological Effects of Climate Change and Sea Level Rise

Some negative ecological impacts are likely to result under current climate change and sea level rise scenarios. These may include changes in the distribution and extent of mangrove and saltmarsh colonies and reductions in the overall productivity of the estuary. Effective planning for future changes will help to mitigate negative impacts.

E.2.4 Water Quality Objectives

E.2.4.1 Improve Water Quality

The perception amongst the community is that water quality in Darkum Creek is generally good. However, analyses against current guidelines suggest that aspects of water quality for the protection of aquatic ecosystems could be improved. The NRCMA CAP also lists an improvement in the condition of coastal zone natural resources as one of its targets. The assembled water quality information indicates that a reduction in the export of nutrients, sediment and other pollutants from the catchment through land and stormwater management would be the most efficient way to improve water quality in Darkum Creek.

E.2.4.2 Improved Monitoring of Water Quality

This is one of the goals identified during community consultation and is also a wish of the Coast and Estuary Management Committee (CEMAC). A suggested water quality monitoring program that meets NSW government reporting obligations will be delivered as part of the Estuary Management Plan.

E.2.5 Recreational Use and Access Objectives

E.2.5.1 Preserve the quiet, undeveloped natural setting of the creek foreshores

The coastal walk including the pedestrian footbridge enables a continuous pedestrian and bicycle route which follows the coastline and connects the residential communities of Arrawarra in the north to Woolgoolga in the south. An absence of other infrastructure and the natural setting is likely to attract people seeking quiet recreational opportunities such as bird watching, bushwalking and canoeing. This objective is accordingly to preserve the quiet undeveloped natural setting of the Darkum Creek waterway and foreshores.

E.2.5.2 Prevent fragmentation or intrusion into the existing undisturbed setting

This objective is to prevent unnecessary disturbance or fragmentation of the existing natural values by minimising the provision of additional recreational infrastructure and formal access routes.

E.2.5.3 Enhance public appreciation of the broader and site specific natural values of the creek environment

The purpose of this objective is partly to develop a sense of custodianship for the area to assist with preserving the existing natural characteristics.

E.2.6 Views and Visual Character*E.2.6.1 Maintain and Preserve Existing Natural Characteristics*

This objective is to maintain and preserve the existing natural characteristics of the area as the dominant visual feature.

E.3 Management Issues**E.3.1 Entrance Conditions and Hydrodynamics Issues***E.3.1.1 Impacts of Climate Change on Flooding*

Sea level rise caused by climate change will result in higher flood inundation levels within the Darkum Creek system in the future. Current inundation levels are likely to increase by a similar amount as sea level rise increases. Adopted sea level rise estimates for NSW are a 0.4m increase in sea level (relative to 1990 levels) by 2050 and a 0.9m increase by 2100. Climate change also has the potential to result in an increased frequency of high rainfall events leading to more frequent flooding events.

Higher future flood levels may present a risk of backyard flooding to some properties in the lower northern portion of Safety Beach in the vicinity of Panarama Parade, Baroona Street and Ocean Links Close. Some sewage pump stations (sewage pump station no. 6 (PS 6) located to the north of Panorama Parade) may also be at risk of flooding which would potentially lead to sewage entering the creek system.

E.3.2 Bank Stability and Sedimentation Issues

At the date of development of this Estuary Management Study, there were no bank erosion issues or sedimentation issues requiring active management within the Darkum Creek estuary.

E.3.3 Ecological, Habitat and Biodiversity Issues*E.3.3.1 Loss of Aquatic Habitats*

A decline in the area and condition of seagrass beds, mangroves, saltmarsh and sedge heath communities was identified by the coast and estuary management committee (CEMAC) as possible issues concerning Darkum Creek. Detailed mapping analysis of estuarine habitats undertaken as part of the Estuary Processes Study shows that a large area of seagrass (1.3ha) has disappeared from Darkum Creek in recent years but that mangroves and saltmarsh habitats have increased in area. The factors causing the decline in the area of seagrass may be naturally occurring, as seagrasses are uncommon in mostly closed ICOLLS such as Darkum Creek. However, opportunities for recolonisation of seagrass into the Darkum Creek estuary could be maximised by a minimisation of suspended sediment loads in catchment runoff.

E.3.3.2 Impacts of Climate Change on Estuary Ecology

Some negative ecological impacts are likely to result under current climate change and sea level rise scenarios. These may include changes in the distribution and extent of mangrove and saltmarsh colonies, reductions in the overall productivity of the estuary and a reduction in feeding and nesting areas for wading birds.

E.3.3.3 Increased Urbanisation of the Darkum Creek Catchment

Increased urbanisation of the Darkum Creek Catchment was raised as an issue during community consultation. In terms of the estuary, the major potential impacts of increased urbanisation would result from changes to the quality of runoff from new urban developments. These are considered under *Section E.3.4.2* of this report.

E.3.3.4 Riparian Vegetation

Weed mapping undertaken in January 2011 identified the presence of environmental weed species throughout Darkum Creek (GeoLINK *et al.*, 2011). The main species identified were groundsel bush, senna, and pink lantana in the mid to upper reaches, and bitou bush, coastal morning glory and ground asparagus in the lower reaches. Environmental weeds degrade the native riparian vegetation, reducing its ecological value

and in some cases potentially impacting upon bank stability and other estuary values including recreational amenity and aesthetics. Reaches of high priority for weed control will be determined as part of the Estuary Management Plan.

E.3.4 Water Quality Issues

E.3.4.1 Elevated Turbidity, Total Nitrogen and Chlorophyll-a Values

The assembled water quality data for Darkum Creek triggers ANZECC (2000) interim guidelines for the protection of aquatic ecosystems for turbidity, total nitrogen and chlorophyll-a. The DECCW guideline value for turbidity is also exceeded.

The specific cause of elevated turbidity levels in Darkum Creek is uncertain, though the following factors may be contributing:

- re-suspension of fine sediments on the bottom due to tidal flow or during entrance breakout events; and
- elevated suspended sediment loads in catchment runoff.

The median turbidity value is only slightly above the ANZECC (2000) guideline value for estuaries.

All of the samples from Darkum Creek tested for total nitrogen were above the ANZECC (2000) guidelines level for the protection of aquatic ecosystems. Whilst the ANZECC (2000) guidelines are the best currently available measuring stick for water quality they have not been developed specifically for ICOLLs like Darkum Creek and as a result can be misleading. However, the median chlorophyll-a concentration in samples from Darkum Creek also exceeds both the ANZECC (2000) guideline value for the protection of aquatic ecosystems and the DECCW guideline value.

Elevated nitrogen concentrations are an indirect threat to an ecosystem. The main problem associated with elevated nitrogen concentrations is that under certain conditions they can lead to algal blooms. Chlorophyll-a concentrations are measured as an indicator of the status of algal populations. Whilst algal blooms have not been reported from Darkum Creek the combination of slightly elevated total nitrogen and chlorophyll-a concentrations constitutes an issue.

E.3.4.2 Stormwater Management and Pollutant Inputs from the Catchment

During community consultation water quality issues associated with runoff from rural and urban lands were raised as a perceived issue. Nutrients, sediments, pesticides and herbicides, and organic matter were all seen as potential contaminants in runoff. A basic modeling exercise was undertaken as part of the Estuary Processes Study using the Catchment Management Support System (CMSS). The CMSS is a method of calculating nutrient and sediment budgets based upon landuse types and their distribution within a catchment.

Rural Landuse

CMSS results indicate horticultural landuses are the largest relative contributor of sediment and nutrients followed by pasture. The CMSS indicated phosphorus input to the lake was largely attributed horticultural land uses. This highlights the importance of erosion and sediment controls for the main agricultural practices in the catchment (eg. banana and blueberry cultivation) and wastewater controls for intensive horticultural practices such as excess fertigation from greenhouse cucumber production.

Urban Development

Residential land is a significant contributor of sediment and nitrogen. This indicates that investment into effective stormwater management could be an effective means of improving overall estuary health.

Projected future growth in the Woolgoolga area includes a review of the golf course adjoining Darkum Creek for urban expansion potential for future residential area for long term growth (beyond 2016) (Coffs Harbour City Council, 2011b). There is also possible long term urban expansion area west of the existing highway should population targets be achieved sooner than currently predicted.

New development areas have the potential to reduce the quality of catchment runoff during and after the construction phase. It is important that controls placed on new developments are sufficient and enforced to ensure no negative net impact upon water quality. It is noted that some older drainage systems based on grassed swales as opposed to kerb and gutter, such as older areas of Safety Beach, provide effective treatment of runoff.

Old on-site sewage management systems (septic systems) on rural and rural-residential properties also have potential to deliver excess nutrients and pathogens to the estuary system.

Golf Course

Due to the significant area of the estuary occupied by the golf course and its location adjacent to the creek it is important that grounds management practices such as fertiliser application are carefully managed to avoid impacts on the estuary.

Pacific Highway Upgrade

An additional and immediate development within the greater catchment area is the construction of the Woolgoolga bypass. It is important that water quality runoff from the construction of this major development is subject to strict controls and does not result in adverse impacts to water quality.

E.3.4.3 Water Quality Impacts Associated with Climate Change and Sea Level Rise

It is difficult to predict precisely how forecast climate change and sea level rise may impact upon water quality in Darkum Creek. It is likely, however, that some existing issues might become more pronounced under climate change and sea level rise scenarios, particularly issues relating to catchment inputs.

E.3.4.4 Lack of Continuity and Detail in Existing Water Quality Data

The conclusions that have been drawn about nutrient and sediment concentrations and trophic status are based upon a limited dataset. In general the available water quality data for Darkum Creek could be described as lacking in continuity and detail.

E.3.5 Recreational Use and Access Issues

E.3.5.1 Damage and loss of amenity from increased use

Increased recreational activity and uncontrolled pedestrian access to riparian areas of Darkum Creek has the potential to damage the natural environment. Additionally, increased recreational activity has the potential to cause a loss of existing recreational amenity and sense of solitude experienced by walkers.

E.3.5.2 Incompatible maintenance practices have the Potential to impact on riparian vegetation and thereby degrade the recreational experience of the creek

Incompatible maintenance practices associated with the adjoining golf course has compromised riparian vegetation.

E.3.6 Views and Visual Character Issues

E.3.6.1 Loss of Visual Amenity

Fragmentation or disturbance of the natural environment by additional and uncontrolled pedestrian movement has the potential to cause a loss of visual amenity.

E.3.6.2 Prevent Loss of Riparian Vegetation

Ensure riparian vegetation is not removed to improve scenic outlook from residential areas. This issue is addressed under *Section E.3.3.4*.

E.4 Ranked List of Issues

Table E.1 shows the ranked management issues in terms of their priority for management over the next five years. Five years is the expected planning timeframe for the Estuary Management Plan before it undergoes review and adjustment. The ranking has been based on the scoring system below. The scoring attributed to each management option is shown in **Table E.1**.

Priorities have been allocated to management objectives based on a matrix assessment that considers:

- the degree to which the management objectives will impact on estuary issues:
(scoring: low = 1, moderate = 3, high = 5);
- timeframe over which the impacts are likely to occur:
(scoring: short (< 3 years) = 1, medium (5-8 years) = 3, long (>10 years) = 5);
- extent of the estuary addressed by the management objective:
(scoring: lower estuary = 1, middle estuary = 1, upper estuary = 1, whole estuary = 3); and
- community rating of the issues addressed by the management objectives based finding from the community survey): (scoring: not important = 0, important = 3, very important = 5).

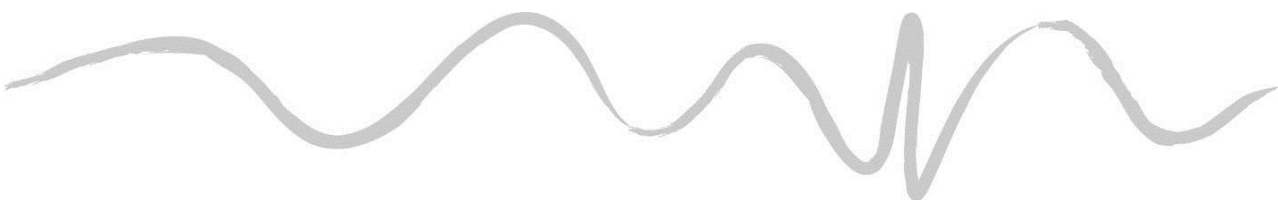
Table E.1: Ranked List of Key Estuary Management Issues

<i>Priority</i>	<i>Key Estuary Management Issue</i>	<i>Report Reference</i>	<i>Potential for Impact on Estuary Objectives</i>	<i>Timeframe over which Impacts Occur</i>	<i>Extent of Estuary Addressed</i>	<i>Community Rating</i>	<i>Priority Score</i>
1	Stormwater Management and Pollutant Inputs from the Catchment	5.2.4.2	4	5	3	5	17
2	Riparian Vegetation	5.2.3.4	5	5	3	4	17
3	Elevated Turbidity, Total Nitrogen and Chlorophyll-a Values	5.2.4.1	4	5	3	5	17
4	Increased Urbanisation of the Darkum Creek Catchment	5.2.3.3	5	5	3	3	16
5	Loss of Aquatic Habitats	5.2.3.1	3	5	2	3	13
6	Water Quality Impacts Associated with Climate Change and Sea Level Rise	5.2.4.4	3	5	2	3	13
7	Damage and loss of amenity from increased recreational use	5.2.5.1	4	5	2	2	13
8	Impacts of Climate Change on Estuary Ecology	5.2.3.2	3	5	2	2	12
9	Lack of Continuity and Detail in Existing Water Quality Data	5.2.4.5	2	5	2	3	12
10	Incompatible maintenance practices have the potential to impact on riparian vegetation and thereby degrade the recreational experience of the creek	5.2.5.2	3	3	2	3	11
11	Loss of Visual Amenity	5.2.6.1	3	3	2	2	10
12	Impacts of Climate Change on Flooding	5.2.1.1	1	5	2	1	9

Entrance Management Policy

Darkum Creek Estuary

Draft for Public Exhibition



quality solutions sustainable future

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Entrance Management Policy

Darkum Creek Estuary

Draft for Public Exhibition

Prepared for: Coffs Harbour City Council and
Office of Environment and Heritage
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Introduction

1.1 Reason for this Policy

The entrance to the Darkum Creek estuary naturally alternates between being open or closed to the ocean. These types of estuaries are known as an ICOLL's - Intermittently Closed and Open Lakes and Lagoons.

Many ICOLL's are manually or artificially opened to the ocean by authorities to 'drain' the estuary for a range of reasons, often to reduce the impacts of flooding around the estuary foreshores. However, artificially opening ICOLL's can impact on estuary health. Therefore a policy is required to outline to Council if and when the entrance to Darkum Creek estuary should be artificially opened.

1.2 The Purpose of this Policy

The purpose of this policy is to provide Council with criteria for initiating an artificial opening event and a procedure for artificial opening of the entrance of Darkum Creek estuary.

1.3 Policy Statement

The Darkum Creek Entrance Management Policy aims to:

- minimise interference with the natural opening and closing regime for Darkum Creek estuary;
- minimise flooding of properties and infrastructure from elevated water levels in the estuary; and
- provide a procedure to address extreme water quality issues in the estuary;
- detail procedures and responsibilities for artificial opening of the estuary entrance; and
- details procedures for monitoring following an artificial opening event.

This policy will be implemented by Coffs Harbour City Council in consultation with the appropriate NSW Government agencies.

1.4 Area to Which this Policy Applies

The area covered by this policy is shown in **Illustration 1.1**. This policy applies to the catchment of the estuary which comprises the waterway, foreshores and land adjacent to the estuary up to the tidal limit of the tributary creeks and the extent of the drainage catchment directly contributing to the estuary waterways. The area relevant to this policy also includes the proposed access route along Woolgoolga Beach for excavator access to the estuary entrance.

1.5 Policy Context

This policy has been prepared as part of the Coastal Zone Management Plan (CZMP) for Darkum Creek estuary. CZMP's for estuaries are prepared in accordance with Part 4A of the *Coastal Protection Act 1979* and the *Guidelines for Preparing Coastal Zone Management Plans* (DECCW, 2010). These guidelines require CZMP's for ICOLL's to include an entrance management policy.

A range of NSW legislation and policies are relevant to estuary management and the establishment of any entrance management policy and subsequent artificial opening procedures.

There may be a range of statutory approvals / licensing requirements that need to be sought in order to undertake entrance management activities, for example artificial opening. A range of approvals may be required due to potentially different land tenures, zonings and statutory provisions. These provisions may include Crown Lands licence under the NSW Crown Lands Act 1989, concurrence from NSW Fisheries for dredge and reclamation work on defined water land under the NSW Fisheries Management Act 1994, or other approvals and licences under the National Parks and Wildlife Act 1974 or the Marine Parks Act 1997.

In addition, the Environmental Planning and Assessment Act 1979 establishes the framework for development control and assessment in NSW. Certain activities may require approval under this Act and associated State Environmental Planning Policies (SEPP) (e.g. SEPP (Infrastructure) 2007). Certain works or activities may either require development consent or be exempt from requiring consent. In the case where works or activities may be exempt from requiring consent, a Review of Environmental Factors (along with all other relevant approvals / licences) would be required under Part 5 of the EP&A Act before works / activities can be carried out. This is addressed more fully in **Section 3** of this policy.

Information shown is for illustrative purposes only



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Darkum Creek Entrance Management Policy
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Area to Which This Policy Applies

Illustration 1.1

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Background

2.1 Entrance Management Issues

Darkum Creek is an ICOLL system that is predominantly closed. There are no records of artificial opening of the entrance being used in the past. Community consultation has not indicated any desire for artificial opening of the creek entrance. Nor is there currently any significant present need for artificial opening for the purpose of flood mitigation.

However, sea level rise caused by climate change will result in higher flood inundation levels within the estuary in the future. Current inundation levels are likely to increase by a similar amount as sea level rise increases. Adopted sea level rise estimates for NSW are a 0.4 m increase in sea level by 2050 (relative to 1990 levels) and a 0.9 m increase by 2100. Climate change also has the potential to result in an increased frequency of high rainfall events leading to more frequent flooding events.

This may present a risk of backyard flooding to some properties in the lower northern portion of Safety Beach in the vicinity of Panarama Parade, Baroona Street and Ocean Links Close – refer to **Illustration 2.1**. Some sewage pump stations (eg. PS 6 located to the north of Panorama Parade) may also be at risk of flooding. This would potentially lead to sewage overflows entering the creek system.

2.2 Flood Mitigation

2.2.1 Mitigation for Major Flood Events

No flood study exists for Darkum Creek however flood levels for 1 in 100 year event were estimated as part of the Estuary Processes Study (GeoLINK *et al.*, 2011a). The flood level estimates are shown below in **Table 2.1**. **Illustration 2.1** shows the 3.0 m AHD contour level to provide context for the estimated flood levels.

Table 2.1 Estimates of Flood, Ocean, and Berm Levels for Darkum Creek Entrance

	Levels (m AHD)		
	Immediate	2050	2100
Flood - 1 in 100 year storm event	2.6 ¹	3.0 ²	3.5 ³
Elevated Ocean Levels - 1 in 20 year event ⁴	2.5	2.9	3.5
Elevated Ocean Levels - 1 in 100 year event ⁵	2.7	3.1	3.7
Entrance Berm Height – Almost Certain ⁵	1.3	1.3	1.3
Entrance Berm Height – Unlikely ⁵	2.4	2.8	3.3

- Notes: 1. Flood level at footbridge (email: M. Robertson, Coffs Harbour City Council, 10/05/2012);
 2. Immediate flood level plus 0.4m sea level rise. Source: GeoLINK *et al.* (2011a);
 3. Immediate flood level plus 0.9m sea level rise. Source: GeoLINK *et al.* (2011a);
 4. Source: BMT WBM (2011);
 5. Based on Woolgoolga Lake entrance berm heights sourced from BMT WBM (2011).

It is important to note the flood levels for major events (shown above) are likely to be independent of any artificial entrance opening works. This is due to the effect of the elevated ocean water levels which would 'over-ride' any impact of an open entrance. This can be seen by comparing the elevated ocean levels in **Table 2.1** with the estimated berm heights at the entrance. The data in **Table 2.1** shows the entrance berm heights to be significantly less than the elevated ocean levels. Therefore, artificially opening the estuary entrance will not have any impact on major (1 in 100 year) flood levels.

Therefore, as flood levels for major events are independent of entrance conditions, there is no benefit to artificially opening the estuary entrance for flood mitigation purposes for major events.

2.2.2 Mitigation for Minor Flood Events

No flood study exists for Darkum Creek however it is reasonable to assume that minor flood levels will be less than 2.5 m AHD for present conditions (this equates to a 1 in 20 year elevated ocean level). The extent of inundation at this flood level is indicated by the 2.5 m AHD contour in **Illustration 2.1**. It can be seen that this flood level does not impact on residential properties or sewer pump stations. The only impact on sewer infrastructure at this flood level is potential inundation of sewer manholes within the golf course property near Ocean Links Close. This latter issue could be rectified by sealing the manhole cover against floodwater inflow or raising the manhole cover. It is noted that sewer pump station No.6 (PS 6) is located at a level of approximately 3.2 m AHD.

Therefore, there is no benefit to artificially opening the estuary entrance for flood mitigation purposes for present conditions to address minor flood events as there are no residential properties or infrastructure presently at risk.

2.3 Water Quality

Artificially opening estuary entrances is often carried out as a 'quick fix' to redress water quality problems stemming from other causes such as inadequate stormwater treatment from urban areas or inadequate erosion control measures in the catchment. Best practice for estuary management is based on addressing the source of the water quality issues rather than treating the symptoms by artificially opening entrances to 'flush' an estuary. The CZMP for Darkum Creek estuary includes strategies to address the source of current water quality issues.

Water quality data examined in the Estuary Processes Study for Darkum Creek (GeoLINK *et al.*, 2011) indicates that physico-chemical water quality data collected from Darkum Creek shows a high degree of variability, a common and defining feature of ICOLLs. Comparison of existing water quality against guideline values revealed that turbidity, total nitrogen and chlorophyll-a measurements are all slightly elevated in Darkum Creek, based upon a limited set of samples and the available guidelines (GeoLINK *et al.* 2011a). These slightly elevated readings would not warrant an artificial opening event. Therefore, there is no need for artificial opening of the entrance to improve water quality under 'normal' conditions.

Nevertheless, there may be instances where artificial opening is justified to address extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the creek system. However, it is not considered practical to include triggers to address a broad range of potential water quality scenarios. A range of factors would need to be considered during a water quality crisis, such as:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue;
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the creek.

This policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. It is recommended that any water quality crisis is assessed on an individual basis.

Drawn by: RE Checked by: MVE Reviewed by: TIM Date: July 2012
 Source of base data: Coffs Harbour City Council

Information shown is for illustrative purposes only



LEGEND

- Contour at 2.5 m AHD
- Sewer pump station 6



Darkum Creek Entrance Management Policy
 1616533

Contour Levels Indicative of Minor Flood Levels

Illustration 2.1

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Approvals

3.1 Statutory Provisions

The area of Darkum Creek and any proposed entrance management works would be located within the Coffs Harbour LGA. The actual water body of Darkum Creek is not zoned, but identified as "Creeks" under the Coffs Harbour Local Environmental Plan (CHLEP) 2000. Land immediately adjacent to and surrounding the defined water body of Darkum Creek is zoned as 6A Open Space and Public Recreation (6A zoning affects land adjoin the entrance) and 7A Environmental Protection Habitat and Catchment under the CHLEP 2000.

Specifically, for the purpose of flooding mitigation works, Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out by or on behalf of a public authority on any land and precludes them from requiring development consent. Clause 50 of ISEPP 2007 states the following:

Development permitted without consent

- (1) *Development for the purpose of flood mitigation work may be carried out by or on behalf of a public authority without consent on any land.*
- (2) *A reference in this clause to development for the purpose of flood mitigation work includes a reference to development for any of the following purposes if the development is in connection with flood mitigation work:*
- (a) *construction works,*
 - (b) *routine maintenance works,*
 - (c) *environmental management works.*

Specifically, for the purpose of waterway or foreshore management activities, Clause 129 of the State Environmental Planning Policy (Infrastructure), 2007 (ISEPP) applies, allowing such works to be carried out by or on behalf of a public authority on any land and precludes them from requiring development consent.

Waterway or foreshore management activities means:

- (a) *riparian corridor and bank management, including erosion control, bank stabilisation, resnagging, weed management, revegetation and the creation of foreshore access ways, and*
- (b) *instream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes, and*
- (c) *coastal management and beach nourishment, including erosion control, dune or foreshore stabilisation works, headland management, weed management, revegetation activities and foreshore access ways, and*
- (d) *coastal protection works, and*
- (e) *salt interception schemes to improve water quality in surface freshwater systems, and*
- (f) *installation or upgrade of waterway gauging stations for water accounting purposes*

Clause 129 of ISEPP 2007 states the following:

Development permitted without consent

- 1) *Despite clause 129A, development for the purpose of waterway or foreshore management activities may be carried out by or on behalf of a public authority without consent on any land.*
- (1A) *To avoid doubt, subclause (1) does not permit the subdivision of any land.*
- (2) *In this clause, a reference to development for the purpose of waterway or foreshore management activities includes a reference to development for any of the following purposes if the development is in connection with waterway or foreshore management activities:*
- (a) *construction works,*

- (b) routine maintenance works,
- (c) emergency works, including works required as a result of flooding, storms or coastal erosion,
Note. Emergency coastal protection works within the meaning of the Coastal Protection Act 1979 are excluded from the operation of the EP&A Act and therefore are not development to which this clause applies.
- (d) environmental management works.

(2A) *The following provisions apply in relation to the carrying out of new coastal protection works by or on behalf of a public authority on the open coast or entrance to a coastal lake:*

- (a) *if a coastal zone management plan is in force in relation to the land on which the development is to be carried out—the public authority (or person carrying out the works on behalf of the public authority) must consider the provisions of that plan before carrying out the development,*
- (b) *if a coastal zone management plan is not in force in relation to the land on which the development is to be carried out—the public authority (or person carrying out the works on behalf of the public authority) must:*
 - (i) *notify the Coastal Panel before carrying out the development, and*
 - (ii) *take into consideration any response received from the Coastal Panel within 21 days of the notification.*

(2B) *For the purposes of subclause (2A):*

new coastal protection works means coastal protection works other than:

- (a) *the placement of sand (including for beach nourishment) or sandbags, or*
- (b) *the replacement, repair or maintenance of any such works.*

Although flood mitigation works and waterway and foreshore management activities would be permitted without consent on any land, the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council would be required to prepare a REF for any proposed relevant works or activities, e.g. artificial opening of Darkum Creek. The REF would outline the nature and extent of the proposal, what would be the trigger and determining factors for proceeding with relevant works / activities such as artificial opening and identify and address any potential environmental effects which may result from such works. Hence the REF would also include mitigation measures and safeguards for the protection of the environment during relevant works / activities. The REF would need to be consistent with the adopted CZMP and entrance management policy for Darkum Creek.

In conjunction with preparation of the REF, Council would be required to consult with and seek any relevant licences and or concurrence from other state government agencies. These would include:

- Crown Lands under the Crown Lands Act 1989;
- Department of Primary Industries - Fisheries under the Fisheries Management Act 1994;
- Marine Parks Authority under the Marine Parks Act 1997;
- NSW Office of Water under the Water Management Act 2000;
- Office of Environment and Heritage (National Parks and Wildlife) under the National Parks and Wildlife Act 1974.

3.1.1 Crown Lands Act 1989

Due to the artificial opening works affecting the waterway of Darkum Creek and the coastline, it is likely that such works would affect Crown Land. Artificial opening of the entrance will require authority by way of licences from the Crown under Part 4, Division 1 of the Crown Lands Act 1989.

3.1.2 Fisheries Management Act 1994

The objectives of the Fisheries Management Act 1994 *are to conserve, develop and share the fishery resources of the State for the benefit of present and future generations.* The provisions of Division 3, Part 7 of the Act are likely to be relevant to any works associated with the artificial opening of Darkum Creek. The provisions relate to the protection of aquatic habitat. Although flood mitigation works and waterway or

foreshore management activities would be precluded from requiring consent under ISEPP, the provisions of the Fisheries Management Act 1994 are still applicable and as part of the REF process concurrence from the Department of Primary Industries (Fisheries) would be required for certain activities. **Table 3.1** outlines the relevant provisions of the Act that would apply to the artificial opening of Darkum Creek.

Table 3.1 Activities requiring concurrence under the Fisheries Management Act 1994

Fisheries Management Act 1994	Sections 198-202	Concurrence is required from the Minister, Department of Primary Industries (Fisheries) for dredge and reclamation works on defined water land. The nature of artificial opening would constitute dredge works and also potentially reclamation works in watered land. Hence a permit and concurrence from s required prior to commencement of any works.
	Sections 219-220	Concurrence is required when barriers to the movement of fish including water course crossings are to be constructed or modified. Any proposed artificial opening is unlikely to create a barrier to the movement of fish. However such specifics would need to be confirmed within the REF.
	Sections 204-205	Any artificial opening works would likely be restricted to the sand berm. Any works must not affect mangroves or other protected marine vegetation. If marine vegetation would be harmed by relevant works / activities, a permit must be sought from the Minister before works commence. Clause 205 (2) states that <i>A person must not harm any such marine vegetation in a protected area, except under the authority of a permit issued by the Minister under this Part.</i> The REF would need to determine if artificial opening works are likely to affect mangroves or other protected marine vegetation.
	Schedules 4, 4A, 5 and 6	The REF prepared for works associated with artificial opening would need to consider any presence of local threatened aquatic habitat for flora or fauna. Thus Key Threatening Processes (KTPs) would need to be considered in preparation of the REF. The following KTPs may be relevant and required consideration: <ul style="list-style-type: none"> ▪ <i>Degradation of native riparian vegetation along NSW water courses.</i> ▪ <i>Installation and operation of instream structures and other mechanisms that alter natural flow regimes of rivers and streams.</i>

3.1.3 Marine Parks Act 1997

As Darkum Creek forms park of the Solitary Islands Marine Park, Council would be required to obtain a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 in order to undertake any works on land affected by the Marine Park and any associated zoning. Preparation of the REF would need to consider these factors and seek the relevant concurrence / permit.

3.1.4 Water Management Act 2000

A controlled activity approval under the Water Management Act 2000 (WM Act) is required for certain types of developments and activities that are carried out in or near a river, lake or estuary (water land). Under the WM Act, a controlled activity means:

- the erection of a building or the carrying out of a work (within the meaning of the Environmental Planning and Assessment Act 1979), or
- the removal of material (whether or not extractive material) or vegetation from land, whether by way of excavation or otherwise, or

- the deposition of material (whether or not extractive material) on land, whether by way of landfill operations or otherwise, or
- the carrying out of any other activity that affects the quantity or flow of water in a water source.

Artificial opening of Darkum Creek would constitute a controlled activity under the WM Act. However under the Water Management (General) Regulation 2011, Clause 38 Controlled activities—public authorities, states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.*

Although Coffs Harbour City Council would be exempt from requiring a Controlled Activity Approval, Clause 37, *Condition applying to all exemptions under this Subdivision*, of the Regulations states: *An exemption conferred under this Subdivision is subject to the condition that the person by whom the relevant controlled activity is carried out must comply with applicable requirements (if any) of the Minister that are published in the Gazette, or notified in writing to the person, for the purposes of this clause and that are for the protection of:*

- (a) *the waterfront land on which the activity is carried out, or*
- (b) *any river, lake or estuary to which that land has frontage.*

3.1.5 National Parks and Wildlife Act 1974

The Darkum Creek system falls within the Coffs Coast Regional Park. The park was created through a partnership of Council and the National Parks and Wildlife Service (now within OEH). The National Parks and Wildlife Act 1974 applies if the park is a reserve made under the Act. The Park's management is guided by a Trust Board. Preparation of an REF for artificial opening works would need to determine whether or not the park is a reserve under the Act and hence consultation / concurrence are required with OEH / National Parks and Wildlife Service. Consultation with the Trust Board would be required whether or not the park is affected by the Act. The REF would also need to consider any management plan that has been prepared for the park.

3.2 Summary of Potential Approvals

Works / activities for the purpose of flood mitigation or waterway / foreshore management (to address an extreme water quality issue) would be permitted without consent under Clause 50 of the State Environmental Planning Policy (Infrastructure), 2007. However the requirements of Part 5 of the EP&A Act 1979 must be fulfilled and Council is required to prepare a REF for proposed works / activities (e.g. artificial opening of the entrance to Darkum Creek estuary). The REF needs to be consistent with the adopted CZMP and entrance management policy for Darkum Creek estuary.

Preparation of the REF will involve consultation with relevant state government agencies. This will confirm the necessary approvals and licences required for artificial opening of the entrance. Preliminary assessment indicates the following approvals and licences may be necessary:

- a license from the Department of Crown Lands under the Crown Lands Act 1989;
- a permit and concurrence from the Minister, Department of Department of Primary Industries (Fisheries) under the Fisheries Management Act 1994 pursuant to Sections 198-202 for dredge and reclamation works on defined water land (the nature of artificial opening would constitute dredge works and also potentially reclamation works); and
- a permit / concurrence from the Marine Park Authority / the Minister under the Marine Parks Act 1997 as Darkum Creek forms park of the Solitary Islands Marine Park.

The Darkum Creek system falls within the Coffs Coast Regional Park, which was created through a partnership of Council and the National Parks and Wildlife Service. Consultation with the National Parks and Wildlife Service and Trust Board is required to determine if any approvals are required under the National Parks and Wildlife Act 1974.

It is noted that a Controlled Activity Approval under the Water Management Act 2000 is not required due to the Water Management (General) Regulation 2011, Clause 38 Controlled activities - public authorities, which states: *A public authority is exempt from section 91E (1) of the Act in relation to all controlled activities that it carries out in, on or under waterfront land.* However, Council is still required to follow any applicable guidelines of NSW Office of Water under the Water Management Act 2000.

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Artificial Opening Procedure

4.1 Decision Making Process

This policy presently only recommends artificial opening of the Darkum Creek estuary entrance in the event of extreme water quality issues such as contaminant spills where it may be desirable to provide some 'draining' of the creek system. However, the decision to initiate an artificial opening event will be based on assessment of each individual circumstance of an extreme water quality issue with consideration of:

- Environmental and public health risks posed by the water quality issue;
- The extent to which artificial opening will mitigate the water quality issue; and
- Consequent environmental and public health risks along the adjoining coastline following artificial opening of the creek.

As noted in **Section 2.3**, this policy does not include triggers for water quality issues due to the broad range of potential water quality scenarios and the associated uncertainties. Determining what constitutes an extreme water quality issue would include reference to water quality monitoring results for Darkum Creek to determine if the issue is 'outside' normal water quality variations for the creek system.

The general decision making process / procedure for determining if artificial opening is to be employed to address an extreme water quality issue is shown in the flow chart in **Illustration 4.1** and involves:

- Following warning of potential extreme water quality issues Council's designated officer will alert relevant state government agencies of the issues and potential for an artificial opening event;
- Council's designated officer will then conduct a site assessment and/or review of water quality monitoring data to determine in consultation with relevant state government agencies if artificial opening is an appropriate response;
- If artificial opening is considered an appropriate response Council's designated officer will initiate deployment of Council's personnel and machinery to the entrance and direct when and where artificial opening is to be initiated. Ideally, the artificial opening should be initiated during a falling tide and shortly after the tide turns from high to low (if possible around a spring tide when tidal fluctuations are larger).

4.2 Responsibilities for Artificial Opening

Coffs Harbour City Council is responsible for artificial opening of the entrance.

4.3 Monitoring

When artificial openings have been carried out, monitoring of the entrance should be undertaken to determine the efficiency of the opening. For each artificial opening event, the following data will be tested / recorded:

- prior to opening:
 - testing of water quality parameters relevant to the specific water quality issue;
 - survey water level of creek prior to opening;
- date and time of opening;
- survey water levels of creek over 24 hours following opening;

- testing of water quality parameters relevant to the specific water quality issue over 24 hours and at appropriate intervals following 24 hours after the opening;
- location and length of excavation;
- approximate width and depth of initial channel;
- ocean swell conditions (wave height and direction);
- preceding rainfall;
- date of closure;
- digital photographs.

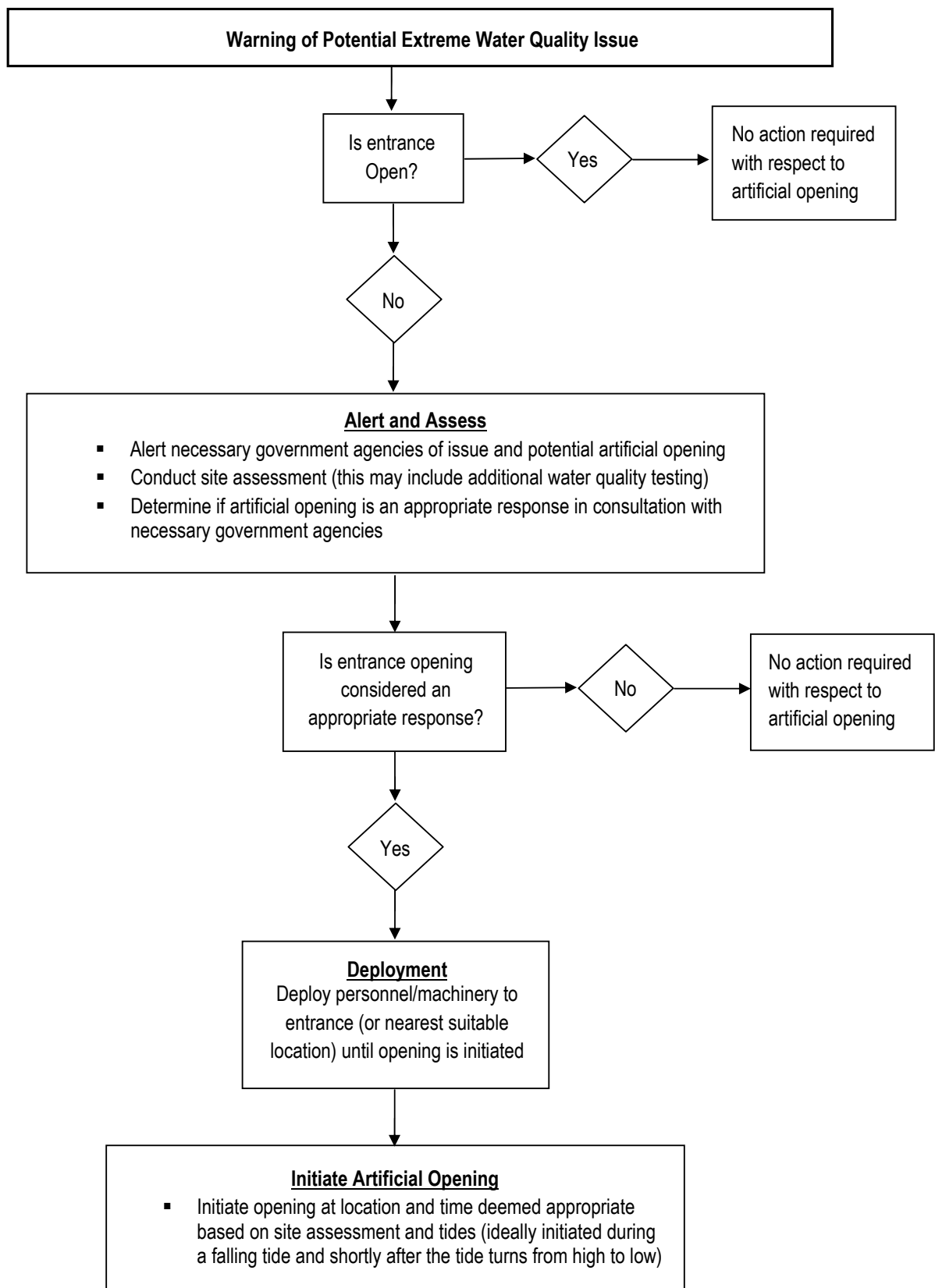


Illustration 4.1 Artificial Opening Decision Making Flowchart

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Policy Updates

5.1 Review and Update of this Policy

This Policy and the associated REF should be reviewed every five years or in response to:

- legislation changes; and
- any other significant factors relevant to artificial opening of the entrance of Darkum Creek estuary.

Review of the policy will include analysis of all monitoring data collected over that period to assess if the assumptions and procedures outlined in the current policy and REF are correct or appropriate. This will include a review of changes to climate change and sea level rise predictions and consequent impacts to this policy.

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Project Team

The project team members included:

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GECO Environmental

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The following people and organisations have provided technical input to the preparation of this report:

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Coffs Harbour City Council Coastal Estuary Management Advisory Committee

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Acronyms

AHD	Australian Height Datum
CEMAC	Coffs Harbour City Council Coastal Estuary Management Advisory Committee
CHCC	Coffs Harbour City Council
CHLEP	Coffs Harbour Local Environmental Plan
CZMP	Coastal Zone Management Plan
ICOLL	Intermittently Closed and Open Lake and Lagoon
ISEPP	State Environmental Planning Policy (Infrastructure), 2007
LGA	Local Government Area
MHL	Manly Hydraulics Laboratory
PS	Pump Station
REF	Review of Environmental Factors
SEPP	State Environmental Planning Policy

CITY WIDE FLOOD MITIGATION, STORMWATER & DRAINAGE WORKS PROGRAM - OCTOBER 2012

Purpose:

To advise on progress of the City Wide flood mitigation, stormwater and drainage works program and to recommend changes to the works program.

Description of Item:

Background

On 26 November 2009 Council resolved to raise a \$6 million loan to undertake flood mitigation works.

On 11 March 2010 Council resolved to apply for a special rate variation to fund further flood mitigation works.

The rate variation was approved in July 2010 and these works are being programmed.

In addition to the \$12 million, Council has secured grants to date to the value of \$3M from State and Federal government programs.

Flood works progress to date:

Detention Basins:

Bennetts Road Detention Basin

The Bennetts Road basin construction is well under way and is expected to be completed by Christmas, weather permitting. An application for the compulsory acquisition of the easements on affected properties has been lodged with the Department of Local Government.

Spagnolos Road Detention Basin

The design has been completed and Dam Safety Committee approval has been granted.

Council is currently relocating trunk water mains on the site to allow construction of the basin wall next year. Council has applied for grant funding to assist in the basin construction however this application was unsuccessful, although it has been placed on the reserve list and may get funds next year.

Upper Shephards Lane Basin

The land for this basin is currently being purchased in accordance with Council's resolution of 11 October 2012. An application for government funding for construction of the basin will be made in the 2012/13 program.

Flood Warning System

Rain gauges and water level recorders have been installed and are operational at the sites shown on the attached plan (a further gauge at Woolgoolga is also planned). The recording and radio communication systems are fully operational with data being transferred to the Bureau of Meteorology and State Emergency Services.

The possibility making the information available "live" on Council's website is being investigated.

Drainage Works

Status report of the 19 stormwater drainage projects identified and reported to Council in November 2009, aimed at alleviating local flooding issues and protecting property against flooding:

Construction complete:

41 King Street	flood surcharge path
36 Links Avenue	piped drainage and bund
Marcia Street/ Ann Street	detention Basin
Betel Palm Close	piped drainage
Norfolk Crescent	overland flow path channel
Merino Drive	piped drainage
44 Coramba Road	additional inlet pits
Masonry Road	surcharge path
Taloumbi Road (west)	piped drainage
Coffs Creek at Orlando Street	Remove old rail bridge piers
Increase waterway area at Coffs Creek	Bridge at the Pacific Highway.
Shellcove Lane	piped drainage
Bellingin Road	piped drainage.
Murphy Crescent	surcharge path
Oxley Place	surcharge path
Wybalena Crescent	piped drainage
Bray Street	surcharge path
Taloumbi Road (east)	surcharge path
Fawcett Street, Woolgoolga	detention basin and piped watercourse.

Survey and investigation underway:

Marcia Street	drainage upgrade
Loaders Lane levy bank	raise levy

Coffs Creek Improvement Works

The following creek cleaning works have been completed:

- Bray Street at the end of Grant Close and Hughes Close approximately 115m.
- Upstream and downstream of Scarba Street bridge (Gundagai Place).
- North Coffs Creek near Pacific Highway and Orlando Street.

Council has also removed creek blockages as well as rubbish such as shopping trolleys and building waste at Roselands Estate, Woolgoolga Creek and Middle Creek, Sawtell.

The Orlando Street/GDT Secombe Close drain has been cleared from the railway all the way to the mangroves which will significantly improve drain efficiency. The prospect of pursuing further permits to continue clearing through the mangroves will be assessed following resolution of permits for clearing of the Duke Street drain.

Survey of the Duke Street drain has been completed and negotiations are under way with agencies to seek approvals/ permits for drain clearing/ dredging works.

Overland Flow Paths in the CBD

Investigations are continuing into the feasibility of improving stormwater overland flowpaths in Gordon Street/ Harbour Drive and Park Avenue.

CBD Drainage including:

- Drainage bypass
The review of the CBD drainage network will be undertaken in conjunction with the investigation into overland flow paths.
- Estuary improvement investigations
Consultants have been engaged to undertake the Coffs Creek infilling and hydraulic capacity study which will investigate changes in creek morphology and waterway capacity.

Sustainability Assessment:

- **Environment**

Appropriate assessments and approvals are being undertaken for the projects in accordance with Environmental Protection legislation.

- **Social**

Flood mitigation works have a positive impact on the community.

- **Civic Leadership**

The Flood Mitigation Stormwater and Drainage works program sees Council taking the lead role in conceptualising, assessing and delivering community infrastructure projects.

The program is in line with the 'Places for Living' theme of the Coffs Harbour 2030 Community Plan - PL1.1 We use best practice in urban design and infrastructure development to promote sustainable living.

- **Economic**

Broader Economic Implications

Flood mitigation works aim to reduce the severe negative economic impacts arising from floods on infrastructure (both public and private) and the regional economy.

Delivery Program/ Operational Plan Implications

Works are funded via loans in accordance with Council resolutions of 26 November 2009 and 11 March 2010.

The Natural Disaster Resilience Scheme grants will allow further works to be undertaken or may allow early repayment of loans. Bennetts Road Detention Basin is being partly funded by State Floodplain Management Program for 2011/12.

As the availability of grant funds are confirmed and detailed investigation into the cost benefit of projects are completed, components of the Delivery Program will require modification in order to meet grant funding conditions or ensure Council maximises benefit from available funds.

Issues:

Construction of flood mitigation measures are recognised as a high priority. Target dates proposed are best estimates using available information. Some of the construction components require third party approvals which may be beyond Council's control.

Regular updates on the progress of the projects will be reported to Council.

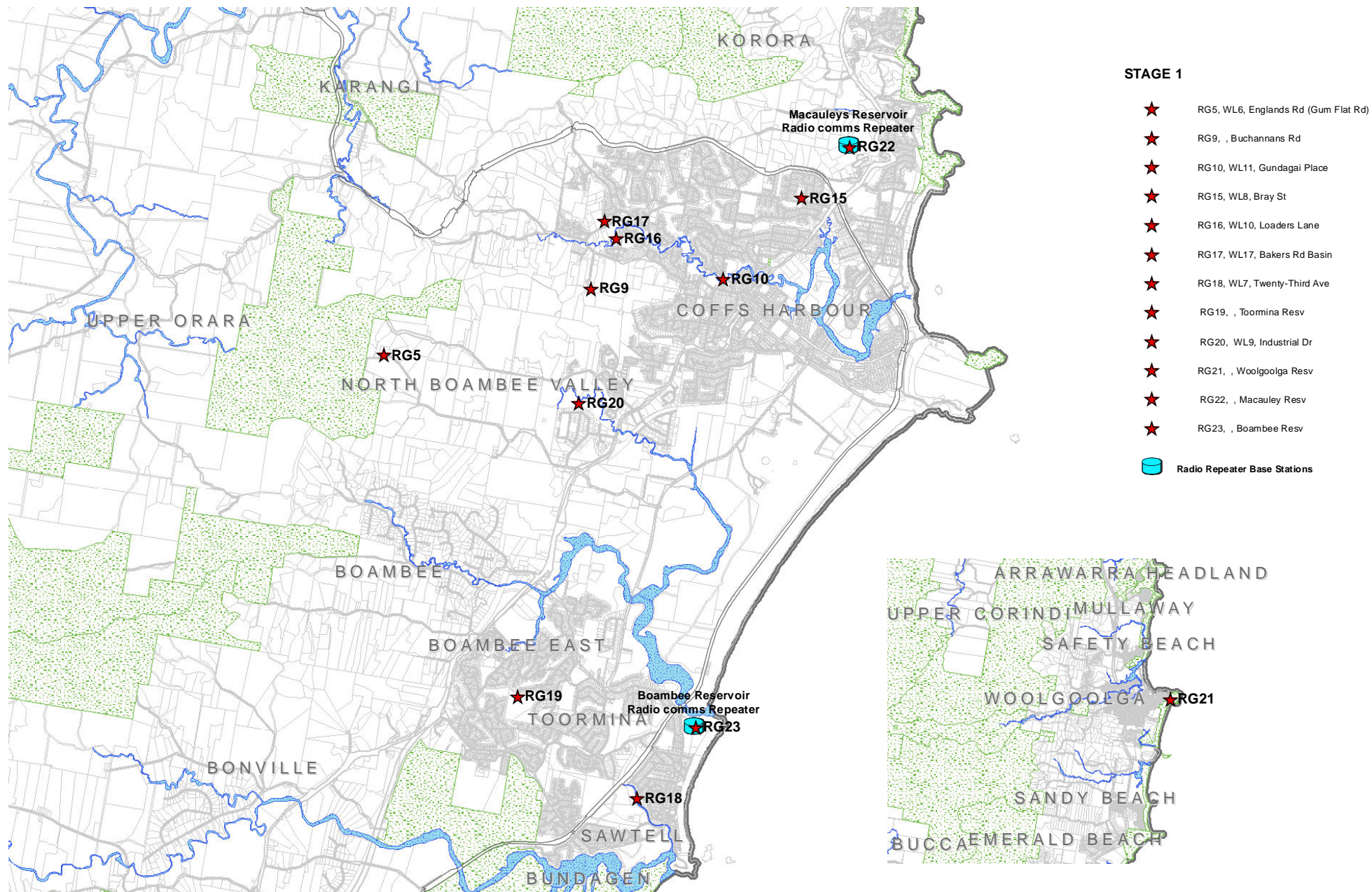
Recommendation:

That Council note the progress on the City Wide Flood Mitigation, Stormwater and Drainage Works Program.

Coffs Harbour City Council - Environmental Monitoring System

Rain Gauge and Water Level Station Locations

Attachment



Please note: The locations of all RG's, WL's & WS's are as per Greenspan Technology Report Nov 5, 2010 V1.0

COFFS COAST CYCLE CHALLENGE MARKETING AND PROMOTION - VISIT TO LAKE TAUPO NZ BIKEFEST

Purpose:

Council's Road Safety and Transport Officer has been invited to be a member of the marketing and promotion team representing the Coffs Coast Cycle Challenge. The team will attend the Lake Taupo Cycle Challenge NZ arriving in Auckland on Wednesday 21st November and returning on Sunday 25th November 2012. The team will be holding discussions with the BikeFest organisers, Rotarians and Council staff. They will observe the way the events are conducted to assist with the Coffs Cycle Challenge in 2013. Brochures advertising the 2013 event and the Coffs Coast destination will be distributed.

Description of Item:

The Coffs Coast Cycle Challenge was modeled on the successful Lake Taupo Cycle Challenge NZ which takes place in November every year. This event is New Zealand's premier mass participation cycling event attracting over 11 000 riders at all levels. The Lake Taupo community has a population of 30 000. This event has had a very significant impact on the local economy, providing enough interest to improve cycleway infrastructure.

Coffs City Rotary is sending a Marketing and Promotion team to the Cycle Challenge in NZ to promote the Coffs Coast Cycle Challenge 2013 and the Coffs Coast.

Coffs City Rotary has requested that a Council staff member – specifically the Road Safety and Transport Officer - attend the event with the Rotarians since she has been involved with the Coffs Coast Cycle Challenge since its inception in 2010.

As part of the team, the Road Safety and Transport Officer would discuss the development of the event with Council staff and organisers, as well as assist with the Coffs Coast Cycle Challenge display. The aim of the promotion would be to encourage people to attend the Coffs Coast event and to encourage bilateral relations with Lake Taupo as well as promote Coffs Coast generally.

Sustainability Assessment:

- **Environment**

Even a relatively minor shift in travel behaviour can have a significant effect on carbon emissions, congestion and demands on parking in town centres. Cycling is a low cost effective alternative to driving over short distances. Major events can motivate people to try cycling or to cycle more. The Coffs Coast Cycle Challenge is a low impact event but highly beneficial on many levels. It enhances Coffs Harbour's reputation as a sustainable city and showcases the green backdrop of the city.

The Road Safety and Transport Officer will distribute information about the Coffs Coast, highlighting its natural beauty and the synergies of sustainability and cycling during the event.

- **Social**

The trip will assist the organisers to build and promote on the success of the Coffs Coast Cycle Challenge in 2012 by learning from the experience of the Lake Taupo community. The Lake Taupo event creates employment and improves the local economy, as well as improving the health and well being of the participants. The team will establish links with the Lake Taupo community which will reap benefits for the local event by encouraging cross fertilisation (ie New Zealanders visiting Coffs Harbour). There is also the potential for Coffs Harbour and Taupo to develop a mutually beneficial sister city relationship.

The Coffs Coast Cycle Challenge Marketing and Promotion team will find new ways of increasing the participation in the event. The social benefits of mass participation cycling events are well known: they are family events which increase health and wellbeing both for the participant and at a secondary level for the people they influence.

Major events can also increase the demand and therefore the provision of local infrastructure, which in turn, encourages more people to cycle.

The trip will be educational for Council's Road Safety and Transport Officer – she will learn from the experience of a small Council's involvement with a large event, and the ways the organisers managed the growth of the event.

- **Civic Leadership**

The promotion of cycling is a key outcome in the Coffs Harbour 2030 Community Strategic Plan (MA2). The Road Safety and Transport Officer convenes a Council Bicycle Users Committee. One of its terms of reference is to promote cycling events in the city. Interest groups have expressed a desire for a major cycling event in Coffs Harbour. This meets the criteria, and has the potential to grow into a very large event. Council is seen as a leader in sustainable transport initiatives, and its support of this event would be consistent with this aim.

The RSO will be an advocate for the Coffs Coast in New Zealand and carry messages from the elected Council if they so wish.

- **Economic**

Broader Economic Implications

The growth of this event will benefit Coffs Harbour economically since it brings riders and their families to Coffs Harbour in the off peak season (August). The weather at this time of year is cool and dry – perfect for a cycling event. 60% of the participants in the 2012 event were from outside Coffs Harbour. The experience of Lake Taupo shows that there is the potential to “value add” additional events to create a Cycling Festival over a period of two weeks.

Cycling is seen as “the new golf”. Cyclists are often professional people who tend to spend more on food and beverage and accommodation. Bicycle retailers and other related industries such as bike hire and mechanical services also benefit from increased numbers of cyclists whether local or visitors.

Delivery Program/Operational Plan Implications

The Rotary Club have generously offered to allocate \$876 towards the cost of the Road Safety & Transport Officer's attendance. The total cost of the event for one person will be approximately \$1776. This will be a work trip for five days. Attendance at the NZ event is at comparatively small cost to Council with the potential for bilateral relations with Lake Taupo and the increased corporate knowledge to be gained from their experience.

Consultation:

The Road Safety and Transport Officer has discussed this trip with Council Directors and members of the bicycle committee.

Related Policy and / or Precedents:

Staff members have previously been on overseas trips as part of their professional development and also to develop corporate knowledge and to promote Coffs Harbour.

Issues:

The City Rotary Club has canvassed Council on a consistent basis to gain support for this event. They have demonstrated that they have the capacity to run this event successfully. The Rotarians are determined to grow this event to be significant in the Coffs Harbour calendar – as well as an important fund raiser. The support of this event is consistent with the aims of the 2030 Plan and Council's vision of a sustainable city.

Implementation Date / Priority:

21 November – 25 November 2011: The Challenge takes place on Saturday 24th November.

Recommendation:

That Council approve the Road Safety and Transport Officer's attendance at the Lake Taupo NZ cycle event from 21 November – 25 November 2012.



Coffs City Rotary

ABN 92 963 118 216
PO Box 570
Coffs Harbour NSW 2450
 coffscityrotaryclubwaage.com

14th August, 2012

Mr. Craig Milburn,
 Director Corporate Business,
 Coffs Harbour City Council,
 Locked Bag 155,
 COFFS HARBOUR 2450

Email: craig.milburn@chcc.nsw.gov.au

Dear Mr. Milburn,

NAB Coffs Coast Cycle Challenge: Tourism Marketing and Promotion

As you know this quickly growing annual community, charity, sporting Event is modelled on the Lake Taupo (NZ) Cycle Challenge which now attracts over 11,000 riders each year.

We have established a cross marketing and promotional relationship with the organisers of that Challenge which we want to enthusiastically foster in the expectation that from our perspective an escalating number of New Zealanders and other non-Australians are attracted to participate in our Event.

The potential increase in tourism to the Coffs Coast and consequent commercial benefits are obvious.

Two of our Event Committee Members (Graham Lockett and Bruce Robertson) will attend this year's Lake Taupo Challenge on 24 November and we would very much like to see Anne Shearer, Council Road Safety and Transport Officer, who is also a highly valued member of the Committee attend there as well, to particularly look at promotion of road safety and tourism to the Coffs Coast.

We have some funding to assist with Anne's expenses and desire and request that Council give favourable consideration to officially approving of her being part of the Coffs Coast Team at Lake Taupo this year.

Subject to Council getting past the preliminary consideration of this request I am happy to discuss the financial arrangements.

In the meantime in anticipation of Council's approval and having regard to the tightness of accommodation at and near Lake Taupo we will proceed to seek some tentative bookings which include for Anne.

Yours sincerely,

Peter Wardman

Event Director

Direct Contact Details:

Tel: 02 66564063 Fax: 02 66537740

Email: wardmans@bigpond.net.au

Attachment



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Coffs Coast Travel



Flagship Event



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APPOINTMENT OF COUNCILLOR TO NORTH COAST WEEDS ADVISORY COMMITTEE

Purpose:

To appoint an elected member to represent Council on the North Coast Weeds Advisory Committee (NCWAC).

Description of Item:

The NCWAC is the leading organisation for weeds in the North Coast Region. This committee comprises all key stakeholders involved in weed management for coastal councils from Nambucca Shire to the Queensland border.

Stakeholder membership is very wide and represents many different interests throughout the region. They include all local councils, NSW Agriculture, farmer organisations, State Forests, National Parks and Wildlife Service, RMS, EPA, Landcare / Coastcare, conservation groups and several other state government departments and local government departments.

The NCWAC began as a single weed awareness committee in 1980 when its original name was the North Coast Giant Parramatta Grass Committee. Since then this committee has expanded and developed into a more wide ranging organisation not only dealing with noxious weeds but environmental and potential weed threats. The main objectives of the NCWAC are to:

- Promote the awareness of noxious and environmental weeds within the community
- Promote the coordination of weed management with all relevant stakeholders on a regional basis
- Advise the Noxious Weeds Advisory Committee on weed matters relating to new declarations, planning and funding for the region
- Recommend weed policy, planning matters, declaration, control and promotional issues to member organisations
- Provide a forum for the interchange of information
- Map weed distributions across the region to allow for better strategic planning and management
- Educate, train and encourage persons and organisations in all matters relating to noxious and environmental weeds
- Develop and implement regional weed control plans and strategies
- Identify emerging weed problems

Sustainability Assessment:

- **Environment**

The impact of weeds on the environment is well known and well documented. Weeds threaten native plant species and a number of native animals. They threaten biodiversity, particularly on the NSW North Coast where the warm moist climate and relatively fertile soils make it ideal for the establishment and growth of weeds.

Weeds can also increase soil erosion while aquatic weeds such as Salvinia block water courses and affect water quality and marine life.

- **Social**

The social impact of weeds can be seen in reduced standards of living of those earning their living from the land. This is reflected in lower crop and pasture yields and the higher costs incurred in implementing weed control programs.

Many weeds also have negative impacts on human health ie Privet and Broad Leaved Pepper Trees.

- **Economic**

Broader Economic Implications

Weeds are estimated to cost Australia over \$4b in lost agricultural productivity pa.

In 2012/13 the NSW Government allocated \$8.8m to assist councils with their weed control activities. Of this, the NCWAC region received \$ 1.1 m , which is divided pro-rata based on area. Catchment Management Authorities (CMA's) have also contributed approximately \$250,000 over the last 5 years to fund 9 (nine) weeds projects in the North Coast region eg: Kudzu,Mysore Thorn and Camphor Laurel.

Delivery Program/Operational Plan Implications

Council's budget for Noxious weed control in 2012/13 is \$186,400 for noxious weed inspections , and \$250,917 for noxious weed control, with a further \$141, 516 provided by NSW Department of Primary Industry (DPI) as Weed Action Programme (WAP) funding.

Further funding is allocated through the Environmental Levy (EL) program with many EL projects requiring weed control. Other indirect funding for weed control is supplied by various sections of council eg: Asset Maintenance , Sewer & Water for the upkeep and maintenance of council infrastructures and amenities.

Consultation:

The following people were consulted during the preparation of the report:

Reece Luxton , Secretary NCWAC

Rod Ensbey, Regional Weed Control Coordinator, NSW Agriculture, Grafton

Related Policy and / or Precedents:

The Senior Weeds Inspector is Council's representative on the NCWAC .

Statutory Requirements:

All activities of the NCWAC are conducted under the Noxious Weed Act 1993 , Pesticide Act 1999 and WHS Act 2011.

Issues:

The NCWAC has evolved to play a significant role in regional weed management and will continue to do so, not only with regard to noxious weeds but also significant environmental weeds that require a unified regional approach for their effective control.

Council spends considerable funds on many aspects of environmental management of which weed control is one. It would further enhance Council's reputation in this area by having a Councillor on the Committee.

Recommendation:

1. That Council appoint an elected representative to the North Coast Weeds Advisory Committee.
2. That Council now determine its Councillor representative.