2010

Version current as of February 2012

Greater Taree City Council

Manning River Maintenance Dredging Strategy

Prepared by Greater Taree City Council in conjunction with the Estuary and Coastline Management Committee

The preparation of this report has been a cooperative effort between Council, Government Agencies and Community Groups and facilitated by Greater Taree City Council through the Estuary and Coastline Management Committee. Members of the committee are identified below:

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MANNING RIVER MAINTENANCE DREDGING STRATEGY 2010

REV	DESCRIPTION	ORIGINAL	REVIEW	DATE
A	Final	GTCC	GTCC	2010
B	2011 Addendum (see Appendix I)	M Griffith	R Pamplin	21/02/2012
C				
D				

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List of Commonly Used Acronyms and Abbreviations

HCRCMA	Central Rivers Catchment Management Authority
NSW	New South Wales
FIMG	Farquhar Inlet Management Group
GTCC	Greater Taree City Council
LGA	Local Government Area
EMP	Estuary Management Plan
EOMP	Entrance Opening Management Plan
LPMA	Land and Property Management Authority
DECCW	Department of Environment, Climate Change and Water

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Acknowledgements

This Strategy has been prepared by Council staff in the Land Resource Management/ Engineering Department. Staff that have contributed to the process include:

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1. Introduction

The Manning River Estuary is situated on the Mid-north Coast of NSW approximately 300 kms north of Sydney in the Greater Taree City Council (GTCC) Local Government Area (LGA). The Estuary falls within the Hunter Central Rivers Catchment Management Authority (HCRCMA). The system includes both Lansdowne River and Dawson River. The estuary is unique as it has two natural ocean entrances, one at Harrington and the other to the south at Old Bar known as the Farquhar Inlet (Figure 1). The Farquhar entrance is untrained and has a history of periodic closure. The main channels of the system are:

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

The Manning River at Harrington features a trained entrance which provides access to the Pacific Ocean in most conditions. Features include a training wall and breakwall located on the northern side of the river. The Farquhar entrance is a natural delta characterised by a number of island, small channels and a sand beach berm. The entrance has a history of intermittent periods of being open or closed to the ocean.

The estuary is an important local environmental feature, supporting a range of social, economic and environmental values.

The bed of the Manning River is submerged Crown land and is owned and managed on behalf of the people of NSW by the Land and Property Management Authority (LPMA).

Management of the Manning river estuary and its entrances are guided by a number of management plans including the Manning River Estuary Management Plan (EMP) and the Draft Farquhar Inlet and Old Bar Entrance Opening Management Plan (EOMP). These plans have been prepared in consultation with the community and relevant agencies and have either been adopted or are in the process of being adopted by GTCC. The implementation of dredging activities is one aspect in these management plans that council is responsible for.

Management of the Manning River estuary is also split between a number of State government authorities and GTCC. Some of the main State authorities that have responsibility include LPMA, NSW Maritime Authority, Industry and Investment NSW and Department of Environment, Climate Change and Water (DECCW).

This Dredging Strategy identifies a number of locations within the Manning River estuary that may benefit from dredging and sets a strategic direction for future dredging activities.

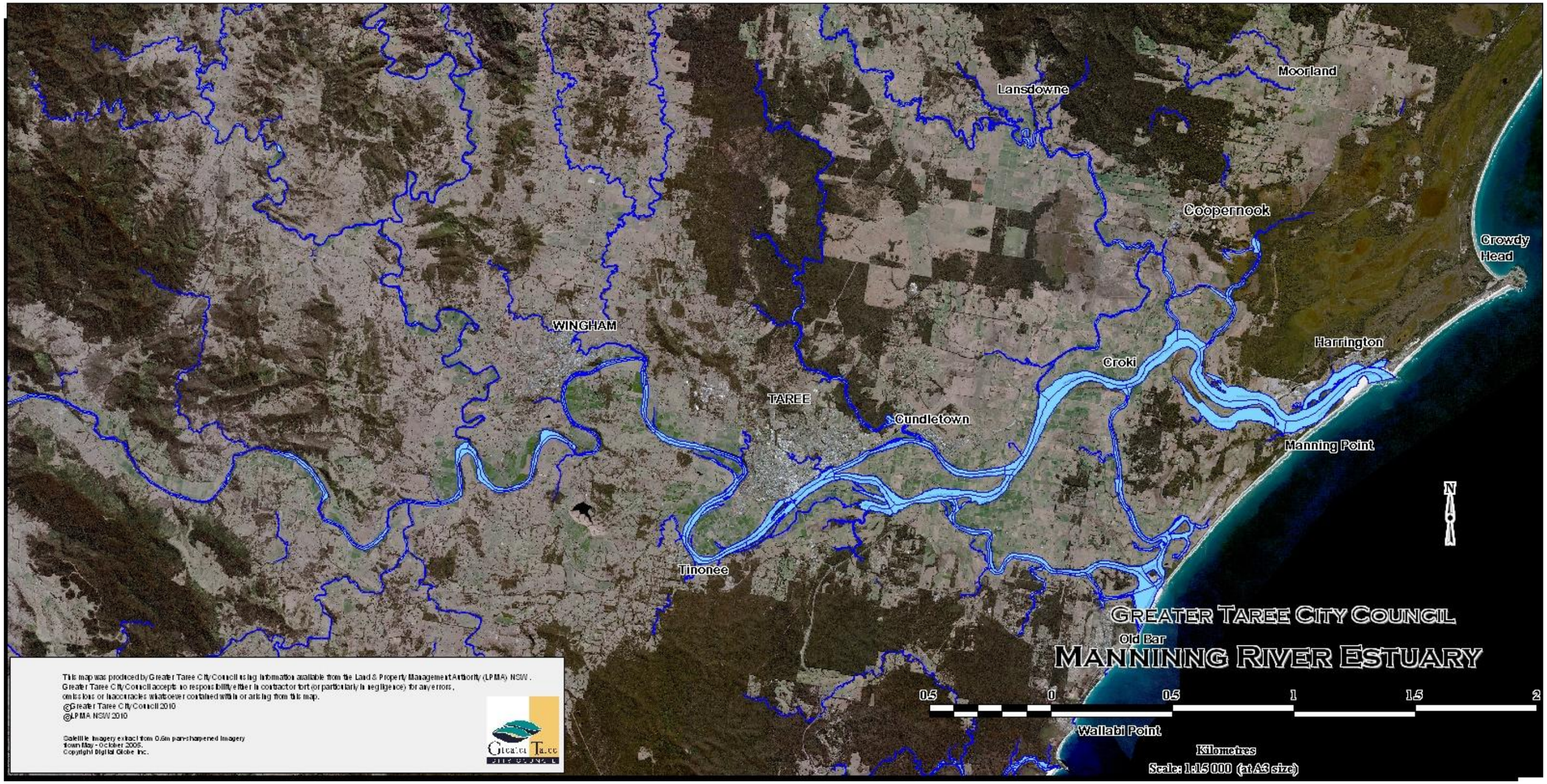


Figure 1. Manning River Estuary

2. Historical Context of Dredging in the Manning River

Dredging in the tidal reaches of the Manning River has occurred since the mid 1800s with the majority of dredging being carried out between 1889 and 1950. The dredging operations that occurred between these periods were primarily channel clearance operations to maintain navigation channels for coasting steamers and other commercial shipping traffic.

Channel clearing operations ceased as the use of the Manning River by commercial shipping diminished. Only a few channel clearance operations have occurred since 1950 (PWD, 1995).

Channel clearing operations between 1889 and 1950 occurred along various reaches of the Manning River from Harrington Inlet all the way up the main channel to Wingham (Figure 2). Between Taree and Wingham the bucket dredge Ulysses was engaged in dredging a 27m wide x 3m deep channel (PWD, 1995). Over this period some 4.3 million tonnes of sediment was removed from the Harrington inlet bar and 4.9 million tonnes upstream from Harrington to Wingham (PWD, 1995).

At Farquhar inlet dredging operations also occurred in the early part of last century at Scotts Creek and Lutherie bay to make a channel for the cream boat. At Farquhar Park dredging occurred to make a channel for picnic boats at around the same time (E.L. McCaffery,1990).

Since extensive dredging ceased for commercial shipping dredging has continued on an as needs basis to maintain navigation channels across various reaches of the Manning River Estuary. Commercial dredging for gravel products was carried out until 1999 especially between Tionee and Mondrook adjacent to the gravel crushing plant at Manning Waters (PWD, 1995)

In the context of this strategy historical dredging has occurred across the majority of the sites within the main channel of the Manning River from Harrington to Wingham (see Appendix E and Figure 2).

3. Capital Dredging and Maintenance Dredging

Capital dredging is the process of creating a new harbour, berth or waterway, or deepening an existing facility in order to allow access to larger vessels.

Maintenance dredging is the process of deepening or maintaining an existing navigational channel which is threatened of becoming silted with the passage of time.

Dredging under this strategy will be assessed during the planning phase to determine which of the above definitions applies to the dredging operation. It is likely given the extent of historical dredging that the large majority of sites will fall under the definition of maintenance dredging

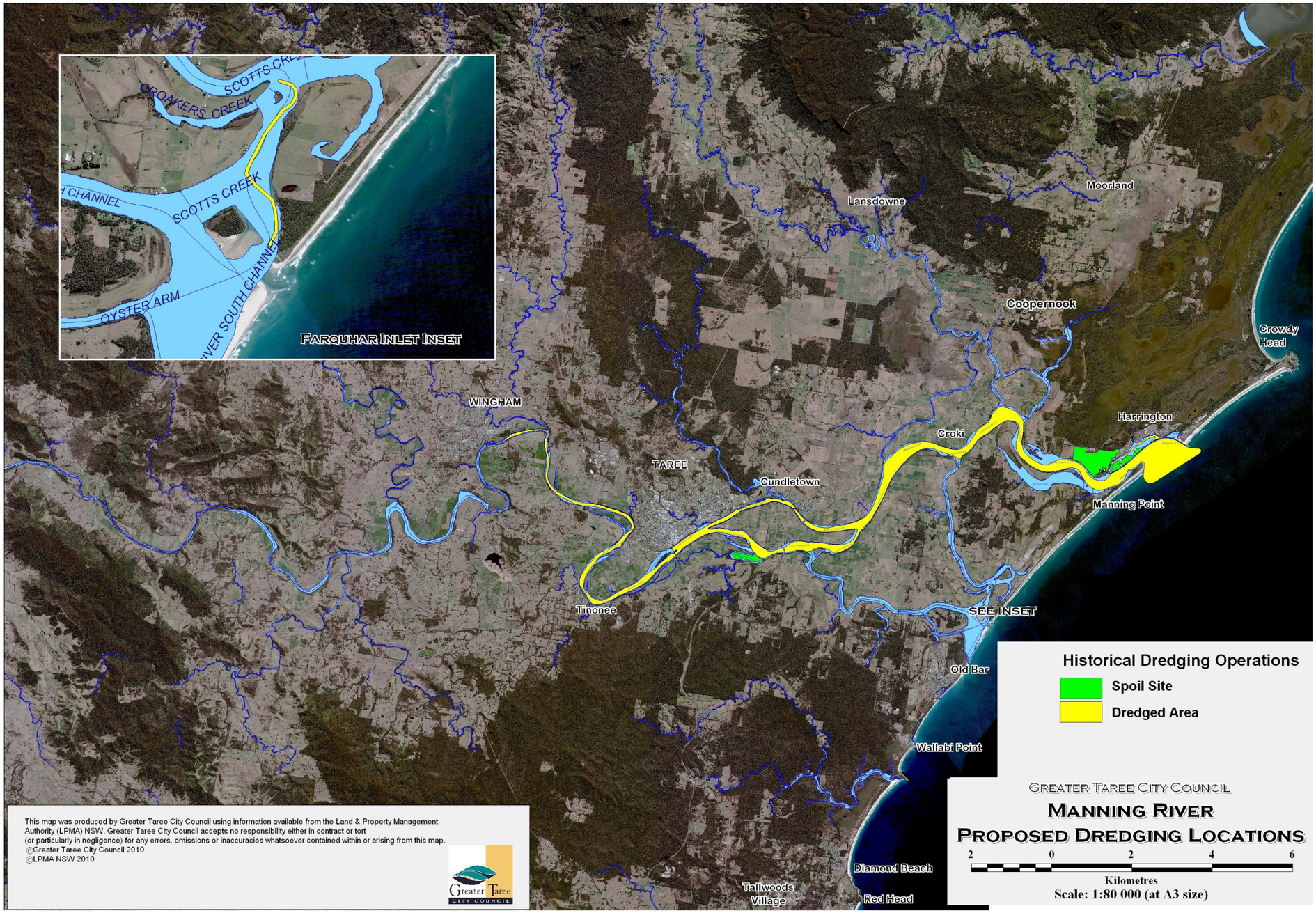


Figure 2. Historical Dredging Operation (PWD, 1995)

4. Sedimentation and the Manning River Estuary

In the Manning River EMP, sedimentation was listed in the top 7 key issues which have the potential to confront the future management of the estuary. Sedimentation throughout the estuary has resulted in the following:

- Shallowing of rivers and creeks
- Natural build up of marine sand in lower estuary entrance areas
- Natural build up of marine sand and alluvial sediment in lower estuary entrance areas
- Reduced water quality

The related issues contributing to this build up of sediment are:

- Bank erosion
- Remobilisation and deposition of existing bed sediments
- Cessation of dredging
- Sediment mobilisation in the upper catchment
- Lack of recent flooding
- Climate Change (evidence of inconsistent weather patterns)

5. Why is River Dredging Necessary?

Navigation requirements vary within the estuary as a result of differing recreational and commercial uses.

The fundamental concept that will direct this strategy is the need for and purpose of river dredging. The principle needs for river dredging are:

- Ensure the maintenance of existing/historical navigational channels which meet the minimum appropriate specifications for width and depth for safe navigation, current river uses, the environment and marine legislative requirements.
- To preserve, maintain and reinstate tidal and environmental flows in the estuarine waters of the Manning River.
- Improve water quality
- To support potential future growth of this region in line with town planning projections
- To reduce the risk of serious injury or death from boating accidents where grounding is a key element of the incident
- To reduce the risk of damage to vessels caused from groundings

- To provide access to areas within the estuary that are no longer accessible

Navigation requirements vary within the estuary as a result of differing recreational, commercial and environmental uses.

6. Sustainable Dredging and Estuary Processes

It is critical that dredging activities do not have adverse impacts on the environment, both terrestrial and aquatic, and the sedimentary processes of the estuary. For this reason, dredging must be planned and managed for the long-term in a sustainable way. The Best Practice Environmental Management - Guidelines for Dredging put out by EPA Victoria provide a good over view of how dredging can be sustainable with minimal impacts on the environment. Dredging can also have positive environmental impacts such as the creation of habitat islands and improvements in water quality.

7. Dredging Objectives

The dredging philosophy that forms the basis of this strategy is focused on maintaining the long-term sustainability of the Manning River Estuary. The following objectives have been identified to guide the implementation of this strategy:

- The purpose of dredging is for the maintenance of navigational channels and to improve both tidal flows and water quality.
- To sustain commercial aquaculture
- To support the future growth of the region by making the estuary a safe and appealing alternative to other sea change options along the NSW coastline
- Dredging needs are to reflect best environmental practice (see EPA Vic Guidelines for dredging, DECCW Waste Classification Guidelines).
- Dredging needs are to minimise impacts on the overall sediment budget of the Estuary.
- Dredging needs are to minimise impacts on both the aquatic and terrestrial environments.

8. Estuary Processes and Sedimentation

The nature of shoaling and sedimentation in the Manning River Estuary and its entrances is documented in the Manning River Estuary Processes Study (EPS) 1997. The study along with the Manning River Estuary Management Study – Numerical Modeling provides insights into the sedimentation processes occurring in the Manning River Estuary.

Sediments identified in this study are broadly characterised into the following:

- Fluvial Sediments – from fluvial loads, bank erosion and deposition;
- Marine Sediments – from Littoral movement, Aeolian movement, tidal movement and fluvial movement.

In general the study does not attempt to identify sedimentation rates for individual sites or areas except in a broad context. The study however does identify sediment movement from different estuary processes including:

- Fluvial Loads
- Bank Erosion
- Deposition
- Littoral Movement
- Aeolian Movement
- Tidal Movement
- Fluvial Movement

These are further described below.

Fluvial Sediments

Fluvial Loads

The total volume of sediments entering the Manning River Estuary from fluvial loads is not great, around 15,000m^3/yr, with the volume of suspended solids similar to the volume of bedload sediment. Table 1 provides the annual fluvial sediment loads for the Manning River.

Table 1. Estimated fluvial sediment loads (Manning River EPS, 1997)

Location	Area km^2	Bedload m^3	Suspended Solids m^3
Manning River (Abbots Falls)	7300	4500	6100
Taree Urban Area/Browns Creek	10	1450	800
Dawson River	100	220	170
Lansdowne River	220	330	280
Other Areas	790	600	500
TOTAL	**8420**	**7100**	**7900**

Bank Erosion

There is a wide occurrence of bank erosion in the Manning River Estuary arguably caused by

1. Wind generated wave attack
2. Wash generated by vessel movement
3. Cattle denuding and wave attack
4. Flood events
5. Bank scour
6. Water logging and tree collapse

Due to the wide occurrence of bank erosion in the Manning River estuary it is difficult to estimate actual sediment input levels into the system. However based on sediment grain size analysis and the observations made in the Bank Management Study (WMA,1997) the sediment input from bank erosion is of a similar order to catchment inputs of around 15,000m^3/yr (Manning River EPS, 1997).

Deposition

In the Manning River fluvial sediments eroded from the catchment or from river banks are either deposited on the flood plain, or on shoals in response to changed river flows.

Hydrographic surveys covering a 100 years indicate that the rate of permanent sedimentation deposition in the main channel of the Manning River has been very small (Manning River EPS, 1997).

In the main river channel permanent sediment deposition has been very slow due to the limited movement of fluvial bed sediments, even during floods, resulting in an average rate of infilling of 1mm/yr (Manning River EPS, 1997).

Marine Sediments

Littoral Movement

The predominant mechanism for northerly sediment movement in the littoral zone near Farquhar and Harrington inlets are south easterly swells, with prolonged periods of easterly and north easterly swells also producing some southerly movement. The net erosion rate in this zone has equated in a northerly loss from wave induced movement of 100,000m^3/yr from Mitchells island beach during the mid 1990s.

Aeolian Movement

Aeolian movement of sand is possibly the major component of sediment movement along the beach embayment at the entrances.

Construction of the northern break wall at Harrington created Harrington Lagoon as well as a large area of mobile dunes north of the entrance. This area contributes large quantities of Aeolian sand to the entrance area particularly during the summer. Sands from this area mainly moves into the entrance channel and hence onto the marine tidal delta. Some of this sand is also moving into Harrington Lagoon which is showing an infilling rate of between 1000m^3/yr and 2000m^3/yr.

Tidal Movement

Both Farquhar and Harrington inlets move north and south due to sediment movement in the beach littoral zone in response to the prevailing net sand supply. Some of this sand is carried into the inlet due to tidal flows. The volume of sand moving into the entrances by tides exceeds the volume moved out due to wave action and the greater sediment capacity of the inflowing tide over the out flowing tide associated with faster peak inflow velocities (Manning River Estuary Management Study – Numerical Modeling, 2001; Manning River EPS, 1997).

Both inlets exhibit a buildup of sand at the inland extent of their deltas indicating that the marine deltas are now well developed with the volume of marine sand stored in the deltas reaching its maximum.

Fluvial Movement

The movement of sand into the entrances at Harrington and Farquhar over time is largely reversed by floods which scour sand from the marine deltas and deposit it in the beach wave zone. The sand is then reworked onto the beach creating a dynamic equilibrium between the beach and the river entrances/marine deltas resulting in neither entrance acting as a sink for marine sediments.

Based on three significant freshes in the river each year the average annual flood scour at Harrington inlet would be of the order of 300,000m^3 and for Farquhar Inlet of around 200,000m^3 (Manning River Estuary Processes Study, 1997).

Sediment Balance

The estuary sediment balance in the Manning River Estuary is dominated by tidal movement at the estuary entrances. This is indicated in the table below which shows the sediment balance for the Manning River in 1999.

Table 2. Average annual sediment balance (Manning River EPS, 1997).

Sediment Balance Component	**Volume In (m^3)**	**Volume Out (m^3)**
Harrington Inlet nett Tidal Movement	300,000	
Harrington Inlet nett Fluvial Movement		300,000
Farquhar Inlet nett Tidal Movement	200,000	
Farquhar Inlet nett Fluvial Movement		200,000
Harrington Lagoon Aeolian Movement	1,000	
Catchment Fluvial Inputs and flood Deposition	15,000	20,000
Bank Erosion and Bed Accretion	15,000	
Sand and Gravel Extraction		60,000*
TOTAL	**531,000**	**580,000**

***Note: Sand and Gravel extraction ceased in 1999 therefore the total volume out is 520,000m^3 rather than 580,000m^3.**

Up to 1999 some 60,000 m^3/year of gravel and sand was being extracted from the river for aggregate creating a small net negative sediment imbalance. The cessation of this activity has meant that the average annual sediment balance has changed from 580,000m^3/yr to 520,000m^3/yr out. This change in the sediment balance means that the total volume out is now less than the total volume in of 531,000m^3/yr creating a small net positive sediment balance of 11,000m^3/yr.

9. Minimising the Need for Dredging and Spoil Disposal

All the dredging activities that are covered by this strategy have an environmental impact at both the dredging site and the spoil site and the proposed amount of dredging needs to be justified. Similarly the cost of dredging is high and there is a strong economic incentive to minimise the amount of dredging that is required.

It is important that where maintenance dredging will be ongoing satisfactory disposal of dredge spoil needs to occur. Disposal of spoil should not adversely impact on the surrounding environment this should be done by keeping the foot print of the spoil site as small as possible.

Dredging under this strategy focuses on maintaining navigational channels and environmental flows. Where dredging is justified for boating activities the channel widths and depths need to be considered. Keeping these widths and depths to a minimum will reduce the volume that needs to be extracted, the cost of dredging and the amount of area impacted on by the spoil. There may also be justification for the realignment of channels if this reduces the maintenance dredging requirements as long as this is within the foot print of a previous navigational channel.

The management of sediment inputs into that Manning River Estuary needs to be considered within the context of this strategy. Any increase in the rate of sedimentation from erosion processes, such as bank and gulley erosion, within the catchment will adversely impact on the frequency of dredging and the volume of material that will need to be extracted. Addressing these issues in conjunction with ongoing maintenance dredging will help to minimise dredging frequencies and reduce the overall requirements for dredging.

10. Environmental Considerations

Environmental impacts on both the dredging site and the spoil site can be many and varied and include:

- Changes in the flow regime
- Changes in water quality
- Contamination of spoil sites from the deposition of contaminated spoil material (including Acid Sulphate Soils)
- Impacts on benthic flora and Fauna
- Impacts on threatened or critically endangered species
- Impacts on the life histories of marine and aquatic flora and fauna
- Impacts on endangered ecological communities
- Impacts on dredge beds
- Impacts on river bank stability

It will be important that dredging takes place at times of the year which will not adversely affect the life histories of marine, estuarine species. Where dredging across a number of sites will result in the removal and translocation of large quantities of spoil material within the foot print of the estuary consideration needs to be given to the cumulative impacts on the stability of the estuary/river system. In particular such considerations need to be reflected in the planning process for dredging sites where the deposition of spoil on sand flats or within the foot print of the estuary is an option.

11. Dredging Sites (see Appendix I for 2011 addendum)

Table 3 shows the sites that have been identified for future dredging. These sites have been identified through a review of literature, including the Manning River EMP and the Farquhar Inlet Old bar EOMP, through anecdotal evidence from staff, state agency representatives and the community and on the basis of future navigation requirements.

Table 3. Proposed dredging sites in the Greater Taree City Council LGA

SITE	SITE REF
HARRINGTON LAGOON	1
HARRINGTON BACKCHANNEL	2
HARRINGTON WATERS QUAY AREA	3
HARRINGTON MAIN CHANNEL	4
MANGROVE ISLAND	5
PELICAN BAY CREEK	6
CATTAI CREEK ENTRANCE	7
SCOTTS CREEK MID SECTION	8
SCOTTS CREEK SOUTH END	9
SOUTH CHANNEL OXLEY ISLAND	10
FARQUHAR INLET	11
CABBAGE TREE CHANNEL	12
OYSTER CREEK	13
CABBAGE TREE ISLAND - WESTERN TIP	14

SITE	SITE REF
MIDDGY GHARRET ISLAND - WESTERN TIP	15
DUMARESQ ISLAND - NORTHERN TIP	16
DUMARESQ ISLAND - NORTHERN CHANNEL	17
ROWING CLUB SHALLOW ISLAND	18
NORTHERN BANK ADJACENT TO TAREE CBD	19
CARTER CREEK ENTRANCE UPSTREAM OF MARTIN BRIDGE	20
OAKYISLAND TAREE WEST	21
MONDROOK CREEK ENTRANCE	22
MONDROOK CREEK - TAREE WEST	23
FIVE ISLANDS	24
WINGHAM	25
CROWDY HARBOUR	26
CROWDY HARBOUR - BOAT RAMP	27

The sites identified in table 3 are shown graphically in Appendix A. The maps provided in Appendix A are approximations of the extent and locations of the dredging and spoil sites. The final extent and locations of these sites will be determined during the planning and assessment process for individual dredging operations.

12. Dredging Priorities (see Appendix I for 2011 addendum)

Given the scope of this strategy and the cost of dredging works, dredging sites had to be prioritised (Table 5). To prioritise dredging sites a range of key criteria where determined and used in the assessment of sites. When making reference to actual and potential boating traffic, these figures have been averaged out over the Peak Boating Season. 1st October through to the end of the following Easter Holidays and considered the warmer 6 months. Although boating is year round, recreational pursuits decrease in the cooler months. Potential boating = normal boating numbers subjected to abnormal weather patterns. Historical vessel traffic data is not accurately recorded anywhere so these figures are not absolute. These key criteria are detailed below in Table 4. A table detailing the identified sites and the prioritisation assessment is provided in Appendix B. This assessment process was based on known and anecdotal evidence and was undertaken by the dredging subcommittee using the criteria in table 4.

Table 4. Criteria for dredging priorities

Parameter	Priority	Weighting	Comments	Range
Community Concern/Support	High	15	• High community support to undertake dredging Low community concern	5
			• Moderate community support to undertake dredging Low community concern	4
			• Moderate community support to undertake dredging Moderate community concern	3
			• Low community support to undertake dredging Moderate community concern	2
			• Low community support High community concern regarding dredging proposal	1
Level of Funding Required/ Community Benefit	High	15	• High level of funding required > $500,000 to undertake project with low community benefit	1
			• High to medium level of funding required < $500,000 but > $250,000 to undertake project with medium to low community benefit	2
			• Medium level of funding required < $250,000 but > $100,000 to undertake project with medium	3

Parameter	Priority	Weighting	Comments	Range
			community benefit • Medium - low level of funding required < $100,000 but > $50,000 to undertake project with medium - high community benefit • Low level of funding required <$50,000 to undertake project with high community benefit.	4 5
Navigation Conditions	High	15	• Channel Closed (Extensive shoaling /Does not provide 24 hr safe access) • Channel Open (high incidence of Shoaling /Does not provide 24 hr safe access) • Channel open (But conditions require Boaters to be alert at all times) • Channel open channel width adequate (Minor Shoaling • Channel width adequate (No shoaling)	5 4 3 2 1
Environmental Outcomes	High	15	• Multiple Benefits (eg Improved Water Quality / Expanded Sea Grasses Area/ Establish Artificial Habitats/ Bank Stabilisation Works / Supports Aquaculture /)	5

Parameter	Priority	Weighting	Comments	Range
			• Single Benefit	1
Existing & Potential Boating Activity **(Taken during the peak Boating Season 1 Oct – end of following Easter)**	High	15	Traffic Volume: • >60 boats per day • 40 to 60 boats per day • 20 to 40 boats per day • 10 to 20 boats per day • 0 to 10 boats per day	 5 4 3 2 1
Opportunities for External Financial Assistance	High to Medium	12.5	Private Interest / Government Assistance: • Full funding (100% by others) • Partial funding (75% others: 25% Council) • Partial funding (67% others: 33% Council) • Partial funding (50% others: 50% Council) • Funding unlikely (100% Council)	 5 4 3 2 1
Sustainability of Dredging	Medium	10	Infill Rate (Estimated Dredging Return Period/frequency) • >10 years (Rare)* • 5 to 10 years (Infrequent)* • 2.5 to 5 years (Frequent)* • 0 to 2.5 years (Often)*	 4 3 2 1

Parameter	Priority	Weighting	Comments	Range
Potential for Additional Benefits	Low	5	• Opportunities for associated benefits • Limited opportunities for associated benefits	5 1

***Defines estimated dredging frequencies provided in Table 6**

Table 5. Dredging priorities within the Greater Taree City Council area.

SITE	SITE REF
HIGH RIORITY	
SCOTTS CREEK SOUTH END	9
SOUTH CHANNEL OXLEY ISLAND	10
CABBAGE TREE CHANNEL	12
CROWDY HARBOUR - BOAT RAMP	27
ROWING CLUB SHALLOW ISLAND	18
FARQUHAR INLET	11
CROWDY HARBOUR	26
HARRINGTON BACKCHANNEL	2
OYSTER CREEK	13
HARRINGTON MAIN CHANNEL	4
CABBAGE TREE ISLAND - WESTERN TIP	14
FIVE ISLANDS	24
MEDIUM PRIORITY	
HARRINGTON LAGOON	1
CARTER CREEK ENTRANCE UPSTREAM OF MARTIN BRIDGE	20
OAKY ISLAND TAREE WEST	21

SITE	SITE REF
WINGHAM	25
DUMARESQ ISLAND - NORTHERN CHANNEL	17
NORTHERN BANK ADJACENT TO TAREE CBD	19
LOW PRIORITY	
CATTAI CREEK ENTRANCE	7
SCOTTS CREEK MID SECTION	8
PELICAN BAY CREEK	6
MANGROVE ISLAND	5
MONDROOK CREEK - TAREE WEST	23
MIDDGY GHARRET ISLAND - WESTERN TIP	15
DUMARESQ ISLAND - NORTHERN TIP	16
HARRINGTON WATERS QUAY AREA	3
MONDROOK CREEK ENTRANCE	22

It should be noted that despite the priorities above, dredging works may be carried out across a number of sites with different priorities for practical reasons and to take advantage of economies of scale for nearby sites.

Dredging of existing boating facilities, including boat ramps, public jetties and wharfs will need to be included in this strategy once a strategic plan prioritising the maintenance (including dredging) and development of boating facilities in the Manning River Estuary has been completed.

The Draft Farquhar Inlet, Old Bar EOMP identifies 7 options for managing an entrance opening at Farquhar inlet. The EOMP is currently in draft format and dependent on which option is finally adopted may impact on how the sites are prioritised in Table 5.

13. Maintenance Dredging Frequency

It is important to recognise that maintenance dredging is an ongoing process. The need for maintenance dredging is driven by natural sedimentary processes that impact on navigation channels, environmental flows and other uses within the estuary. Sedimentary processes are dynamic and are driven by factors such as changes in deposition and flow rates resulting from flood events and coastal processes at estuary entrances. The frequency of maintenance

dredging consequently is hard to predict and conservative estimates of dredging frequency are given in Table 6. The estimates in table 6 are based on anecdotal evidence, professional judgment and previous dredging works. It will be important to monitor individual sites after they have been dredged to refine these estimates to provide a better indication of dredging frequencies.

Table 6. Estimate of the likely maintenance dredging frequencies at each site. Estimates have been provided by the dredging subcommittee in the absence of any documented information.

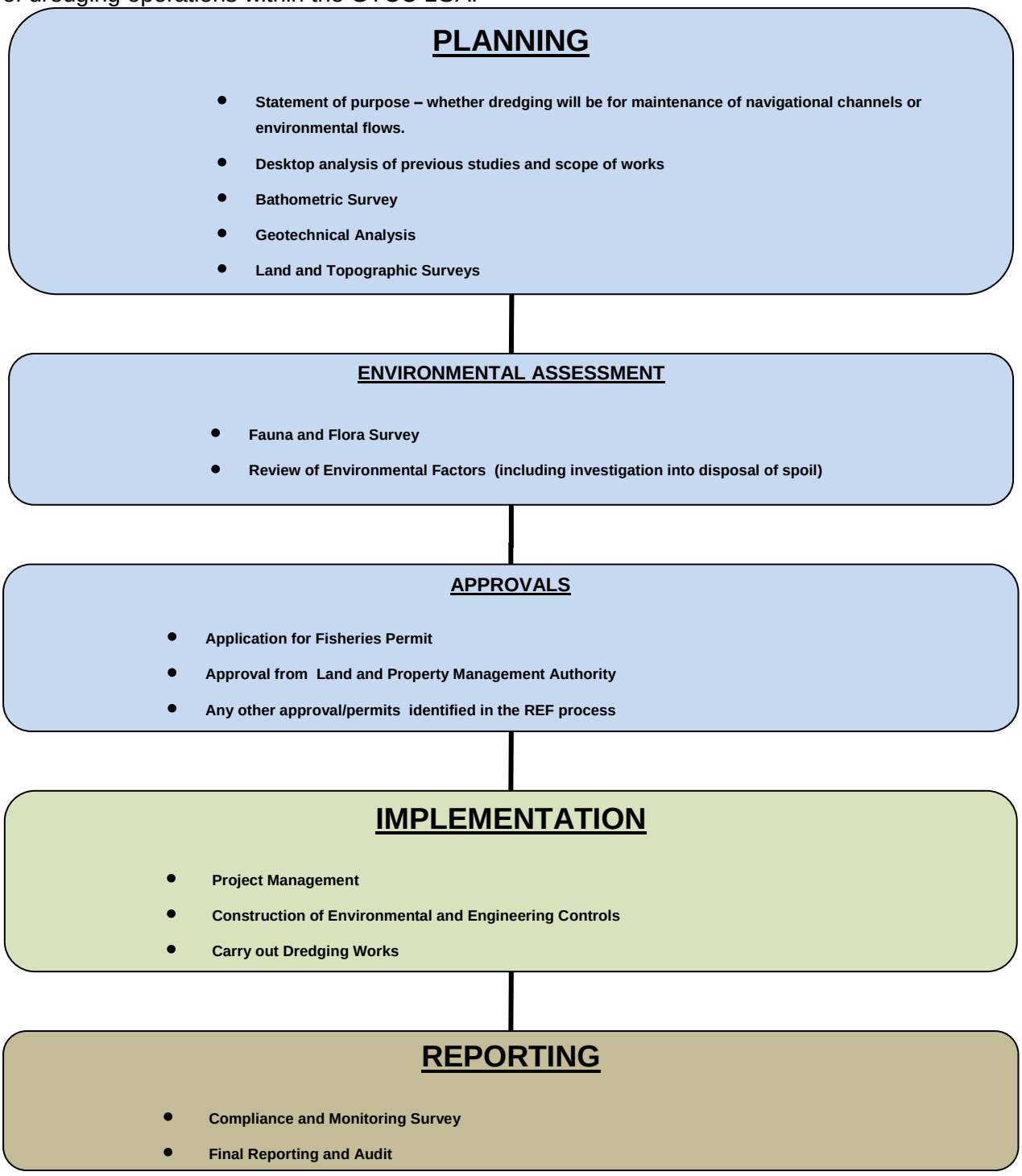
SITE	SITE REF	ESTIMATED DREDGING FREQUENCY
HARRINGTON LAGOON	1	**INFREQUENT**
HARRINGTON BACKCHANNEL	2	**INFREQUENT**
HARRINGTON WATERS QUAY AREA	3	**INFREQUENT**
HARRINGTON MAIN CHANNEL	4	**OFTEN**
MANGROVE ISLAND	5	**RARE**
PELICAN BAY CREEK	6	**RARE**
CATTAI CREEK ENTRANCE	7	**RARE**
SCOTTS CREEK MID SECTION	8	**INFERQUENT**
SCOTTS CREEK SOUTH END	9	**INFERQUENT**
SOUTH CHANNEL OXLEY ISLAND	10	**FERQUENT**
FARQUHAR INLET	11	**OFTEN**
CABBAGE TREE CHANNEL	12	**INFREQUENT**
OYSTER CREEK	13	**INFREQUENT**
CABBAGE TREE ISLAND - WESTERN TIP	14	**INFREQUENT**
MIDDGY GHARRET ISLAND - WESTERN TIP	15	**RARE**
DUMARESQ ISLAND - NORTHERN TIP	16	**RARE**
DUMARESQ ISLAND - NORTHERN CHANNEL	17	**RARE**
ROWING CLUB SHALLOW ISLAND	18	**INFREQUENT**

SITE	SITE REF	ESTIMATED DREDGING FREQUENCY
NORTHERN BANK ADJACENT TO TAREE CBD	19	**INFREQUENT**
CARTER CREEK ENTRANCE UPSTREAM OF MARTIN BRIDGE	20	**INFREQUENT**
OAKY ISLAND TAREE WEST	21	**INFREQUENT**
MONDROOK CREEK ENTRANCE	22	**RARE**
MONDROOK CREEK - TAREE WEST	23	**RARE**
FIVE ISLANDS	24	**RARE**
WINGHAM	25	**RARE**
CROWDY HARBOUR	26	**FREQUENT**
CROWDY HARBOUR - BOAT RAMP	27	**FREQUENT**

Note: See note table 5 for definition of estimated dredging frequency terms.

14. Dredging Procedure

The following outlines the procedure to follow during the planning, implementation and reporting of dredging operations within the GTCC LGA.



15. Spoil Management Options

The management of dredge spoil is a critical component of any dredging operation. Spoil management has significant potential to impact on the environment, sedimentary processes and operational cost of individual dredging operations.

Spoil management will be site specific and dependent on the type of material that is removed during the dredging operation. Spoil from the upper estuary channel is likely to consist of fluvial gravels and fluvial sand/silts while spoil downstream of Taree Island will be dominated by fluvial mud and sands (PWD, 1995). Towards Farquhar and Harrington inlets this mud and sand becomes increasingly mixed with reworked coastal sands. The management options for the spoil vary with changes in the material being extracted and will need special consideration during the planning and assessment phases of any dredging operation.

Wherever possible dredge spoil should be seen as a resource. Beneficial uses of spoil include:

- reclamation
- beach nourishment
- raising the level of residential land
- Creation of breeding habitat islands for Little Terns and Beach Stone Curlews
- Use of aggregate in construction

On occasion the dredge material from the bed of the Manning River may be considered for sale to recuperate some of the costs associated with the dredging operation. In such instances and were dredging material is used on land other than Crown Land payment of royalties will need to be negotiated with the LPMA. Also the assessment and use of the dredge material will be subject to the provisions of the Waste Classification Guidelines (DECCW, 2008)

Conservative estimates of extraction volumes for each of the sites identified in this strategy are provided below (Table 7.) These volumes are an indication of the quantity of spoil that might be generated and are not a true reflection of the final volumes that will be extracted as no detailed investigations have been undertaken as part of this strategy. Further refinement to these volumes will occur during the planning phase for individual dredging operations where volumes will be accurately assessed through detailed investigations and designs.

Table 7. Extraction volumes for dredging sites as recorded by NSW Maritime.

SITE	SITE REF	EXTRACTION VOLUME (m^3)
HARRINGTON LAGOON	1	**20,000**
HARRINGTON BACKCHANNEL	2	**84,000**
HARRINGTON WATERS QUAY AREA	3	**9,600**
HARRINGTON MAIN CHANNEL	4	**48,000**
MANGROVE ISLAND	5	**5,000**
PELICAN BAY CREEK	6	**25,200**
CATTAI CREEK ENTRANCE	7	**12,800**
SCOTTS CREEK MID SECTION	8	**14,400**
SCOTTS CREEK SOUTH END	9	**40,000**
SOUTH CHANNEL OXLEY ISLAND	10	**56,250**
FARQUHAR INLET	11	**84,000**
CABBAGE TREE CHANNEL	12	**39,000**
OYSTER CREEK	13	**75,000**
CABBAGE TREE ISLAND - WESTERN TIP	14	**10,800**
MIDDGY GHARRET ISLAND - WESTERN TIP	15	**60,000**
DUMARESQ ISLAND - NORTHERN TIP	16	**17,500**
DUMARESQ ISLAND - NORTHERN CHANNEL	17	**50,000**
ROWING CLUB SHALLOW ISLAND	18	**5,000**
NORTHERN BANK ADJACENT TO TAREE CBD	19	**45,000**
CARTER CREEK ENTRANCE UPSTREAM OF MARTIN BRIDGE	20	**18,000**
OAKY ISLAND TAREE WEST	21	**12,000**
MONDROOK CREEK ENTRANCE	22	**12,000**

SITE	SITE REF	EXTRACTION VOLUME (m^3)
MONDROOK CREEK - TAREE WEST	23	**4,000**
FIVE ISLANDS	24	**16,800**
WINGHAM	25	**8,000**
CROWDY HARBOUR	26	**8,000**
CROWDY HARBOUR - BOAT RAMP	27	**6,000**

Note 1: All extraction volumes are approximate indications of material at each site and further investigations during the planning phase will be required to determine the exact volumes.

From an environmental management perspective, management of sediments within the estuary or near shore environment is clearly the most sustainable practice. This approach minimises the potential for impacts on estuarine sediment budgets and adverse consequences including excessive scour during flood events, bank erosion and beach dune erosion. It also minimises costs associated with transport and disposal of spoil material.

Methods and sites for the disposal of spoil will be identified and detailed during the planning and assessment phase of individual maintenance dredging operations. Management of large quantities of spoil will be crucial to the sustainability and feasibility of dredging operations. Where disposal is to land, there must be a suitable site near the dredge site for sediment dewatering where the salt content and the sediment leachate will not cause environmental problems.

Historically, dredging spoil from channel clearance operations was deposited along the banks of various reaches of the Manning River prior to 1889. Gravel from dredging the channel from Taree to Wingham was dumped in adjacent deep water at Tionee and material from the entrance bar in the 1900 was deposited in Blackfords Bay (PWD, 1995).

16. Dredging Methods

Methods for dredging will be determined as part of the detailed investigations for individual dredging operations. Dredging methods employed under this strategy must:

- Be suitable for the specific site and material
- Reflect environmental best practice
- Be cost effective
- Meet statutory requirements

There are a number of dredging methods that can employed to maintain navigational channels and environmental flows. These dredging methods and their limitations are further discussed in Appendix F, however the most suitable dredging methods are likely to include:

- Cutter suction dredge with pump to disposal site
- Land based excavator (for minor works)

17. Statutory Requirements

There are a number of statutory provisions which relate to maintenance dredging activities. The following summary gives an overview of the controls and their possible impacts on maintenance dredging and the placement of spoil in the Manning River Estuary.

Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act* 1999 (the EPBC Act) is administered by Australian Government's Department of the Environment, Water, Heritage and the Arts. It establishes an environmental assessment and approval system that is separate from and additional to State systems. The EPBC Act establishes matters of national environmental significance (that is, World Heritage properties, Wetlands of international importance (Ramsar wetlands), listed threatened species and communities, listed migratory species, nuclear actions, and Commonwealth marine areas). Under the EPBC Act, a person must not take an action that has, will have or is likely to have a significant impact on a matter of national environmental significance, except where certain processes have been followed and/or certain approvals obtained.

Penalties for unlawfully taking such an action include a fine of up to $5.5 million or up to seven years imprisonment. The EPBC Act requires proponents of actions to which the EPBC Act may apply to seek a determination from the Commonwealth Minister for the Environment, Water, Heritage and the Arts not their proposed action is a 'controlled action'. Proponents must then, if the Act applies, seek approval for the controlled action directly from the Commonwealth Environment Minister. The State Government is not able to advise proponents on whether or not any particular proposal is affected by the EPBC Act; this advice can only come from the Commonwealth Minister for the Environment, Water, Heritage and the Arts

Environmental Planning & Assessment Act 1979 and the Environmental Planning & Assessment Regulations 2000

The NSW Environmental Planning and Assessment (EP&A) Act 1979 generally imposes requirements for controlling development under two schemes. Part 4 of the Act controls development that requires consent or is prohibited under an environmental planning instrument. Part 5 of the Act imposes requirements for assessing the impact of development that does not require consent under the EP&A Act .

Under this Strategy it is envisaged that maintenance dredging activities (including the deposition of dredged material) are likely to be subject to the provisions under Part 5 of the EP&A Act 1979. In this instance, the public authority undertaking the dredging is required to examine the environmental aspects of carrying out the activity and must 'take into account to the fullest extent possible all matters affecting or likely to affect the environment' and seek any necessary approvals from relevant authorities such as the LPMA (i.e. approval to dredge Crown land).

Such an examination would usually take the form of a Review of Environmental Factors (REF).

Determination (or approval) for an activity to proceed is given by the "Determining Authority". In determining the matter, the Determining authority must ensure the environmental impacts have been adequately considered in the REF and there is not likely to be any significant environmental impacts as a consequence of the proposed activity. Should any dredging proposal be „likely to significantly affect the environment", an Environmental Impact Assessment would be required.

Where the approval of more than authority is required, there may be more than one Determining Authority.

The EP&A Act also allows State Environmental Planning Policy (SEPP) to be created under Part 3 of the Act by the Governor.

State Environmental Planning Policy (Infrastructure) 2007

SEPP (Infrastructure) 2007 aims to facilitate the effective delivery of infrastructure across the state by permitting certain types of development without consent.

Infrastructure includes waterway and foreshore management activities which are identified under Division 25 – Waterway and foreshore management activities Clause 128 – definition and Clause 129 – Development permitted without consent.

Clause 128 – "In this Division:

"waterway or foreshore management activities" means:

(b) instream management or dredging to rehabilitate aquatic habitat or to maintain or restore environmental flows or tidal flows for ecological purposes, and

Clause 129 (1)– "Development permitted without consent

(1) 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.

SEPP (infrastructure) 2007 also identifies maintenance dredging of navigation and boating facilities under Division 13 - Port, wharf or boating facilities. Clause 68 (5) deals specifically with this issue:

"(*5) In this clause, a reference to development for the purpose of port facilities, navigation facilities, wharf or boating facilities or associated public transport facilities for a public ferry wharf includes a reference to the operation of such a facility and to development for any of the following purposes if the development is in connection with such facilities:*

(a) construction works (including dredging and land reclamation, if it is required for the construction of facilities),

(b) routine maintenance works (including dredging, or bed profile levelling, of existing navigation channels if it is for safety reasons or in connection with existing facilities),

(c) environmental management works,

(d) alteration, demolition or relocation of a local heritage item,

(e) alteration or relocation of a State heritage item."

A Part 5 assessment process under the EP&A Act 1979 would apply.

Under SEPP (infrastructure) 2007 nothing affects any requirement under another Act to obtain an approval, licence or permit for or concurrence to any development of a kind specified in the SEPP. This means that for any activity on Crown land the proponent must seek an approval under the Crown Land Act.

SEPP Infrastructure also requires a public authority to consult with another public authority from whom an approval is required for development to be carried out lawfully.

State Environmental Planning Policy 14 – Coastal Wetlands

SEPP 14 aims to protect and preserve coastal wetlands in the environmental and economic interests of NSW. According to the policy a person shall not clear, construct a levee, drain or fill identified wetlands except with the consent of the council and the concurrence of the Director.

Appropriate assessment will need to be carried out under Part 5 Assessment of the Environmental Planning and Assessment Act 1979 at the assessment stage of each activity to determine whether the dredging or the placement of spoil will impact identified wetlands.

Greater Taree Local Environment Plan 1995

All land in the GTCC LGA, including waterways, are zoned. The Manning River and its Tributaries have the following zonings:

7(a) Environmental Protection Habitat;

6(a) Open Space Recreation;

1(b1) Rural Valley Agriculture;

1(a) Rural General.

Extractive industries (including dredging) are permissible if compatible with the relevant zone objectives.

Schedule 3 item 10 (Clause 7) of the LEP states that river management works do not require consent of Council. As a consequence the activity is assessed under Part 5 of the EP&A Act 1979.

Draft Greater Taree Local Environmental Plan 2010

The Manning River and its tributaries are proposed to be zoned W2 – Recreational waterways under the Draft LEP. It is proposed that dredging be a permissible use in this zone

Crown Lands Act 1989

Given that dredging activities will extend below the mean high water mark, above which Council has care and control, a license would be required from the Land and Property Management Authority for maintenance dredging activities.

Protection of the Environment and Operations Act 1997

This legislation controls environmental pollution and regulates scheduled activities carried out in NSW. In relation to dredging activities, the provisions of the Act would primarily relate to preventing water pollution, contaminated waste (spoil) and transport of dredge spoil as well as ancillary matters such as noise and air pollution. Dredging activities that involve the dredging of more than 30,000 m^3 of material annually are scheduled and may require an Environmental Protection License. A decision as to whether an EPL is required rests with the Environmental Protection Agency Regional Manager.

Depending upon the staging of maintenance dredging works, an EPL may be required for maintenance dredging at some sites.

Threatened Species Conservation Act 1995

The Threatened Species Conservation Act requires assessment of listed threatened species that occur on any proposed development site. A Seven Part Test will be required under this legislation as part of the environmental assessment for individual dredging proposals.

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Fisheries Management Act 1994

The Fisheries Management Act requires Council to obtain permits for dredging or reclamation works. However, a permit is not required where the works are authorized under the Crown Lands Act or by any other relevant authority (excluding Council). Given that a Crown Lands licence will be required for all river dredging sites identified in this strategy, a dredging permit from NSW DPI will not be required.

The Act also requires a permit to be issued where marine vegetation is to be harmed.

Water Management Act 2000

This legislation requires a controlled activity approval to be obtained for works within 40m of rivers/foreshores. However, certain public authorities (including Council) are exempt from the requirements of the Act.

Marine Pollutions Act 1987

This Act relates to the protection of the sea and certain waters from pollution by oil and other noxious substances discharged from ships.

A summary of the applicability of statutory provisions to the sites identified under this strategy is provided in Appendix C.

18. The Do Nothing Option

To ensure a balanced assessment of the maintenance dredging issue, the 'do nothing' option should be assessed. This is a relevant consideration given the cost implications and potential environmental impacts of maintenance dredging.

Table 8 is a summary of the potential risks of maintenance dredging that can be used to inform decisions.

Table 8. Potential risks for maintenance dredging.

Risk	Mitigation Measures
Water Pollution	Apply established best practice dredging methods
Adverse Impacts on sedimentary processes	Keep sediments in the key system and minimise maintenance dredging
Loss of aquatic organisms	Align channels to avoid sea grass disturbance
High Cost	Seek Government subsidies and partner with community and other government agencies to reduce financial implications

As indicated above, for each potential risk there are sound and realistic measures that can be implemented to mitigate risk and enable maintenance dredging to proceed in a sustainable manner.

Risks and potential disadvantages also need to be compared with the benefits of maintenance dredging. Most of the advantages associated with maintenance dredging are economic and social benefits as demonstrated by the following:

- recreational boating access
- continued viability of commercial boating operations and support industries
- continued viability of waterway associated tourism operations
- maintenance of tidal flows in high priority oyster growing areas
- reduction in risk and damage resulting from flood events
- reduced risk of damage to vessels caused by groundings
- reduced risk of serious injury or loss of life where grounding is a key element of the incident.

In the context of the activities listed above, it is clear that a failure to maintain navigable waterways is likely to have an economic and social impact on the community. The following negative impacts are relevant:

- loss of waterway access for recreational fishing and boating uses negative tourism, implications associated with diminished access for tourism vessel operators
- negative economic and tourism impacts resulting from reduced vessel stop overs
- negative economic impacts associated with loss of access for maritime industries and commercial fishing/aquaculture industries
- increased risk of accident and loss of life

On balance, the benefits of maintenance dredging outweigh the risks identified above and on this basis the 'do nothing' option can be discounted.

19. Funding

Maintenance dredging works are expensive to undertake. Detailed cost estimates for individual dredging operations have not been carried out given the lack relevant pre-planning information.

At this stage indicative cost estimates for dredging activities have been identified by the strategy. The costs that have been presented in the following table provide a broad guide to potential dredging costs. These costs are based on the removal of the estimated volumes in Table 7. and should be considered within that context. Changes to the estimates provided in table 9 are likely to occur once the dredging methods and volumes of materials to be extracted have been accurately determined through the planning and assessment phase.

Table 9. Estimate of dredging costs according to site priority.

SITE	SITE REF	DURATION (DAYS)	ESTAMATED COST ($)
HIGH RIORITY			
SCOTTS CREEK SOUTH END	9	33	$279,840
SOUTH CHANNEL OXLEY ISLAND	10	46	$477,000
CABBAGE TREE CHANNEL	12	9	$76,320
CROWDY HARBOUR - BOAT RAMP	27	5	$42,400
ROWING CLUB SHALLOW ISLAND	18	6	$50,000
FARQUHAR INLET	11	69	$585,120
CROWDY HARBOUR	26	4	$55,380
HARRINGTON BACKCHANNEL	2	69	$585,120
OYSTER CREEK	13	61	$517,280
HARRINGTON MAIN CHANNEL	4	39	$330,720
CABBAGE TREE ISLAND - WESTERN TIP	14	32	$271,360
FIVE ISLANDS	24	14	$118,720
	Sub Total	**387**	**$3,389,260.00**
MEDIUM PRIORITY			
HARRINGTON LAGOON	1	12	$101,760
CARTER CREEK ENTRANCE UPSTREAM OF MARTIN BRIDGE	20	15	$127,200
OKLEY ISLAND TAREE WEST	21	10	$84,800
WINGHAM	25	7	$59,360
DUMARESQ ISLAND - NORTHERN CHANNEL	17	14	$118,720
NORHTERN BANK ADJACENT TO TAREE CBD	19	37	$313,760

SITE	SITE REF	DURATION (DAYS)	ESTAMATED COST ($)
	Sub Total	**95**	**$805,600.00**
LOW PRIORITY			
CATTAI CREEK ENTRANCE	7	10	$84,800
SCOTTS CREEK MID SECTION	8	11	$93,280
PELICAN BAY CREEK	6	21	$178,080
MANGROVE ISLAND	5	4	$33,940
MONDROOK CREEK - TAREE WEST	23	3	$25,440
MIDDGY GHARRET ISLAND - WESTERN TIP	15	49	$415,520
DUMARESQ ISLAND - NORTHERN TIP	16	41	$347,680
HARRINGTON WATERS QUAY AREA	3	8	$67,840
MONDROOK CREEK ENTRANCE	22	10	$84,800
	Sub Total	**157**	**$1,331,380.00**

Note: Costs associated with dredging works are based on the recent work done by WorleyParsons for the Farquhar Inlet, Old Bar Entrance Opening Management Plan (Appendix 4).

Note: Duration of the dredging operation is based on an extraction volume of 1,225m^3 per day.

Note: Estimates do not include dredge setup costs (approximately $ 44,000), costs associated with the removal of spoil from a site or costs associated with the planning phase of individual dredging activities.

The adoption of this strategy does not imply a commitment by Council to fund its implementation. Similarly where Council commits funds for the dredging of a site, it does not infer a commitment by council to fund ongoing maintenance at the site. The implementation of this strategy will depend on the availability of funds from Council, Government and the Community

Significant funding over the long-term will be necessary to sustain a maintenance dredging program in the GTCC LGA.

Principle funding sources will include:

1. Council funds
2. Government Grants
3. Government Funds
4. Community funds

1. Council Funds.

   Council in partnership with community organisation does and will continue to apply for funding for projects that benefit the whole community. Under most funding programs for which Council applies, Council is required to contribute up to 50% of the project cost. To limit the financial burden on Council and to extend the number of grants to which Council can contribute, Council often partners with community organisations.

   This Strategy will allow Council to incorporate future dredging works into its rolling works program, depending on available funding, and liaise with government agencies on funding opportunities to ensure dredging frequencies can be achieved.

2. Government Grants.

   There are number of grants administered by various Government Agencies from which funding can be obtained for maintenance dredging. The types of grants that are available and who administers them are outlined below.

   NSW Government Estuary Management Program

   This program is administered by the Department of Environment Climate Change and Water. The primary objective of the NSW Government's Estuary Management Program is to provide support to councils to improve the health of NSW estuaries and understand the potential risks from climate change. The support provided to councils under the Program includes financial assistance to prepare estuary management plans and supporting studies and to carry out projects to improve estuary health.

   Projects which can be subsidised under the Estuary Management Program include:

   - estuary management plans and their supporting studies prepared and implemented in accordance with the *Estuary Management Manual*, and the updating of these studies and plans to reflect projected sea level rise impacts;
   - estuary management technical studies;
   - environmental repair works to estuaries, including habitat restoration and conservation projects;
   - estuary health assessments prepared in accordance with protocols developed jointly with DECCW; and

- pre-construction activities for projects which are eligible for subsidy and likely to proceed to construction.

There is approximately $13 Million in Coastal, Estuary and Floodplain Management Grants available each year. Funding of up to 50% of a project's costs will normally be offered to the successful grant applicants.

NSW Government Better Boating Program – Regional Infrastructure Grants

The Better Boating Program (BBP) administered by NSW Maritime is a State Government grants program aimed at providing recreational boating infrastructure for the benefit of the boating community on New South Wales waterways. The BBP which commenced in July 2009, consolidated the three grants programs previously run by NSW Maritime.

The following table provides information on the funding available through the grant

Better Boating - Regional Infrastructure Grants

Funding allocated	Up to $2.5 million per year
Funding ratio	Up to 50% of total eligible costs
Outcomes	Better public recreational boating infrastructure across NSW

Waterways Program

The Waterways Program is administered by the Land and Property Management Authority. In 2009/2010 funding under the Waterways Program was made on a statewide priority basis for dredging projects that demonstrated there would be a significant improvement to the navigability of the waterway with a focus on recreational boating needs. The funding was based on a 50:50 partnership with local government.

19.1. Community Fund Raising

There are many community groups that will benefit from the dredging operations identified in this strategy. The community groups that will benefit are those groups that are closely associated with the estuary including recreational fishing groups and boating groups. These groups should be encouraged support this strategy through both "inkind" and dollar value contributions towards dredging operations.

19.2. Industry Fund Raising

The local fishing and aquaculture industries are set to benefit from this strategy and from the options contained in the Farquhar Inlet, Old Bar EOMP. The oyster industry currently contributes up to $1.3 Million per year to the local economy and in recent years has suffered substantial losses due to poor water quality (DPI,2002; DPI, 2004; DPI 2007).

These industries should be encouraged to help fund individual dredging operations that provide a benefit to the industry. The primary benefit that dredging will bring to the industry is improved water quality through better tidal flushing. Improved water quality will result in the following for these industries:

- reduction in diseased fish and oysters
- high quality product.
- increased productivity.

The tourist industry is also set to benefit through improved navigation, improved water quality for recreational fishing, boating and swimming etc. The annual income from tourism is in the Manning Valley is in the order of $200 Million. Improvement in water quality and an increase in boating safety as a result of maintenance dredging are set to provide increased economic opportunities to the industry. The boat building industry would similarly benefit from this strategy

All these industries need to be engaged to support this strategy and the positive flow on effects that it will have..

20. Community Partnerships

The purchase of a dredge by the Farquhar Inlet Management Group (FIMG) represents an opportunity for GTCC and other government agencies to partner with the group in implementation of the dredging strategy.

FIMG intends the dredge to be operated on a commercial basis with profits going back to the community group who will then utilise them to undertake smaller projects that will benefit the whole community. The group intends to work in partnership with Council, other government agencies and build new partnerships with business in the implementation with this strategy.

21. Monitoring and Reporting

Monitoring and reporting on the progress of the strategy will be important in identifying progress towards meeting its objectives. A report will be provided to the ECMC on a yearly basis and include:

- Lessons learned
- Any Negative Impacts
- Progress towards meeting objectives and priorities
- Any amendments made to the dredging strategy as a result of the yearly review

22. Review of Strategy

It is important that the dredging strategy remains a living document that can be used to provide for future dredging needs. Changes in flow regimes and other estuary and hydrological processes can result in changes of maintenance dredging requirements over time and space and through the review process such changes will be identified and captured.

The dredging strategy will be reviewed on an annual basis with a comprehensive review undertaken every 5 years. These reviews are designed to keep the strategy relevant in meeting both community expectations and environmental needs.

The annual review will incorporate the following

1. Revision of dredging quantities – for sites that have been dredged during the preceding 12 months
2. Revision of dredging costs – for sites that have been dredged during the preceding 12 months
3. Revision of dredging priorities – Reallocation of sites within the priority table dependent on whether the site has been dredged in the preceding 12 months
4. Changes in legislation – revision of legislation to include any new requirements for dredging activities.
5. Reference to documentation for sites that have gone through the planning and implementation phase.

The annual review is designed to capture information for sites that have been dredged during the preceding 12 months and any changes in legislation which impact on maintenance dredging activities.

A comprehensive review of the dredging strategy is to be undertaken every 5 years and will review all aspects of the strategy including:

1. The relevance of the strategy in meeting its objectives
2. Changes in our understanding of Estuary Processes and Sedimentation
3. Changes in legislation
4. Changes in the prioritisation of dredging works
5. A review of all costs associated with the dredging strategy
6. Review and refinement of maintenance dredging frequencies

7. A review of the funding opportunities available for maintenance dredging activities
8. A review of how the strategy has gone in meeting the dredging priorities, community expectations and environmental needs..

The five yearly review will ensure that the dredging strategy remains a living document which accommodates changes in communities expectations, legislative requirements, sedimentary processes and funding opportunities.

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APPENDIX A – Dredging and Spoil Location Maps

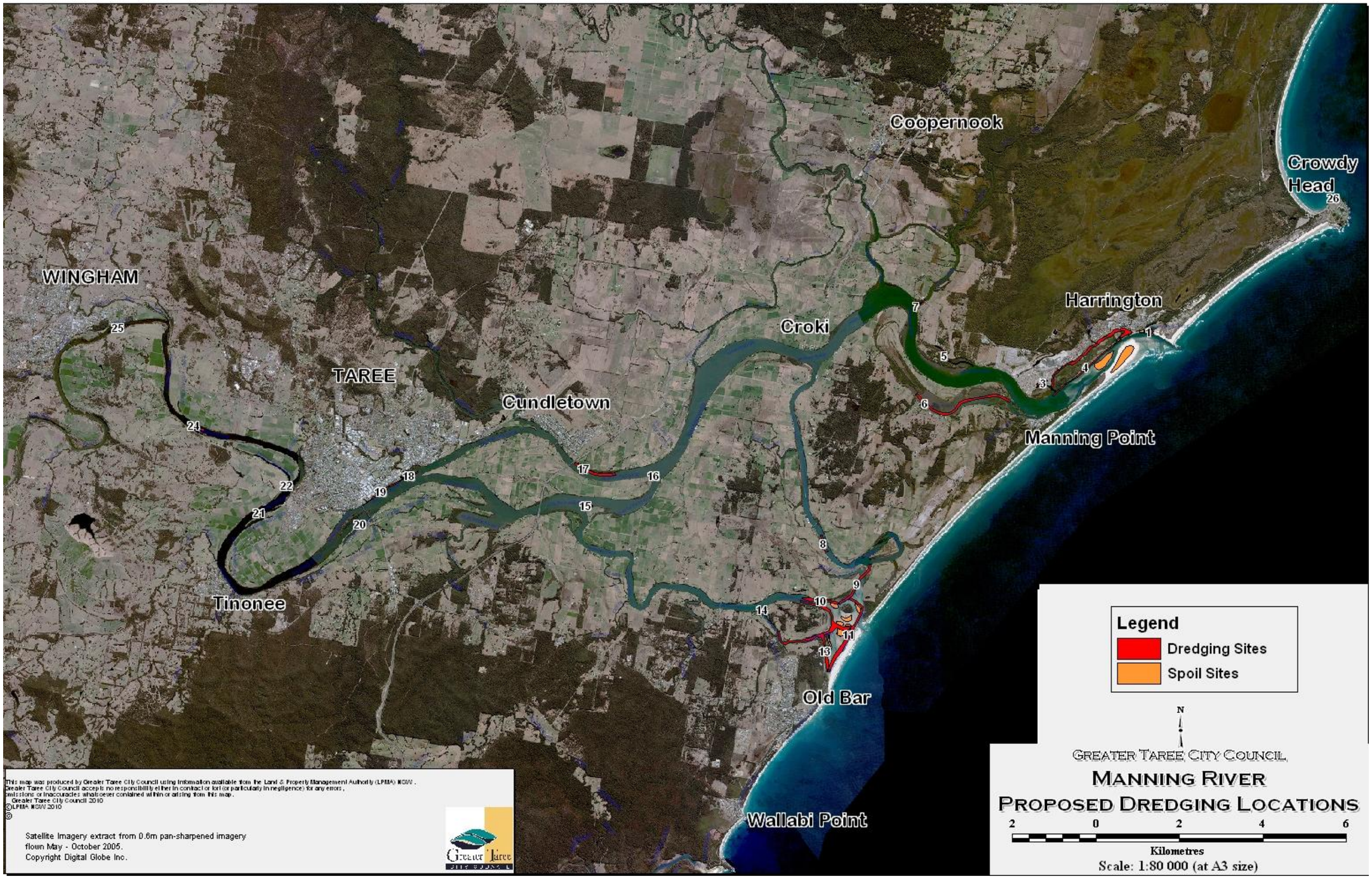


Figure 3. Map of potential dredging and Spoil locations in the Manning River Estuary

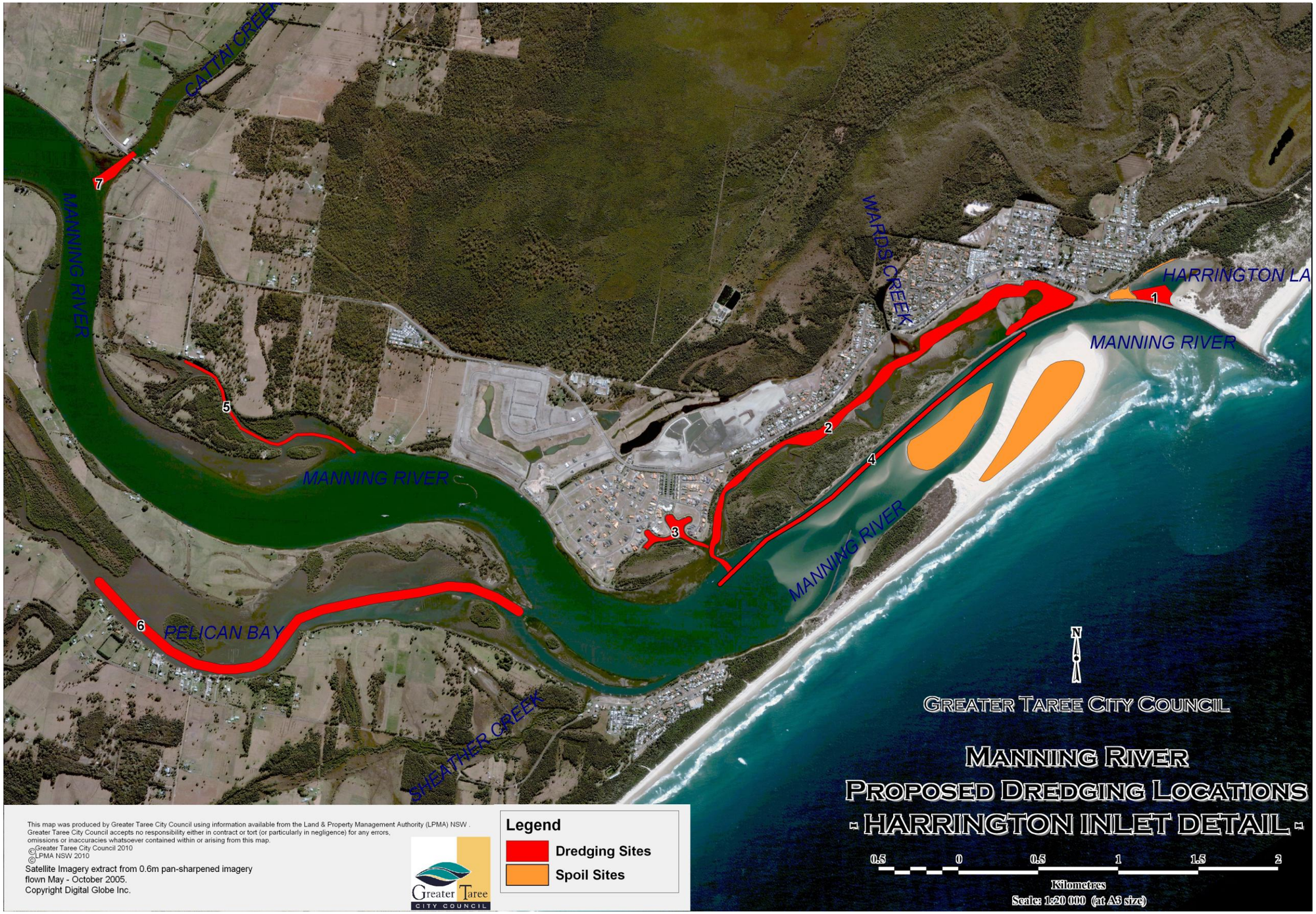


Figure 4. Potential dredging and spoil site locations - Harrington Inlet

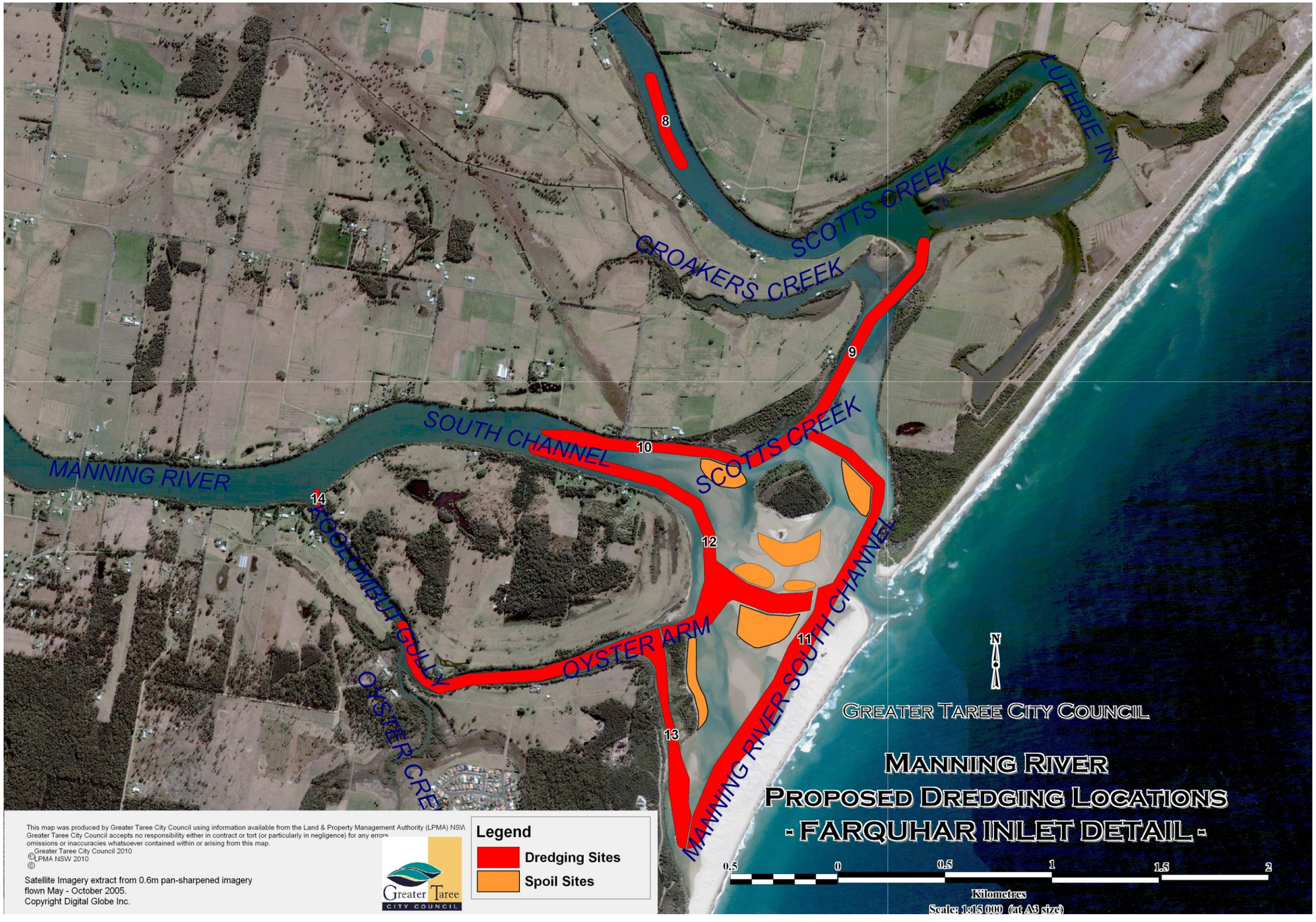


Figure 5. Potential dredging and spoil locations - Farquhar Inlet

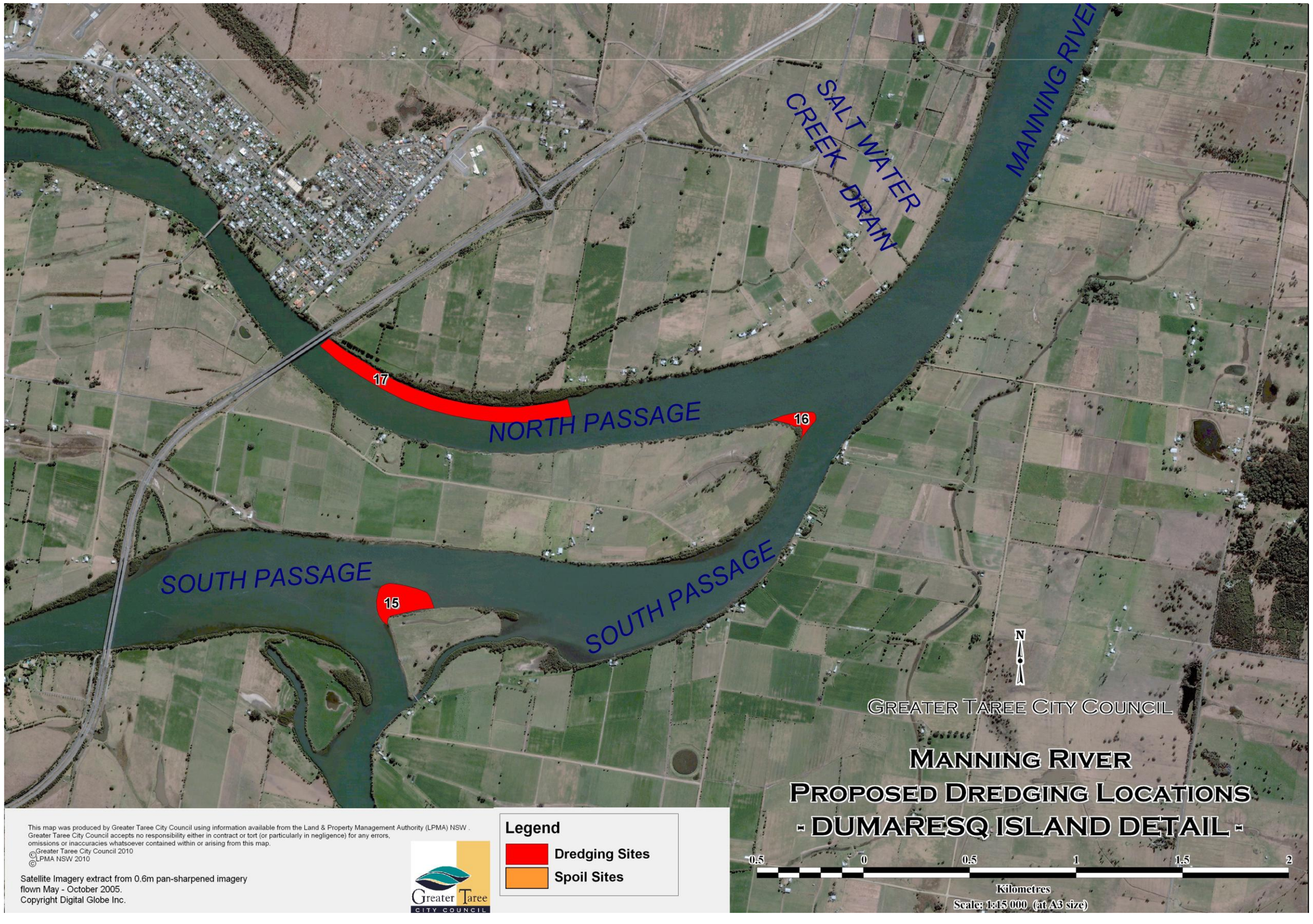


Figure 6. Potenetial dredging and spoil locations – Dumaresq Island

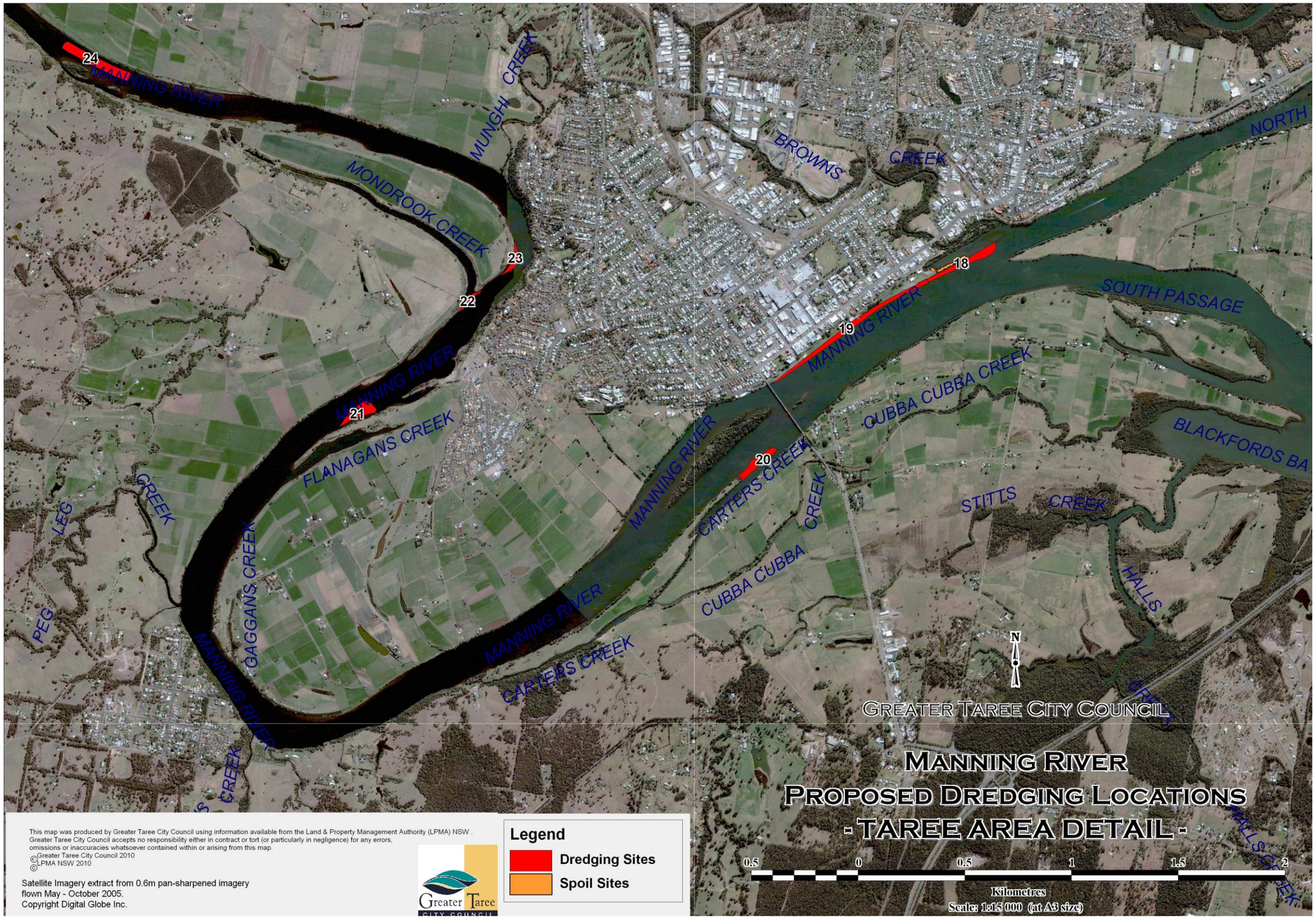


Figure 7. Potential dredging and spoil locations -Taree CBD

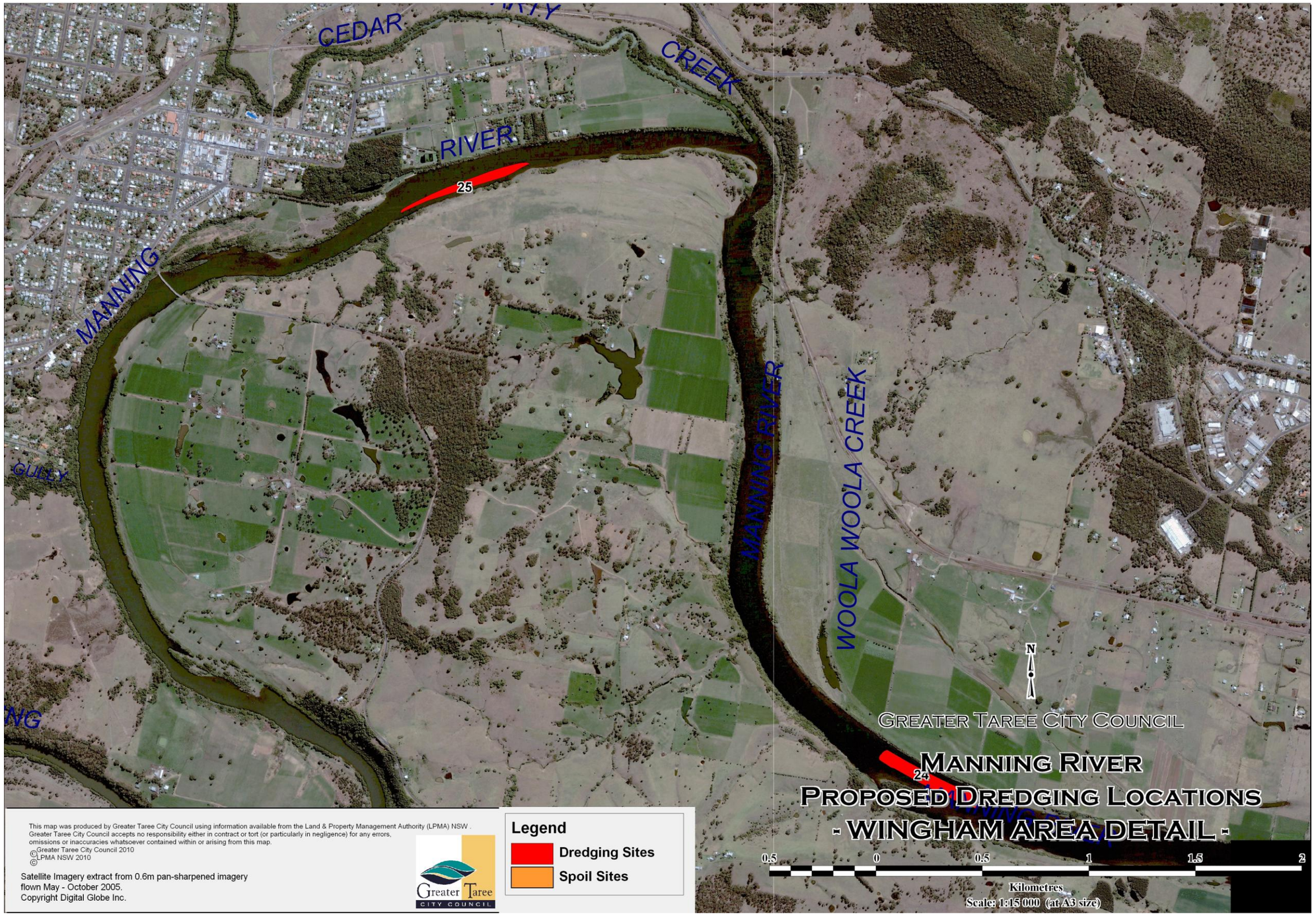


Figure 8. Potential Dredging and Spoil locations -Wingham

Figure 9. Potential Dredging and Spoil location Crowdy Harbour

APPENDIX B – Site Priorities Assessment

Ref	Estuary	Site	Community concern/support		Level of funding required/community benefit		Navigation Conditions		Environmental Outcomes		Existing and potential boating activity (traffic volume)		Opportunities for external financial assistance		Sustainability of Dredging (Infill rate)		Potential for Additional Benefits		Score	Dredging Priority High = >345 Medium: 290 to 345 Low: <290
			Priority : High Weighting: 15		Priority : High Weighting: 15		Priority : High Weighting: 15		Priority : High Weighting: 15		Priority : High Weighting: 15		Priority: Medium - High Weighting: 12.5		Priority: Medium Weighting: 10		Priority: Low Weighting: 5			
			Description		Description		Description		Description		Description		Description		Description		Description			
			High level of wider community support to undertake dredging **Low** community concern	5	High level of funding required > $500,000 to undertake project with low community benefit	1	Channel Closed (Extensive shoaling /Does not provide 24 hr safe access)	5	Multiple Benefits (eg Improved Water Quality / Expanded Sea Grasses Area/ Establish Artificial Habitats/ Bank Stabilisation Works / Supports Aquaculture /)	5	>60 boats per day	5	Full Funding (100% by Others)	5			Opportunities for associated benefits	5		
			Moderate to High level of wider community support to undertake dredging **Low to Moderate** community concern	4	High to medium level of funding required < $500,000 but > $250,000 to undertake project with medium to low community benefit	2	Channel Open (high incidence of Shoaling /Does not provide 24 hr safe access)	4	Single Benefit	1	40 to 60 boats per day	4	Partial Funding (75% Others: 25% Council)	4	>10years	4	Limited opportunities for associated benefits	1		
			Moderate level of wider community support to undertake dredging **Moderate** community concern	3	Medium level of funding required < $250,000 but > $100,000 to undertake project with medium community benefit	3	Channel open (But conditions require Boaters to be alert at all times)	3			20 to 40 boats per day	3	Partial Funding (67% Others: 33% Council)	3	5-10 years	3				
			Low to Moderate level of wider community support to undertake dredging **Moderate to High** community concern	2	Medium - low level of funding required < $100,000 but > $50,000 to undertake project with medium - high community benefit	4	Channel open channel width adequate (Minor Shoaling	2			10 to 20 boats per day	2	Partial Funding (50% Others: 50% Council)	2	2.5-5 years	2				
			Low level of wider community support **High** community concern regarding dredging proposal	1	Low level of funding required <$50,000 to undertake project with high community benefit.	5	Channel width adequate (No shoaling)	1			0 to 10 boats per day	1	Funding Unlikely (Requires 100% Council)	1	0 - 2.5 years	1				
1	Manning River	Harrington Lagoon																		
			5		3		1		5		1		3		3		5			
			75		45		15		75		15		37.5		30		25		317.5	Medium
2	Manning River	Harrington Back Channel																		
			5		1		3		5		3		3		3		5			
			75		15		45		75		45		37.5		30		25		347.5	High
3	Manning River	Harrington Waters Quays Area																		
			1		4		1		1		1		5		3		1			
			15		60		15		15		15		62.5		30		5		217.5	Low
4	Manning River	Harrington Main Channnel																		
			5		2		3		5		4		2		1		5			
			75		30		45		75		60		25		10		25		345	High
5	Manning River	Mangrove Island																		
			2		5		3		1		1		1		4		1			
			30		75		45		15		15		12.5		40		5		237.5	Low
6	Manning River	Pelican Bay																		
			2		3		2		1		2		2		4		5			

Ref	Estuary	Site	Community concern/support Priority : High Weighting: 15 Description		Level of funding required/community benefit Priority : High Weighting: 15 Description		Navigation Conditions Priority : High Weighting: 15 Description		Environmental Outcomes Priority : High Weighting: 15 Description		Existing and potential boating activity (traffic volume) Priority : High Weighting: 15 Description		Opportunities for external financial assistance Priority: Medium - High Weighting: 12.5 Description		Sustainability of Dredging (Infill rate) Priority: Medium Weighting: 10 Description		Potential for Additional Benefits Priority: Low Weighting: 5 Description		Score	Dredging Priority High = >345 Medium: 290 to 345 Low: <290
			High level of wider community support to undertake dredging **Low** community concern	5	High level of funding required > $500,000 to undertake project with low community benefit	1	Channel Closed (Extensive shoaling /Does not provide 24 hr safe access)	5	Multiple Benefits (eg Improved Water Quality / Expanded Sea Grasses Area/ Establish Artificial Habitats/ Bank Stabilisation Works / Supports Aquaculture /)	5	>60 boats per day	5	Full Funding (100% by Others)	5			Opportunities for associated benefits	5		
			Moderate to High level of wider community support to undertake dredging **Low to Moderate** community concern	4	High to medium level of funding required < $500,000 but > $250,000 to undertake project with medium to low community benefit	2	Channel Open (high incidence of Shoaling /Does not provide 24 hr safe access)	4	Single Benefit	1	40 to 60 boats per day	4	Partial Funding (75% Others: 25% Council)	4	>10years	4	Limited opportunities for associated benefits	1		
			Moderate level of wider community support to undertake dredging **Moderate** community concern	3	Medium level of funding required < $250,000 but > $100,000 to undertake project with medium community benefit	3	Channel open (But conditions require Boaters to be alert at all times)	3			20 to 40 boats per day	3	Partial Funding (67% Others: 33% Council)	3	5-10 years	3				
			Low to Moderate level of wider community support to undertake dredging **Moderate to High** community concern	2	Medium - low level of funding required < $100,000 but > $50,000 to undertake project with medium - high community benefit	4	Channel open channel width adequate (Minor Shoaling	2			10 to 20 boats per day	2	Partial Funding (50% Others: 50% Council)	2	2.5-5 years	2				
			Low level of wider community support **High** community concern regarding dredging proposal	1	Low level of funding required <$50,000 to undertake project with high community benefit.	5	Channel width adequate (No shoaling)	1			0 to 10 boats per day	1	Funding Unlikely (Requires 100% Council)	1	0 - 2.5 years	1				
			30		45		30		15		30		25		40		25		240	Low
7	Manning River	Cattai Creek - Entrance																		
			2		4		2		5		1		2		4		1			
			30		60		30		75		15		25		40		5		280	Low
8	Manning River	Scotts Creek Mid Section																		
			2		4		2		5		1		2		3		1			
			30		60		30		75		15		25		30		5		270	Low
9	Manning River	Scotts Creek South End																		
			5		2		5		5		4		4		3		5			
			75		30		75		75		60		50		10		25		420	High
10	Manning River	South Channel Oxley Island																		
			5		2		5		5		4		4		2		1			
			75		30		75		75		60		50		20		5		390	High
11	Manning River	Farquhar Inlet																		
			5		1		3		5		4		4		1		5			
			75		15		45		75		60		50		10		25		355	High
12	Manning River	Cabbage Tree Channel																		
			5		3		3		5		2		4		3		1			
			75		45		45		75		30		50		30		5		375	High
13	Manning	Oyster Creek																		

Ref	Estuary	Site	Community concern/support Priority : High Weighting: 15 Description		Level of funding required/community benefit Priority : High Weighting: 15 Description		Navigation Conditions Priority : High Weighting: 15 Description		Environmental Outcomes Priority : High Weighting: 15 Description		Existing and potential boating activity (traffic volume) Priority : High Weighting: 15 Description		Opportunities for external financial assistance Priority: Medium - High Weighting: 12.5 Description		Sustainability of Dredging (Infill rate) Priority: Medium Weighting: 10 Description		Potential for Additional Benefits Priority: Low Weighting: 5 Description		Score	Dredging Priority High = >345 Medium: 290 to 345 Low: <290
	River																			
			High level of wider community support to undertake dredging **Low** community concern	5	High level of funding required > $500,000 to undertake project with low community benefit	1	Channel Closed (Extensive shoaling /Does not provide 24 hr safe access)	5	Multiple Benefits (eg Improved Water Quality / Expanded Sea Grasses Area/ Establish Artificial Habitats/ Bank Stabilisation Works / Supports Aquaculture /)	5	>60 boats per day	5	Full Funding (100% by Others)	5			Opportunities for associated benefits	5		
			Moderate to High level of wider community support to undertake dredging **Low to Moderate** community concern	4	High to medium level of funding required < $500,000 but > $250,000 to undertake project with medium to low community benefit	2	Channel Open (high incidence of Shoaling /Does not provide 24 hr safe access)	4	Single Benefit	1	40 to 60 boats per day	4	Partial Funding (75% Others: 25% Council)	4	>10years	4	Limited opportunities for associated benefits	1		
			Moderate level of wider community support to undertake dredging **Moderate** community concern	3	Medium level of funding required < $250,000 but > $100,000 to undertake project with medium community benefit	3	Channel open (But conditions require Boaters to be alert at all times)	3			20 to 40 boats per day	3	Partial Funding (67% Others: 33% Council)	3	5-10 years	3				
			Low to Moderate level of wider community support to undertake dredging **Moderate to High** community concern	2	Medium - low level of funding required < $100,000 but > $50,000 to undertake project with medium - high community benefit	4	Channel open channel width adequate (Minor Shoaling	2			10 to 20 boats per day	2	Partial Funding (50% Others: 50% Council)	2	2.5-5 years	2				
			Low level of wider community support **High** community concern regarding dredging proposal	1	Low level of funding required <$50,000 to undertake project with high community benefit.	5	Channel width adequate (No shoaling)	1			0 to 10 boats per day	1	Funding Unlikely (Requires 100% Council)	1	0 - 2.5 years	1				
				5		1		3		5		3		3		3		5		
				75		15		45		75		45		37.5		30		25	347.5	High
14	Manning River	Cabbage Tree Island Western Tip																		
				4		4		3		5		3		2		3		1		
				60		60		45		75		45		25		30		5	345	High
15	Manning River	Middgy Gharrat Island - Western Tip																		
				3		2		3		1		1		2		4		1		
				45		30		45		15		15		25		40		5	220	Low
16	Manning River	Dumaresq Island - Off Northern Tip																		
				2		2		3		1		2		2		4		1		
				30		30		45		15		30		25		40		5	220	Low
17	Manning River	Drumaresq Island - Northern Channel																		
				3		3		2		5		2		3		4		1		
				45		45		30		75		30		37.5		40		5	307.5	Medium
18	Manning River	Rowing Club Shallow Island																		
				5		4		3		5		2		3		3		1		
				75		60		45		75		30		37.5		30		5	357.5	High
19	Manning River	Northern Bank Adjacent to Taree																		

Ref	Estuary	Site	Community concern/support Priority : High Weighting: 15 Description		Level of funding required/community benefit Priority : High Weighting: 15 Description		Navigation Conditions Priority : High Weighting: 15 Description		Environmental Outcomes Priority : High Weighting: 15 Description		Existing and potential boating activity (traffic volume) Priority : High Weighting: 15 Description		Opportunities for external financial assistance Priority: Medium - High Weighting: 12.5 Description		Sustainability of Dredging (Infill rate) Priority: Medium Weighting: 10 Description		Potential for Additional Benefits Priority: Low Weighting: 5 Description		Score	Dredging Priority High = >345 Medium: 290 to 345 Low: <290
		CBD																		
			High level of wider community support to undertake dredging **Low** community concern	**5**	High level of funding required > $500,000 to undertake project with low community benefit	**1**	Channel Closed (Extensive shoaling /Does not provide 24 hr safe access)	**5**	Multiple Benefits (eg Improved Water Quality / Expanded Sea Grasses Area/ Establish Artificial Habitats/ Bank Stabilisation Works / Supports Aquaculture /)	**5**	>60 boats per day	**5**	Full Funding (100% by Others)	**5**			Opportunities for associated benefits	**5**		
			Moderate to High level of wider community support to undertake dredging **Low to Moderate** community concern	**4**	High to medium level of funding required < $500,000 but > $250,000 to undertake project with medium to low community benefit	**2**	Channel Open (high incidence of Shoaling /Does not provide 24 hr safe access)	**4**	Single Benefit	**1**	40 to 60 boats per day	**4**	Partial Funding (75% Others: 25% Council)	**4**	>10years	**4**	Limited opportunities for associated benefits	**1**		
			Moderate level of wider community support to undertake dredging **Moderate** community concern	**3**	Medium level of funding required < $250,000 but > $100,000 to undertake project with medium community benefit	**3**	Channel open (But conditions require Boaters to be alert at all times)	**3**			20 to 40 boats per day	**3**	Partial Funding (67% Others: 33% Council)	**3**	5-10 years	**3**				
			Low to Moderate level of wider community support to undertake dredging **Moderate to High** community concern	**2**	Medium - low level of funding required < $100,000 but > $50,000 to undertake project with medium - high community benefit	**4**	Channel open channel width adequate (Minor Shoaling	**2**			10 to 20 boats per day	**2**	Partial Funding (50% Others: 50% Council)	**2**	2.5-5 years	**2**				
			Low level of wider community support **High** community concern regarding dredging proposal	**1**	Low level of funding required <$50,000 to undertake project with high community benefit.	**5**	Channel width adequate (No shoaling)	**1**			0 to 10 boats per day	**1**	Funding Unlikely (Requires 100% Council)	**1**	0 - 2.5 years	**1**				
			3		**2**		**3**		**5**		**1**		**3**		**3**		**5**			
			45		30		45		75		15		37.5		30		25		**302.5**	**Medium**
20	**Manning River**	**Carter Creek Entrance Upsteam of Martin St Bridge**																		
			4		**4**		**3**		**5**		**1**		**2**		**3**		**1**			
			60		60		45		75		15		25		30		5		**315**	**Medium**
21	**Manning River**	**Oakley Island Taree West**																		
			3		**4**		**3**		**5**		**2**		**2**		**3**		**1**			
			45		60		45		75		30		25		30		5		**315**	**Medium**
22	**Manning River**	**Mondrook Creek Entrance**																		
			1		**4**		**3**		**5**		**2**		**1**		**4**		**1**			
			15		60		45		75		30		12.5		40		5		**208.5**	**Low**
23	**Manning River**	**Mondrook Creek - Taree West**																		
			2		**5**		**2**		**1**		**2**		**1**		**4**		**1**			
			30		75		30		15		30		12.5		40		5		**237.5**	**Low**
24	**Manning River**	**Five Islands**																		
			5		**3**		**3**		**5**		**1**		**2**		**4**		**5**			
			75		45		45		75		15		25		40		25		**345**	**High**
25	**Manning River**	**Wingham**																		

Ref	Estuary	Site	Community concern/support Priority : High Weighting: 15 Description		Level of funding required/community benefit Priority : High Weighting: 15 Description		Navigation Conditions Priority : High Weighting: 15 Description		Environmental Outcomes Priority : High Weighting: 15 Description		Existing and potential boating activity (traffic volume) Priority : High Weighting: 15 Description		Opportunities for external financial assistance Priority: Medium - High Weighting: 12.5 Description		Sustainability of Dredging (Infill rate) Priority: Medium Weighting: 10 Description		Potential for Additional Benefits Priority: Low Weighting: 5 Description		Score	Dredging Priority High = >345 Medium: 290 to 345 Low: <290
			High level of wider community support to undertake dredging **Low** community concern	5	High level of funding required > $500,000 to undertake project with low community benefit	1	Channel Closed (Extensive shoaling /Does not provide 24 hr safe access)	5	Multiple Benefits (eg Improved Water Quality / Expanded Sea Grasses Area/ Establish Artificial Habitats/ Bank Stabilisation Works / Supports Aquaculture /)	5	>60 boats per day	5	Full Funding (100% by Others)	5			Opportunities for associated benefits	5		
			Moderate to High level of wider community support to undertake dredging **Low to Moderate** community concern	4	High to medium level of funding required < $500,000 but > $250,000 to undertake project with medium to low community benefit	2	Channel Open (high incidence of Shoaling /Does not provide 24 hr safe access)	4	Single Benefit	1	40 to 60 boats per day	4	Partial Funding (75% Others: 25% Council)	4	>10years	4	Limited opportunities for associated benefits	1		
			Moderate level of wider community support to undertake dredging **Moderate** community concern	3	Medium level of funding required < $250,000 but > $100,000 to undertake project with medium community benefit	3	Channel open (But conditions require Boaters to be alert at all times)	3			20 to 40 boats per day	3	Partial Funding (67% Others: 33% Council)	3	5-10 years	3				
			Low to Moderate level of wider community support to undertake dredging **Moderate to High** community concern	2	Medium - low level of funding required < $100,000 but > $50,000 to undertake project with medium - high community benefit	4	Channel open channel width adequate (Minor Shoaling	2			10 to 20 boats per day	2	Partial Funding (50% Others: 50% Council)	2	2.5-5 years	2				
			Low level of wider community support **High** community concern regarding dredging proposal	1	Low level of funding required <$50,000 to undertake project with high community benefit.	5	Channel width adequate (No shoaling)	1			0 to 10 boats per day	1	Funding Unlikely (Requires 100% Council)	1	0 - 2.5 years	1				
			3		**3**		**3**		**5**		**1**		**2**		**4**		**5**			
			45		45		45		75		15		25		40		25		315	**Medium**
26	**Crowdy Harbour**	**Crowdy Harbour**																		
			5		**5**		**3**		**5**		**1**		**2**		**2**		**5**			
			75		75		45		75		15		25		20		25		355	**High**
27	**Crowdy Harbour**	**Crowdy Harbour - Boat Ramp**																		
			5		**5**		**3**		**5**		**2**		**2**		**2**		**5**			
			75		75		45		75		30		25		20		25		370	**High**

APPENDIX C – Approvals and Legislative Requirements

Estuary	Site Name	Site Ref	SEPP Infrastructure	EP&A Act Part 5 Approval	Threatened Species Conservation Act (7 Part Test)	Licence under Crown Act	Fisheries Management Act (fisheries permit required)	SEPP 14 Coastal Wetlands	National Parks and Wildlife Act 1979 (Assessment of Aboriginal Heritage)	Protection of the Environment Operations Act 1997 (Environment Protection Licence)
Manning River	HARRINGTON LAGOON	1	X	X	X	X	X		X	
	HARRINGTON BACKCHANNEL	2	X	X	X	X	X	X	X	+
	HARRINGTON WATERS QUAY AREA	3	X	X	X	X	X		X	
	HARRINGTON MAIN CHANNEL	4	X	X	X	X	X		X	+
	MANGROVE ISLAND	5	X	X	X	X	X	X	X	
	PELICAN BAY CREEK	6	X	X	X	X	X	X	X	
	CATTAI CREEK ENTRANCE	7	X	X	X	X	X		X	
	SCOTTS CREEK MID SECTION	8	X	X	X	X	X	X	X	
	SCOTTS CREEK SOUTH END	9	X	X	X	X	X	X	X	+
	SOUTH CHANNEL OXLEY ISLAND	10	X	X	X	X	X	X	X	+
	FARQUHAR INLET	11	X	X	X	X	X		X	+
	CABBAGE TREE CHANNEL	12	X	X	X	X	X	X	X	+
	OYSTER CREEK	13	X	X	X	X	X	X	X	+
	CABBAGE TREE ISLAND - WESTERN TIP	14	X	X	X	X	X		X	
	MIDDGY GHARRET ISLAND - WESTERN TIP	15	X	X	X	X	X		X	+
	DUMARESQ ISLAND - NORTHERN TIP	16	X	X	X	X	X	X	X	
	DUMARESQ ISLAND - NORTHERN CHANNEL	17	X	X	X	X	X	X	X	+
	ROWING CLUB SHALLOW ISLAND	18	X	X	X	X	X		X	

Estuary	Site Name	Site Ref	SEPP Infrastructure	EP&A Act Part 5 Approval	Threatened Species Conservation Act (7 Part Test)	Licence under Crown Act	Fisheries Management Act (fisheries permit required)	SEPP 14 Coastal Wetlands	National Parks and Wildlife Act 1979 (Assessment of Aboriginal Heritage)	Protection of the Environment Operations Act 1997 (Environment Protection Licence)
	NORHTERN BANK ADJACENT TO TAREE CBD	19	X	X	X	X	X		X	+
	CARTER CREEK ENTRANCE UPSTREAM OF MARTIN ST BRIDGE	20	X	X	X	X	X		X	
	OKLEY ISLAND TAREE WEST	22	X	X	X	X	X		X	
	MONDROOK CREEK ENTRANCE	23	X	X	X	X	X		X	
	MONDROOK CREEK - TAREE WEST	24	X	X	X	X	X		X	
	FIVE ISLANDS	25	X	X	X	X	X		X	
	WINGHAM	26	X	X	X	X	X		X	
Crowdy Harbour	CROWDY HARBOUR	27	X	X	X	X	X		X	
	CROWDY HARBOUR - BOAT RAMP	28	X	X	X	X	X		X	

X Applies

\+ May Apply

APPENDIX D – Dredging Costs

The information provided below has been adapted from costings provided for the options in the Farquhar Inlet, Old Bar Entrance Opening Management Plan prepared by Worley Parsons. Costings are based on a daily extraction volume of 1225m^3 per day

Table 1. Costs associated with the removal of 1225m^3 per day.

Description	Quantity	Rate	Unit	Cost
1. Dredging Cost	1			
Dredging shifts	1	$6,870	day	$6,870
Booster pump (if required)	1	$950	day	$950
Meals and accommodation for 4 person crew	1	660	day	$660
			Total	**$8,480**

Table 2. Costs associated with dredging operation

Description	Quantity	Rate	Unit	Cost
1. Dredging setup				
Mobilisation	1	$34,000		$34,000
Crane for installation	1	$10,000		$10,000
2. Dredging Costs				
Down time (5%)		$3,120	day	$3,120
Movement of dredge within estuary		$4,080	day	$4,080

APPENDIX E – Historical Dredging Data (PWD, 1995)

Table 6.3 Summary of Channel Clearance Operations
(Sources: PWD, 1889-1940 and PWD files CR 846/1 and CR 854)

Year	Dredge	Weight (tons)	Volume (m^3)	Material	Location/Comments
1889	Ulysses	190,291	105,717#	sand, shingle*	Upstream+
1890	Ulysses	167,708	93,171#	sand, shingle*	Upstream+
1891	Ulysses	166,790	92,661#	clay, shingle, mud	Deposited in river
1892	Ulysses	201,858	112,143#	shingle	Goat Is, Croki, Oakly Is, Churchs Flat, Tinonee, Carters Is, Harrington, Cundle Passage
1893	Ulysses	204,061	113,367#	sand, shingle	Between Cundle and Wingham
1894	Ulysses	238,884	132,713#	shingle	Upstream+
1895	Ulysses	189,760	105,422#	shingle, mud	Upstream+
1896/97					
1897/98					
1898/99	Ulysses	274,247	152,359#	gravel, sand	From river flats
1899/1900	Pluto	187,394	117,121#	sand, mud	Upstream+
	Ulysses	25,541	14,189#	shingle	Upstream+
1900/01	Pluto	257,876	143,264#	shingle, stone, clay, sand	To keep river channels navigatable
	Antleon	85,884	47,713#	sand	Harrington bar and crossing
1901/02	Pluto	137,987	76,659#	sand, shingle*	Deepening various channels
	Antleon	70,635	39,242#	sand	Harrington entrance
1902/03	Pluto	245,065	136,147#	sand, shingle	Lower Manning, Taree punt crossing, Goat Is.
	Dorus	75,928	42,182#	sand	Harrington entrance
1903/04	Dorus	439,459	244,144#	sand, stone	Harrington crossing
	Antleon	10,659	5,922#	sand	Harrington crossing
1904/05	Dorus	70,548	39,193#	sand, shingle	Harrington crossing
1905/06	Pluto	23,460	13,033#	sand, mud, shingle, clay	Landsdowne River
	Dorus	166,120	92,289#	sand, clay, shingle	Harrington main channel, Croki, Cattai, Dawson River mouth

Table 6.3 Summary of Channel Clearance Operations (continued)
(Sources: PWD, 1889-1940 and PWD files CR 846/1 and CR 854)

Year	Dredge	Weight (tons)	Volume (m^3)	Material	Location/Comments
1906/07	Pluto	78,193	43,441#	shingle	Channel cut from Cross Bend to Lansdowne
	Dorus	29,587	16,437#	sand, stone, shingle	Harrington crossing
	Antleon	82,110	45,617#	sand*	Harrington entrance
	Tethys	3,264	1,813#	sand*	Inner channel near Harrington Wharf
1907/08	Pluto	1,856	1,031#	shingle	Taree
	Dorus	124,219	69,011#	shingle, sand	Harrington entrance
	Antleon	255	142#	sand*	Harrington entrance
1908/09	Pluto	<147,000*	<81,667#	shingle, rock	Between Wingham and Taree
	Dorus	103,981	57,767#	shingle, sand	Harrington crossing
	Antleon	15,810	8,783#	sand	Harrington crossing
1909/10	Pluto	111,570	61,983#	sand, shingle*	Between Taree and Wingham
	Dorus	137,283	76,268#	sand*	Harrington crossing
	Tethys	24,480	13,600#	sand*	Harrington bar
1910/11	Pluto	2,142	1,190#	sand, shingle*	Upstream+
	Dorus	62,846	34,914#	sand*	Harrington crossing
	Antleon	62,730	34,850#	sand*	Harrington bar
	Tethys	65,932	36,629#	sand*	Harrington bar
1911/12	Pluto	146,084	81,158#	sand, shingle*	Devils Elbow, Birds Flat, Clinchs Cutting, Singletons Flat, Goat Is., Newbys Flat
	Dorus	149,409	83,005#	sand*	Harrington crossing
	Antleon	121,839	67,688#	sand*	Harrington bar and crossing
	Tethys	13,056	7,253#	sand*	Harrington bar and crossing
	Latona	612	340#	sand*	Harrington bar and crossing
1912/13	Pluto	141,117	78,398#	sand, shingle*	Between Taree and Cundle
	Dorus	115,048	63,916#	sand*	Harrington crossing
	Antleon	58,905	32,725#	sand*	Harrington bar
	Tethys	106,651	59,250#	sand*	Harrington bar
	Latona	19,686	10,937#	sand*	Harrington bar

(continued)

Table 6.3 Summary of Channel Clearance Operations (continued)
(Sources: PWD, 1889-1940 and PWD files CR 846/1 and CR 854)

Year	Dredge	Weight (tons)	Volume (m^3)	Material	Location/Comments
1913/14	Pluto	124,093	68,941#	sand, shingle*	Upstream+
	Dorus	192,273	106,818#	sand*	Harrington crossing and dredge depot
	Antleon	16,575	9,208#	sand*	Harrington bar
	Tethys	46,573	25,874#	sand*	Harrington bar
1914/15	Pluto	87,108	48,393#	sand, shingle*	Upstream
	Dorus	71,089	39,494#	sand*	Primarily at the dredge depot
	Antleon	55,590	30,883#	sand*	Harrington bar
	Tethys	20,114	11,174#	sand*	Harrington bar
1915/16	Pluto	72,256	40,142#	sand, shingle*	Devils Elbow to Walla Bend, Wingham to Devils Elbow, Bays Hill to Tinonee, Lansdowne River mouth
	Dorus	299,547	166,415#	sand*	Harrington dredge depot
	Antleon	91,800	51,000#	sand*	Harrington crossing
	Latona	23,511	13,062#	sand*	Harrington crossing
	Tethys	unknown		sand*	Harrington crossing
1916/17	Pluto	26,642	14,801#	sand, shingle*	Upstream+
	Dorus	148,349	82,416	sand*	Harrington entrance+
	Antleon	73,250	40,694#	sand*	Harrington entrance+
	Latona	21,981	12,212#	sand*	Harrington entrance+
1917/18	Lansdowne	22,848		unknown*	Unknown+
	Antleon	121,380	67,433#	sand*	Harrington entrance+
	Tethys	92,106	51,170#	sand*	Harrington entrance+
1918/19	Antleon	15,555	8,642	sand*	Harrington bar and crossing
	Tethys	92,432	51,351#	sand*	Harrington crossing
	Latona	10,710	5,950#	sand*	Harrington crossing
	Harrington	104,774	58,208#	sand*	Pelican Bay bar dredge depot
1919/20	Tethys	363,579	201,988#	sand*	Harrington crossing
	Latona	53,958	29,977#	sand*	Harrington crossing
	Harrington	94,952	52,751#	sand*	Pelican Bay bar dredge depot and Harrington back channel

Table 6.3 Summary of Channel Clearance Operations (continued)
(Sources: PWD, 1889-1940 and PWD files CR 846/1 and CR 854)

Year	Dredge	Weight (tons)	Volume (m³)	Material	Location/Comments
1920/21	Tethys	81,753	45,418#	sand*	Harrington crossing
	Antleon	75,735	42,075#	sand*	Harrington crossing
	Harrington	67,524	37,513#	sand*	(Harrington+) back channel
1921/22	Tethys	17,544	9,747#	sand*	Harrington crossing
1922/23		154,561		unknown*	Unknown+
1923/24		147,416		unknown*	Unknown+
1924/25		16,850		unknown*	Unknown+
1925/26					
1926/27	Latona	7,905	4,392#	sand*	Harrington entrance+
	Tethys	4,641	2,578#	sand*	Harrington entrance+
c.1967		1,215Δ	675	gravel	Manning River Rowing Club to deepen course and build a groyne Harrington back channel
1970		11,629Δ	6,461	sand	Harrington back channel
1982		72Δ	40	gravel	Old Wharf at Wingham Brush

Notes:
* Assumed material
\+ Assumed location
\# Estimated volume (sand and gravel) = tonnes ÷ 1.8 (assumes 32% porosity derived from Readymix, 2.65 SG)
(sand) = tonnes ÷ 1.8 (assumes 32% porosity; 2.65 SG)

Gravel refered to as shingle by PWD (1889 - 1940)
Δ Estimated tonnage

Table 6.4 Channel Clearance and Spoil Disposal Prior to 1889 (Coo...

Name of Cutting	Where Situated	Tons Excavated	* Volume (m^3)	Nature of Material	Where Deposited	Depth at Low Water after Dredging (m)
Birds Flat	4kms below Wingham wharf	124,180	69,000	Large shingle	South bank upper end Mundrook	2
Mundrook Flat	5.6kms above Tinonee	212,800	118,000	Shingle	Mundrook Creek and south bank at MacCabes Hill	2.7
Mundrook Flat	5.6kms above Tinonee	145,320	81,000	Shingle	Mundrook Creek and south bank at MacCabes Hill	2.7
Clinchs Flat	3.2kms above Tinonee	109,760	61,000	Shingle	Mundrook Creek and south bank at MacCabes Hill	2.7
Clinchs Flat	3.2kms above Tinonee	68,320	38,000	Shingle	Mundrook Creek and south bank at MacCabes Hill	2.7
Crossing Carters Island	0.8kms above Taree Flat	40,320	22,500	Shingle	South bank above Carters Island	2.4
Taree Flat	At back of Island, Taree	49,140	27,500	Shingle	Along south bank near Blackfords Bay	2.7
Cundletown Passage	1.6km below Taree	141,890	79,000	Shingle and clay	South bank and Blackfords Bay	0
Bar at entrance of Lansdowne Creek	About 2.4kms below Croki	7,180	4,000	Sand and mud	North bank below Mambo Island	3.1
Crossing at Heads	Near Pilot Station	195,850	109,000	Sand	Along south bank	2.7
Crossing at Heads	Near Pilot Station	66,640	37,000	Sand	Along south bank	2.7
Crossing at Heads	Near Pilot Station	362,350	201,500	Sand	Along south bank	3.4

* Conversion factor of 1.8 tons = $1.0m^3$ assumed.

APPENDIX F – Dredging Methods - Environmental Protection Agency Victoria (2001) *Best Practice Environmental Management Guidelines for Dredging*

APPENDIX 2: DREDGING OPERATIONS AND IMPACTS

Dredging Technology and its Appropriate Use

The main types of dredges used throughout the world are cutter suction dredges (CSD), trailing suction hopper dredges (TSHD) and grab dredges. CSDs are used principally for removing hard sediments in capital dredging projects, while TSHDs are used mostly for maintenance dredging of soft sediments in shipping channels. Grab dredges have much lower rates of production than suction dredges and are used principally in confined areas such as alongside wharfs.

Cutter Suction Dredger

CSDs are typically mounted on a barge and consist of a rotating cutter head with an adjacent suction pipe that collects a slurry of cuttings and water which it pumps through a discharge pipeline to its destination. In Victoria, several small CSDs are used to maintain boating access to small rivers in Port Phillip Bay and elsewhere, and large CSDs are used occasionally for capital dredging projects.

The action of the suction near the cutter means that most of the sediment removed by the cutter is captured. A variable proportion of sediment may be missed and fall to the seafloor below the cutter. These losses are usually small and consist primarily of solid sediment. As the economics of dredging is greatly affected by losses near the cutter and by overdredging, their minimisation is a primary concern for the dredging contractor. As high dredge efficiency and low turbidity at the cutter head are closely linked, it is uncommon for turbidity near the cutter head to cause environmental concern. Where very low turbidity is required near the cutter head or where contaminated sediments are dredged, the cutter head may be replaced with other intake systems (for example, sweep head suction head, see Seurynck and deVos 1997).

The site of discharge is the source of most environmental concern with CSDs. Typically, runoff water is controlled by the use of bunds and sluice boxes to enable settlement of solids and to improve water quality before it is discharged. Where sand is pumped, the resulting turbidity is typically confined to a small area near the discharge; spoil remains at the site of discharge. Where silts and clays are pumped, turbidity and spoil stability are more problematic. Clays, if pumped significant distances, may fluidise and therefore should not be pumped long distances into unbunded areas, either on land or on the seafloor. Dredging of the Geelong Channel during 1997 involved pumping of fine clay sediments over distances of greater than 1 km and created very fluid spoil that had a very low angle of repose and covered much larger areas than desirable.

Trailing Suction Hopper Dredger

A TSHD consists of a self-propelled ship with a large hopper. The vessel is equipped with one or two suction pipes which end with a draghead. The dragheads are lowered to the seabed and a slurry of sediment and water is pumped through them into the hopper. Dredged material settles in the hopper and the water drains off through a controllable hopper overflow system. Settlement of material in the hopper is dependent upon grain size, therefore, loading times can vary markedly for different sediments. The dredger usually deposits

the contents of the hopper on a spoil ground through doors or valves in the bottom of the hopper. Split hulled vessels are common for smaller dredgers of this type. Most modern TSHDs are also fitted with pump ashore equipment and are able to discharge the hopper load through a floating pipeline connected to the bow of the dredger. TSHDs have been used to maintain shipping channels in Port Phillip Bay and Western Port. The April Hamer is a purpose-built side-casting dredger, designed to operate in shallow water and maintain access to Bass Strait at Lakes Entrance. This dredger is not built with a hopper but discharges the dredged material directly abeam by use of a swivelling boom.

During dredging, TSHDs create turbid plumes as a result of the intake bypass, overflow and turbulence caused largely by the ship's propeller. The bypass system is designed to prevent water being discharged into the hopper at the commencement and conclusion of dredging. A sensor in the dredge line switches the discharge over the side of the vessel when the sediment concentration falls below a threshold value. Overflow occurs once the hopper is full and is used to increase the sediment load. Overflow creates a turbid plume on the surface particularly when fine sediments are dredged. Technical information to support the need for restrictions on overflow is limited (Palermo and Randall 1990).

Overflow is of greatest environmental concern where fine sediments are dredged as they create the largest plume. Consequently, overflow of fine sediments is not usually permitted by environmental agencies. When fine sediments are dredged (for example, Yarra River shipping channels), there is also no economic advantage to overflowing these sediments as there is negligible settlement in the hopper, so the sediment concentration in the intake and the overflow are similar. When sand is dredged (for example, South Channel), increasing overflow results in appreciable economic benefits as settlement in the hopper means there is a large differential between the sediment load in the intake and any overflow. Also, the hopper load is increased.

Restrictions on the overflow of fine sediments are justified on both environmental and economic grounds. But restrictions on overflow to minimise turbidity must, on occasions, be balanced against a longer period of turbidity if hopper loads are reduced. Modern TSHDs discharge overflow at keel level, rather than above water level, to reduce turbidity and dispersal of fine sediments.

Measurements in Chesapeake Bay indicate that 12 per cent of the load transported in a TSHD was redistributed, but the resulting sedimentation caused minimal impact (see 'Direct effects' in appendix 2). Turbidity also increases when sediment is dumped. Studies of spoil dumped from TSHDs dumping sediments similar to those dredged from the Yarra, indicate that all but one to four per cent of the sediment remains on the site where it is dumped; the remainder settles at a greater distance over the next 24 hours (Truitt 1988).

Grab Dredgers

A grab dredger consists of a crane mounted on a pontoon. The grab normally discharges into independent hopper barges. Grab dredges may

cause minimal disturbance and dilution of clays compared to hydraulic methods used by CSDs and TSHDs, but may cause high turbidity in loose silts where a significant fraction of the load may be washed out as the grab is hauled through the water. Grabs are also better able to handle boulders, debris, ropes, chains, and so forth, than are dredges which rely on pumps. They are also well-suited to dredging in confined places such as alongside wharfs, and their depth of operation is limited only by their cable length. Their main disadvantage is that they have slow rates of production.

Agitation Dredging

Agitation dredging involves disturbing seabed or riverbed materials by forcing them into suspension, after which they are moved by natural water flow to be redeposited elsewhere. Suspension of materials may be achieved with water jets, or by raking or pumping. This method may be suitable for fine sediments in channels, but before such methods are adopted it is important to establish the likely pattern of deposition and be satisfied that it will be acceptable.

Injection Dredging

This is a variation on the agitation method. A fixed array of water jet nozzles are lowered to penetrate the seabed from a self-propelled vessel. Pressure injection of water into the near-surface seabed deposits reduces the *in situ* density of the material to the point where it behaves like a liquid and is induced to flow. If the seabed slopes then large masses of sediment may be induced to flow at high rates. Unlike agitation dredging, the object is not to raise the individual sediment grains into the water column, although this can be achieved, intentionally or otherwise, using the same equipment.

There is evidence that consolidation of certain materials that have been subject to water injection may be hindered, but this process is not fully understood (Bray *et al.*1997).

Backhoe Dredger

The backhoe dredger has most of the advantages and disadvantages of the grab dredger, but can operate more quickly. Unlike a grab dredge, its maximum depth of dredging is limited by the length of its dredging arm.

Sweep Bar

A sweep bar consists of a large steel bar which is dragged across the seabed to level it. The bar is suspended horizontally from a barge and towed by a tug. It is usually used within port areas where grab dredges have been operating to achieve a minimum depth throughout berth areas without unnecessary dredging, but may also be used to remove high points following dredging by TSHDs or other dredges.

Stationary Slurry Pumps

Near the entrance to Portland harbour there is a stationary pump that uses water jets to fluidise sand before the resulting slurry is pumped approximately three km beyond the harbour entrance. The design of this pump/dredge has been patented.

Special-Purpose Dredges

There are many specialised dredges that are not readily available in Australia. Descriptions are provided by Bray *et al.* (1997).

Dredge Selection

Since dredging and spoil disposal are usually site-specific, the ideal dredge varies between dredging projects (Raymond 1984). Dredge selection depends on availability and cost, physical characteristics of sediment, amount to be dredged, depth, distance to disposal site, depth of disposal site, physical environment at dredging and disposal sites, contamination level of sediments, dredging site and method of disposal. The production rate relative to levels of turbidity generated, project duration, background levels of suspended sediment and contamination levels should all be considered when evaluating dredges (Raymond 1984). In evaluating dredges, it is also important that all phases of the dredging operation (excavation, transportation and disposal) are considered as an integrated system.

Typically, CSDs have the least effect on turbidity at the dredging site and TSHDs produce similarly low turbidity when used without overflow. Grab dredges and TSHDs, when used with overflow, produce significantly higher turbidity throughout the water column near the dredging site than do CSDs, and in clay may create surface turbidities two to three times those of CSDs (Raymond 1984).

However, at the disposal site, the reverse may be true. Grab dredges do not disturb the structure of clay sediments as much as CSDs or TSHDs do, which may fluidise sediments by mixing them with water. Fluidisation of clays by CSDs and TSHDs may cause spoil to cover an excessive area, and fluidised spoil may take some time to consolidate thus providing a source of ongoing turbidity until consolidation has occurred. Consequently, suction dredges may be preferred if the vicinity of the dredge site is particularly sensitive, while a grab dredge may be favoured if the vicinity of the spoil site is sensitive.

While sand may be pumped out of TSHDs with few environmental problems, pumping out sediments with a high clay content is not desirable, as fluidisation of clays is increased as the fines are twice mixed with water. This process is undesirable, and while it may be acceptable if sediments can be effectively contained within bunds on the seafloor, bottom dumping of fine sediments is preferable.

Table 5: Guidance on selection of appropriate dredges for maintenance dredging (from Bray et al. 1997)

Site conditions	Standard trailer	Small trailer	Cutter suction	Grab	Backhoe
Bed material					
Loose silt	1	1	1	2	2
Cohesive silt	1	2	1	1	2
Fine sand	1	1	1	2	2
Medium sand	1	1	1	2	2
Coarse sand	1	2	1	2	1
Sea conditions					
Impounded water	3	2	1	1	2
Sheltered water	1	1	1	1	1
Exposed water	1	2	3	3	3
Disposal to					
shore	2	2	1	N	2
tide	1	1	1	N	N
sea	1	1	N	1	1
Quantities (m^3)					
‹100,000	2	1	1	1	1
‹250,000	1	2	1	1	2
‹500,000	1	2	1	3	2
›500,000	1	2	1	3	3
Heavy traffic	1	1	3	2	1
Confined working	N	3	2	2	1

1=suitable, 2=acceptable, 3=marginal, N=not usually suitable

Table 6: Guidance on selection of appropriate dredges for capital dredging (from Bray et al. 1997)

Site conditions	Standard trailer	Small trailer	Cutter suction	Grab	Backhoe
Bed material					
Loose silt	1	1	1	2	2
Cohesive silt	1	1	1	1	2
Fine sand	1	1	1	2	2
Medium sand	1	1	1	2	2
Coarse sand	1	1	1	1	2
Gravel	1	2	1	1	1
Soft clay	1	2	3	1	2
Medium clay	2	3	3	2	1
Stiff clay	3	N	3	3	1
Boulders	N	N	3	3	1
Very weak rock	3	N	1	3	1
Weak rock	N	N	1	N	1
Moderately weak rock	N	N	2	N	2
Pretreated rock	2	N	3	3	1
Sea conditions					
Impounded water	N	3	1	1	1
Sheltered water	1	2	1	2	1
Exposed water	1	1	3	3	2
Disposal to:					
shore	1	2	1	N	N
tide	1	1	2	N	N
sea	1	1	3	1	1
Quantities (m^3)					
‹100,000	2	1	1	1	1
‹250,000	1	2	1	2	1
‹500,000	1	3	1	3	2

APPENDIX G – Submissions from Public Exhibition Period

The public exhibition period (42 days) was from 26 March – 7 May 2010 with comments being received until 7th May 2010. After the exhibition period five submissions were received, these are provided on the following pages. The intent of the comments received have been incorporated into the strategy.

Land and Property Management Authority

Level 4, 437 Hunter Street, NEWCASTLE NSW 2300
PO Box 2185 Dangar NSW 2309
Tel (02) 4920 5059; fax (02) 4925 3489
Mob 0407 066 416
email stephen.driscoll@llpma.nsw.gov.au
www.lpma.nsw.gov.au

18th May 2010

Greater Taree City Council
PO Box 482
Taree NSW 2430

Attention Mr Oliver Muenger

Dear Oliver

Draft Greater Taree City Council Dredging Strategy (GTCC, 2010)

Please find attached the Land and Property Management Authority's (LPMA's) comments on the draft Strategy report for your consideration.

The following should be considered for amendment and/or inclusion:

List of Commonly Used Acronyms and Abbreviations (page 5)

Include the following: LPMA Land and Property Management Authority

1. Introduction (page 9)

The bed of the Manning River is submerged Crown land and is owned and managed on behalf of the people of NSW by the Land and Property Management Authority (LPMA).

The Manning River at Harrington features a trained entrance which provides access to the Pacific Ocean in most conditions. Features include a training wall and breakwall located on the northern side of the river. The Farquhar entrance is a natural delta characterised by a number of island, small channels and a sand beach berm. The entrance has a history of intermittent periods of being open or closed to the ocean.

Management of the Manning River estuary is also split between a number of State government authorities and GTCC. Some of the main State authorities that have responsibility include LPMA, NSW Maritime Authority, Industry and Investment NSW and DECCW.

Note: Reference to PoMs (Plan of Management??) POMs has special planning significance under the Crown Lands Act and the Local Government Act. The use of the word PoM should be clarified and referred to the LPMA for further comment.

This Dredging Strategy identifies a number of locations within the Manning River estuary that may benefit from dredging and sets a strategic direction for future dredging activities.

3. Capital Dredging and Maintenance Dredging

Maintenance dredging is the process of maintaining an existing channel which has become silted with the passage of time.

8. Estuary Processes and Sedimentation

This section seems to understate the complex interactions and processes that influence sedimentation and the accretion of marine sand at the Manning and Farquhar inlet entrances. Moreover, the interrelationship in hydraulic flows between the Manning and Farquhar inlet entrances and the potential impact if the balance is adversely affected is not covered in the document.

15. Spoil Management Options

The use of dredged material from the bed of the Manning River on land (other than Crown land) will attract the payment of royalties at an negotiated rate.

The assessment and use of dredge material is subject to the provision of the Waste Classification Guidelines (DECCW, 2008).

17. Statutory Requirements
Environmental Planning & Assessment Act 1979 and the Environmental Planning & Assessment Regulations 2000

The NSW Environmental Planning and Assessment (EP&A) Act 1979 generally imposes requirements for controlling development under two schemes. Part 4 of the Act controls development that requires consent or is prohibited under an environmental planning instrument. Part 5 of the Act imposes requirements for assessing the impact of an "activity" that does not require consent under Part IV of the EP&A Act.

Under this Strategy it is envisaged that maintenance dredging activities (including the deposition of dredged material) are likely to be subject to the provisions under Part 5 of the EP&A Act 1979. In this instance, GTCC (proponent) is required to examine the environmental aspects of carrying out the activity and must 'take into account to the fullest extent possible all matters affecting or likely to affect the environment' and seek any necessary approvals from relevant authorities such as the LPMA (i.e. approval to dredge Crown land).

Such an examination would usually take the form of a Review of Environmental Factors (REF).

Determination (or approval) for an activity to proceed is given by the "Determining Authority". In determining the matter, the Determining authority must ensure the environmental impacts have been adequately considered in the REF and there is not likely to be any significant environmental impacts as a consequence of the proposed activity. Should any dredging proposal be 'likely to significantly affect the environment', an Environmental Impact Assessment would be required.

Where the approval of more than authority is required, there may be more than one Determining Authority.

The EP&A Act also allows State Environmental Planning Policy (SEPP) to be created under Part 3 of the Act by the Governor.

State Environmental Planning Policy (Infrastructure) 2007

It should be noted that under SEPP Infrastructure (see Preliminary) nothing affects any requirement under another Act to obtain an approval, licence or permit for or concurrence to any development of a kind specified in the SEPP. This means that for any activity on Crown land the proponent must seek an approval under the Crown Land Act.

Furthermore, SEPP Infrastructure requires a public authority to consult with a public authority from whom an approval is required for development to be carried out lawfully.

19. Funding

Waterways Program

The Waterways Program is administered by the Land and Property Management Authority. In 2009/2010 funding under the Waterways Program was made on a statewide priority basis for dredging projects that demonstrated there would be a significant improvement to the navigability of the waterway with a focus on recreational boating needs. The funding was based on a 50:50 partnership with local government.

If you have any questions regarding the project please do not hesitate to contact me.

Yours faithfully

STEPHEN DRISCOLL
State Manager, Minor Ports Unit

HARRINGTON COMMUNITY ACTION GROUP.

Joan Hall
Secretary
24 Josephine BVD
Harrington NSW 2427
P.H. 65561521

27 April 2010

General Manager
Greater Taree City Council
P O Box 482
TAREE NSW 2430
Attn: Land Resource Management.

Dear Sir,

Reference: "Submission - Exhibition Draft Dredging Strategy 2010.

On viewing the CD on the Draft Dredging Strategy 2010 Plan listed are questions and concerns that the Harrington Community Action Group have and believe that further clarification is needed.

* Have the sand dunes been over regenerated preventing the natural movement of sand?

* It would be helpful if Management Plans were written in every day language that the every day person could understand!

* Could bank erosion be partially caused by boat movement up and down certain sections of the river system?

* When the river was dredged for the fill required for Harrington Waters was the channel formed by the dredge directed in the correct direction so that it did not interfere with the natural flow of the river? Has the dredging that was carried out caused the change in the flow of the river to the south side of the river near Manning Point?

* A great deal of the issues raised seem to relate back to the urgent need for the construction of the Southern Wall!

* Mention does not seem to be made about the construction of a second gantry to assist with the flow of sand in and out of the backwater.

* How long will it take to carry out environmental impact studies prior to the commencement of dredging and at what cost?

* Who is paying for the "Protection" Surveys to be undertaken?

* Before dredging commences a definite plan for the "spoils" needs to be in place to ensure financial viability.

* Who decided the order of dredging priorities in Table 5?

* Who decided on maintenance dredging frequency in Table 6?

* No.14 - Dredging Procedure - has not a lot of this work already been carried out?

* Table 7 - Extraction Volumes for dredging recorded by NSW Maritime - how correct are these volume figures now? Are they sufficient to obtain the desired end result? How long ago were these extraction figures carried out?

* "Do nothing" option is not an option for Harrington and Crowdy Head for future development and tourism.

* Page 40 - 1 Council Funds:-
Why should Council be expected to contribute 50% of the project cost when applying for Government funds? The Federal / State Governments should fund the entire project!

* Is the Worley Parsons Cost Estimates based on the Farquhar Inlet ETC. a good guide as to costs for other areas?

* If FIMG works in conjunction with Council will Council take out administration charges? Also will 50% of the cost of a project be applicable when State Government grant monies are obtained?

* Page 42 - 19.2 Industry Fund Raising:-
The River provides an excellent opportunity for the encouragement of the boat building industry. Already a strong boat building industry exists in Taree. Such like industries could contribute towards dredging costs.

The Action Group would greatly appreciate a response to this submission.

Yours faithfully

Joan Hall
Secretary

Submission from Greg Crisp 27-04-2010

Oliver,

Before I forget..... a few points to include in the DS:

1. Now that we have an approved wharf pad for the dredge to tie up to at the Croki base we need to include in the DS a small channel to be dug to the wharf to allow the dredge to gain access at all tides and not sit on the bottom. I will come down one day and show you and peter where to plot it.

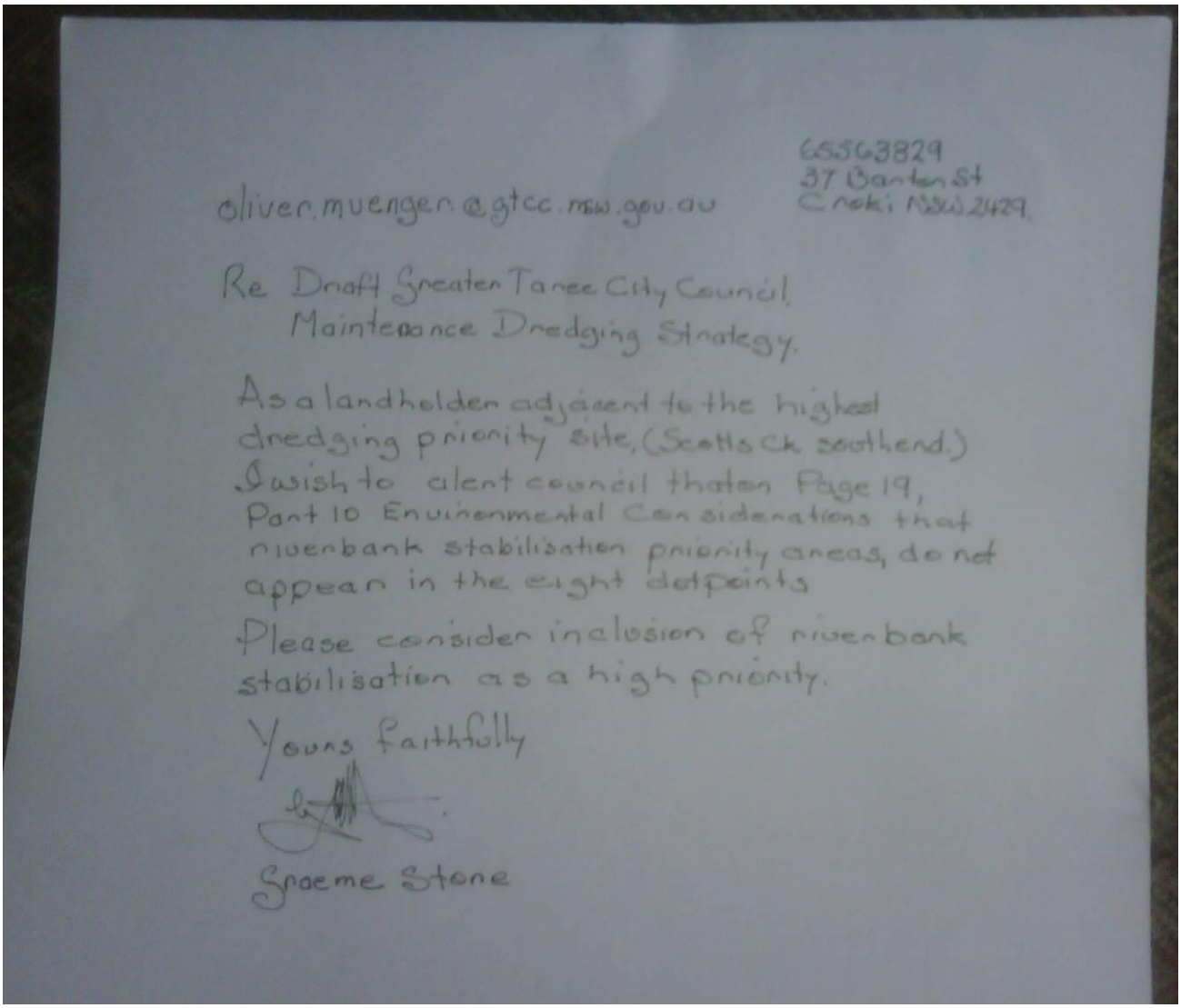
2. We should include dredging for all existing and future boat ramps, public and private jetties/wharves, where any works are required for bank stabilisation, refurbishment or replenishment, dredging of oyster leases where siltation is rendering them unusable, etc if you can think of anymore of this type of activity. any marinas. another one we may not have explored is the entrance to Browns Creek. There used to be a commercial hire boat business up this creek. however, we would want to watch out what sort of material came out of browns creek !!!!

3. We (FIMG) need a statement in the document that acknowledges that the community funded dredge is to be utilised in the first instance wherever possible and practicable.

We will get some more to you once we finish going thru.

regards

GREG CRISP



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Croki NSW 2429.

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Re Draft Greater Taree City Council
Maintenance Dredging Strategy.

As a landholder adjacent to the highest dredging priority site, (Scotts Ck southend.) I wish to alert council that on Page 19, Part 10 Environmental Considerations that riverbank stabilisation priority areas, do not appear in the eight dotpoints

Please consider inclusion of riverbank stabilisation as a high priority.

Yours faithfully

Graeme Stone

Submission from Greg Crisp 20-5-2010

Page 30 sec 15.

--- Just refer to island creation for bird habitat breeding opportunities. do not refer to individual bird species as there is red capped dotterels, plovers, pied oystercatchers, white fronted chats, caspian terns, as well as the little terns and the BSC.

- It seems very strange that they would dump spoil from the entrance way up to blackfords bay. As I understand the channel clearance spoil at harrington was dumped on the north side of the training wall filling in the old river channel and now recognised as a 7(a) environmental zone !!!!!!.

I think blackfords would have been a gravel dump from the adjacent shoal in the main river. A bit of investigation of the old survey plans shows that the only islands not created by spoil were big and little goat and goat island at chatham. all the others were created - five islands, oaky island and the point by the looks (see original grant survey and 100'reservation survey), shallow island at rowing club, island now joined to land about 2km upstream of bays hill on caldons property.

- we need to include a statement that where ever possible the spoil as a resource can be sold to recover costs. This MUST be an essential part of this study. As discussed this aspect I believe is supported by the NSW government - see driscoll.

Why can't we include recognition that a small channel is required to allow storage and maintenance of the community dredge.) I note you slipped in the crowdy harbour boat ramp now as a separate site I think!!!!! If it wasn't for the community purchasing this dredge this dredging study would not have happened.... sec 20 is good.

The approval process is ridiculous..... why do we need to go to ALL these government departments -

page 37 & 38 - include environmental benefits - not just recreational and commercial. better flows, better environment. island, beaches.

page 40 - you could include a statement here about sale of spoil to recover cost. From our meeting with the minister we reckon we are not out of line at all as he will support where possible.

we understand that there are other avenues for funding such as CMA, heritage fund, environmental funds, national parks, tourism grants, recreational grants, community grants etc. as discussed at the last meeting there must be millions available.

page 50 - you still have the spoil on the tern breeding area. have you checked with mick thomas? what about the spoil areas at glacken street on private land(obviously subject to DA approval) - spoil along farquhar park beach MUST be shown. maybe the maps should say "possible" spoil sites !

I cannot remember what else I said in my red writing .....

GREG CRISP

APPENDIX H – Changes to Strategy resulting from Submissions

The draft dredging strategy has been amended to reflect the comments received in the submissions contained in Appendix G.

The following information contained in the submission from the Land and Property Management Authority has been included in the draft dredging strategy. -

Page 5 List of Commonly Used Acronyms and Abbreviations

LPMA - Land and Property Management Authority has been added to the list of abbreviations

Page 9 - Section 1. Introduction.

The following paragraphs have been added to the introduction from the submission made by the LPMA-

The bed of the Manning River is submerged Crown land and is owned and managed on behalf of the people of NSW by the Land and Property Management Authority (LPMA).

The Manning River at Harrington features a trained entrance which provides access to the Pacific Ocean in most conditions. Features include a training wall and breakwall located on the northern side of the river. The Farquhar entrance is a natural delta characterised by a number of island, small channels and a sand beach berm. The entrance has a history of intermittent periods of being open or closed to the ocean.

Management of the Manning River estuary is also split between a number of State government authorities and GTCC. Some of the main State authorities that have responsibility include LPMA, NSW Maritime Authority, Industry and Investment NSW and DECCW.

This Dredging Strategy identifies a number of locations within the Manning River estuary that may benefit from dredging and sets a strategic direction for future dredging activities.

The introduction now reads –

The Manning River Estuary is situated on the Mid-north Coast of NSW approximately 300 kms north of Sydney in the Greater Taree City Council (GTCC) Local Government Area (LGA). The Estuary falls within the Hunter Central Rivers Catchment Management Authority (HCRCMA). The system includes both Lansdowne River and Dawson River. The estuary is unique as it has two natural ocean entrances, one at Harrington and the other to the south at Old Bar known as the Farquhar Inlet (Figure 1). The Farquhar entrance is untrained and has a history of periodic closure. The main channels of the system are:

- The Manning River;
- The North Passage;
- The South Passage;
- The South Channel; and,

- Scotts Creek.

The Manning River at Harrington features a trained entrance which provides access to the Pacific Ocean in most conditions. Features include a training wall and breakwall located on the northern side of the river. The Farquhar entrance is a natural delta characterised by a number of island, small channels and a sand beach berm. The entrance has a history of intermittent periods of being open or closed to the ocean.

The estuary is an important local environmental feature, supporting a range of social, economic and environmental values.

The bed of the Manning River is submerged Crown land and is owned and managed on behalf of the people of NSW by the Land and Property Management Authority (LPMA).

Management of the Manning river estuary and its entrances are guided by a number of management plans including the Manning River Estuary Management Plan (EMP) and the Draft Farquhar Inlet and Old Bar Entrance Opening Management Plan (EOMP). These plans have been prepared in consultation with the community and relevant agencies and have either been adopted or are in the process of being adopted by GTCC. The implementation of dredging activities is one aspect in these management plans that council is responsible for.

Management of the Manning River estuary is also split between a number of State government authorities and GTCC. Some of the main State authorities that have responsibility include LPMA, NSW Maritime Authority, Industry and Investment NSW and DECCW.

This Dredging Strategy identifies a number of locations within the Manning River estuary that may benefit from dredging and sets a strategic direction for future dredging activities.

Page 31 Section 15. Spoil Management Options

The following paragraph has been added to section 15-

The use of dredged material from the bed of the Manning River on land (other than Crown land) will attract the payment of royalties at an negotiated rate. The assessment and use of dredge material is subject to the provision of the Waste Classification Guidelines (DECCW, 2008).

Page 34 Section 17.Statutory Requirements

Environmental Planning & Assessment Act 1979 and the Environmental Planning & Assessment Regulations 2000

The following paragraphs have been added under this heading -

Under this Strategy it is envisaged that maintenance dredging activities (including the deposition of dredged material) are likely to be subject to the provisions under Part 5 of the EP&A Act 1979. In this instance, GTCC (proponent) is required to examine the environmental aspects of carrying out the activity and must 'take into account to the fullest extent possible all matters affecting or likely to

affect the environment' and seek any necessary approvals from relevant authorities such as the LPMA (i.e. approval to dredge Crown land).

Such an examination would usually take the form of a Review of Environmental Factors (REF).

Determination (or approval) for an activity to proceed is given by the "Determining Authority". In determining the matter, the Determining authority must ensure the environmental impacts have been adequately considered in the REF and there is not likely to be any significant environmental impacts as a consequence of the proposed activity. Should any dredging proposal be „likely to significantly affect the environment ", an Environmental Impact Assessment would be required.

Where the approval of more than authority is required, there may be more than one Determining Authority.

The EP&A Act also allows State Environmental Planning Policy (SEPP) to be created under Part 3 of the Act by the Governor.

The following paragraphs have been removed –

Dredging activities, including the deposition of spoil, under this strategy requires assessment under Part 5 of the EP&A Act 1979. GTCC is the determining authority and is required by the Act to examine the environmental aspects of carrying out the activity.

Such an examination would take the form of a Review of Environmental Factors (REF). Should any dredging proposal be 'likely to significantly affect the environment', an Environmental Impact Assessment would be required.

State Environmental Planning Policy (Infrastructure) 2007

The following paragraphs were added under this heading-

Under SEPP Infrastructure (see Preliminary) nothing affects any requirement under another Act to obtain an approval, licence or permit for or concurrence to any development of a kind specified in the SEPP. This means that for any activity on Crown land the proponent must seek an approval under the Crown Land Act.

Furthermore, SEPP Infrastructure requires a public authority to consult with a public authority from whom an approval is required for development to be carried out lawfully.

Page 40 Section 19.Funding

The information under this heading was replaced with the information contained in the submission form the LPMA.

Waterways Program

The Waterways Program is administered by the Land and Property Management Authority. In 2009/2010 funding under the Waterways Program was made on a statewide priority basis for dredging projects that demonstrated there would be a significant improvement to the navigability of the waterway with a focus on recreational boating needs. The funding was based on a 50:50 partnership with local government.

The following information contained in the submission from the Harrington Community Action Group has been included in the strategy –

Page 22 Section 12 Dredging Priorities

Who decided the order of dredging priorities in Table 5?

Reference has been made to the dredging subcommittee within this section

Page 28 Section 13.Maintenace Dredging Frequencies

Who decided the maintenance dredging frequencies in table 6?

Reference has been made to the dredging subcommittee in this section

The following has been included in the dredging strategy to reflect information contained in the submission from Greg Crisp (Farquhar Inlet Management Group) -

Page 22 Section 12.Dredging Priorities

Dredging of existing boating facilities, including boat ramps, public jetties and wharfs will be included in this strategy once a strategic plan prioritising the maintenance (including dredging) and development of boating facilities on the Manning River has been completed.

The following has been included in the dredging strategy to reflect information contained in the submission from Graeme Stone –

Page 20 Section 10.Environmental considerations

- *Impacts on river bank stability*

APPENDIX I – 2011 dredging priority addendum

Council at its Ordinary Meeting on 15 February 2012 resolved to adopt this Addendum as a means to update dredging priorities contained within this strategy and that an annual update be added to this strategy based on advice from Roads and Maritime Services and upon endorsement by the Estuary, Coastline and Catchment Management Advisory Committee to ensure accuracy.

11. Review of Sites recognized for dredging

Table 3 lists the sites that have been identified for future dredging under this Strategy. These sites have been identified through a review of literature, including the Manning River Estuary Management Plan and the Farquhar Inlet Old Bar EOMP, through anecdotal evidence from staff, state agency representatives and the community and on the basis of future navigational requirements. It is acknowledged that many of these sites may change from time to time, influenced by flood and storm events. The agencies should also accept that new dredge priority sites may develop and that an annual report from the Maritime section of Roads and Maritime Services should be prepared and presented to the Estuary, Coastline and Catchment Management Advisory Committee for consideration before being formally adopted into this report.

Table 3. List of reviewed proposed dredging sites in the Greater Taree City Council LGA as identified by NSW Maritime, December 2011.

SITE	SITE REF
HARRINGTON LAGOON (No appreciable change)	1
HARRINGTON BACKCHANNEL (Additional minor siltation)	2
HARRINGTON WATERS QUAY AREA (No appreciable change)	3
HARRINGTON MAIN CHANNEL (Shoaling improved at Entrance to Harrington Back Channel, now deposited at Harrington Bar –June 2011)	4
MANGROVE ISLAND (No appreciable change)	5
PELICAN BAY CREEK (No appreciable change)	6
CATTAI CREEK ENTRANCE (Additional minor siltation – June 2011)	7
SCOTTS CREEK MID SECTION (No appreciable change)	8
SCOTTS CREEK SOUTH END (Bisho's Corner) (This site has experienced extensive additional shoaling which has all but closed Scotts Creek)	9
SOUTH CHANNEL OXLEY ISLAND (Additional minor siltation)	10

SITE	SITE REF
FARQUHAR INLET (Additional minor siltation however a deeper channel approach is forming around the nth side of Charleys Island)	11
CABBAGE TREE CHANNEL (Additional minor siltation at the eastern entrance to this channel)	12
OYSTER CREEK (Additional minor siltation at the eastern entrance to this channel)	13
CABBAGE TREE ISLAND - WESTERN TIP (No appreciable change)	14
MIDDGY GHARRET ISLAND - WESTERN TIP (A large volume of sediment has deposited on the North/Western side of this site – June 2011)	15
DUMARESQ ISLAND - NORTHERN TIP (Moderate siltation – June 2011)	16
DUMARESQ ISLAND - NORTHERN CHANNEL (No appreciable change)	17
ROWING CLUB SHALLOW ISLAND (Add minor siltation – June 2011)	18
NORHTERN BANK ADJACENT TO TAREE CBD (No appreciable change)	19
CARTER CREEK ENTRANCE UPSTREAM OF MARTIN ST BRIDGE (No appreciable change)	20
OKLEY ISLAND TAREE WEST (No appreciable change)	21
MONDROOK CREEK ENTRANCE (Add minor siltation – June 2011)	22
MONDROOK CREEK - TAREE WEST (No appreciable change)	23
FIVE ISLANDS (Large tree snags are now evident in this area but no real change to siltation)	24
WINGHAM (A large volume of sediment including rock has deposited on the Southern side of this site – June 2011)	25
CROWDY HARBOUR (Constant slow ingress of sand at this site)	26
CROWDY HARBOUR - BOAT RAMP (Constant slow ingress of sand at this site)	27
The following section identifies additional sites developed as a result of the June 2011 flood.	

SITE	SITE REF
WINGHAM, south of "The Elbow" on western side out from riverbank.	28
FIVE ISLANDS, 500m upstream on northern bank	29
TAREE WEST, 600m downstream of Andrews Reserve	30
COOCUMBAC ISLAND, North/west side (0.3m dries above @ MLWS)	31
OXLEY BEND, 1km downstream of Highway bridge, north side	32
NORTH PASSAGE, adjacent to Ghinni Ghinni Creek entrance, mid channel	33

These sites are shown graphically in Appendix A

12. Dredging Priorities

Given the scope of this strategy and cost of dredging works, dredging of individual sites need to be prioritised. All dredging sites have been assessed with regard to a range of key criteria (Table 4) and prioritised accordingly. A table detailing the identified sites and the prioritisation assessment is provided in Appendix B. This assessment process was based on known and anecdotal evidence.

Table 4. Criteria for dredging priorities

CRITERIA	SOURCE OF INFORMATION
TRAFFIC VOLUMES + PUBLIC USE OF AREA	NSW MARITIME
HISTORY OF ACCIDENTS	NSW MARITIME
ENVIRONMENTAL FLOWS	DREDGING SUB-COMMITTEE
ENVIRONMENT	DREDGING SUB-COMMITTEE
PRACTICALITY OF SPOIL DISPOSAL	DREDGING SUB-COMMITTEE
ACCESS REQUIRED FOR BOATING INFRASTRUCTURE	DREDGING SUB-COMMITTEE

Table 5. Dredging priorities within the Greater Taree City Council area

SITE	SITE REF
EXTREME PRIORITY	

SITE	SITE REF
SCOTTS CREEK SOUTH END (Bisho's Corner)	9
SOUTH CHANNEL OXLEY ISLAND (Cowan's Channel)	10
HARRINGTON MAIN CHANNEL	4
HIGH PRIORITY	
HARRINGTON LAGOON	1
HARRINGTON BACKCHANNEL	2
FARQUHAR INLET	11
CABBAGE TREE CHANNEL	12
OYSTER CREEK	13
CABBAGE TREE ISLAND - WESTERN TIP	14
ROWING CLUB SHALLOW ISLAND	18
FIVE ISLANDS	24
CROWDY HARBOUR	26
CROWDY HARBOUR - BOAT RAMP	27
DUMARESQ ISLAND - NORTHERN TIP (Due to June 2011 Flood)	16
MODERATE – HIGH PRIORITY	
NORTH PASSAGE – Adjacent to Ghinni Ghinni Creek entrance	33
TAREE WEST – 600m downstream of Andrews Reserve	30
CARTER CREEK ENTRANCE UPSTREAM OF MARTIN ST BRIDGE	20
MODERATE PRIORITY	
DUMARESQ ISLAND - NORTHERN CHANNEL	17
OKLEY ISLAND TAREE WEST	21
WINGHAM	25

SITE	SITE REF
LOW – MEDIUM PRIORITY	
NORHTERN BANK ADJACENT TO TAREE CBD	19
LOW PRIORITY	
HARRINGTON WATERS QUAY AREA	3
MANGROVE ISLAND	5
PELICAN BAY CREEK	6
CATTAI CREEK ENTRANCE	7
SCOTTS CREEK MID SECTION	8
MIDDGY GHARRET ISLAND - WESTERN TIP	15
WINGHAM – South of "The Elbow"	28
FIVE ISLANDS – 500m north	29
OXLEY BEND – 1km downstream of Highway bridge on north bank	32
COOCUMBAC ISLAND – North west channel (dries @ MLWS)	31
MONDROOK CREEK ENTRANCE	22
MONDROOK CREEK - TAREE WEST	23

It should be noted that despite the priorities above, dredging works may be carried out across a number of sites with different priorities for practical reasons and to take advantage of economies of scale for nearby sites.

The Farquhar Inlet Old Bar EOMP identifies 7 options for managing an entrance opening at Farquhar inlet. The EOMP is currently in draft format and dependent on which option is finally adopted may impact on how the sites are prioritised in Table 5.