

***TWEED SHIRE COUNCIL***

**COBAKI BROADWATER  
MANAGEMENT PLAN**

**FINAL REPORT**

**JANUARY 1998**

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# 1 INTRODUCTION

In 1991 Cobaki Broadwater was identified in the Lower Tweed Estuary Management Plan as an area of high scenic and ecological value. As a consequence it was earmarked as a management priority. The objectives of the management strategy were concerned primarily with the conservation of all valuable habitats within the vicinity of the broadwater.

In January 1996 Tweed Shire Council and the Tweed River Management Plan Advisory Committee undertook the preparation of a Management Plan for Cobaki Broadwater. The plan was to have a strong focus on the preservation and enhancement of valuable habitats within the broadwater whilst encouraging sensitive and low key levels of recreational activity and environmental education. The conservation of all of the valuable ecological assets of the broadwater was to be strongly emphasised.

# 2 BACKGROUND INFORMATION

All source information utilised in the preparation of the Cobaki Broadwater Management Plan has been obtained from documentation and previous studies on the Lower Tweed Estuary, Tweed Shire and Cobaki Broadwater as well as consultation with community groups, Tweed Shire Council and industry representatives

## PRIORITY ACTIONS

- Council to initiate a requirement for habitat replacement / enhancement for environmental degradation due to development
- Council to develop a control process for new developments regarding water distribution and inputs to wetland areas so that no degradation occurs as per NSW Wetlands Management Policy
- B** Protect and enhance internationally significant migratory bird habitat
  - Investigate ecological exchange and mitigation offsets to accommodate airport expansion and conflicts with aircraft movements
- E** Continue to investigate possible leachates from Tugun landfill and pump discharges from Tugun STP to ensure that adequate infrastructure is present to control stormwater runoff to the Broadwater
  - take action to establish mitigation of any leachate from Tugun landfill
- F<sub>1</sub>** Enforce sediment controls and management of current construction sites:
  - Improve sediment runoff management of exposed excavations and earthwork faces eg. short term surface protection such as hydroseeding
- F<sub>2</sub>** Address issue of nutrient and pollutant runoff within catchment:
  - establish wetland filters wherever practical and as components of development
  - apply stormwater management strategy to airport drainage
  - promote catchment land use practices that minimise nutrient inputs
  - planners to ensure existing and future developments to have an adequate stormwater management plan in compliance with Council's Stormwater Management Strategy
- H** Secure redundant FAC land that contains important water habitat and valuable rainforest community. Rehabilitate rainforest community to remove exotic species

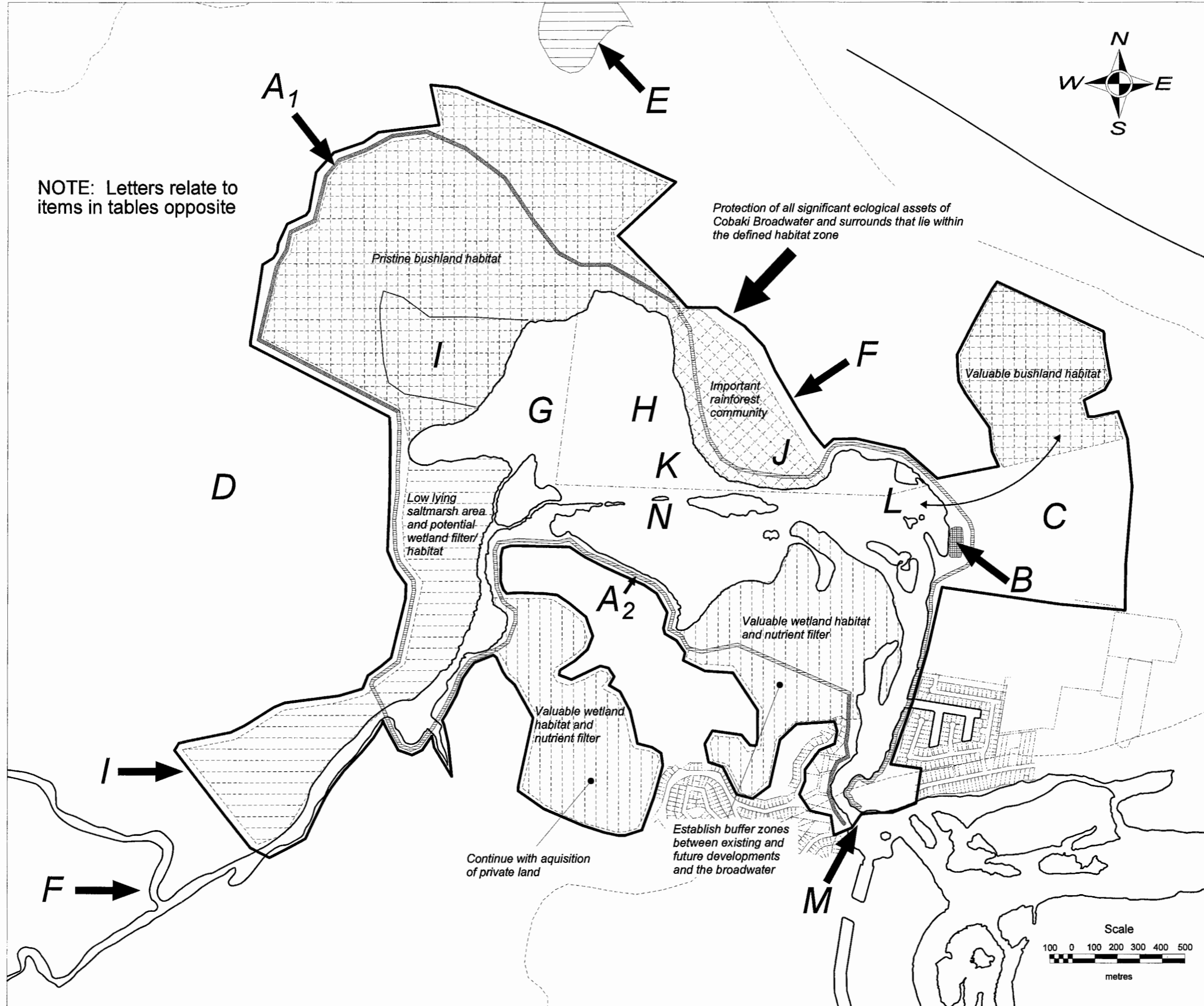
## MEDIUM-TERM ACTIONS

- Detailed flora and fauna surveys required for areas of:
- native vegetation with special reference to threatened or regionally significant flora species and communities
  - potential significance for native fauna with special reference to the value of habitat for threatened or regionally significant species
  - archaeological potential and Aboriginal heritage value as defined by the Aboriginal community
- A<sub>1</sub>** Walking trail utilising existing fire trails
- A<sub>2</sub>** Establish walking trail
- C** If airport extension *does not* proceed:
  - establish ecological corridor from existing valuable bushland to broadwater.
  - provide enhancement to bushland and migratory bird habitatsIf airport extension *does* proceed:
  - seek compensation for lost habitat
- D** Negotiate with Cobaki Lakes Development to establish wetland area adjacent to both proposed development and broadwater
  - investigate the relative benefits of salt and freshwater wetlands as a functional component of Cobaki Broadwater
- K** Restore functionality of water habitat through rehabilitation infilling and connection of dredge holes to establish flushing
  - investigate further dredging for environmental benefit and improved entrance access
- M** Incorporate stabilisation of banks in entrance channel with foreshore enhancement of adjacent parkland
  - impose restrictions on boat speed and access by recreational users that create erosive conditions if determined to be main causal factor of bank instability

## LONG-TERM ACTIONS

- G** Opportunity for ecological enhancement of marine environment of the broadwater through dredging. Need for further investigation to ascertain the environmental benefits and economic reward of such a capital dredging operation
- I** Extend knowledge of local habitat function and ecological progression
- J** Rehabilitate current dredge disposal site
- L** Alternatives are to be sought by the proponents of the proposed alignment of the Tugun Bypass which are less destructive of the estuarine and terrestrial environment of Cobaki Broadwater. Any loss or fragmentation of natural habitat in the area will need to be fairly and adequately compensated.
- N** Investigate the benefits of habitat enhancing dredging operations to extend navigational access channel across broadwater suitable for low key recreational use

# COBAKI BROADWATER MANAGEMENT PLAN



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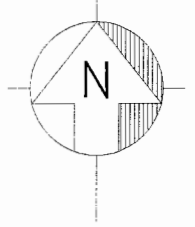
### **3 HABITAT VALUES OF THE BROADWATER**

Cobaki Broadwater and surrounds include a number of terrestrial and aquatic habitat zones under both private and public ownership.














The habitats that are considered of value to the broadwater include:

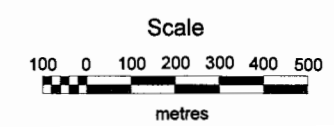
- an area of natural bushland and wetlands to the north west of the broadwater. This area is fairly pristine in nature and is not in any particularly degraded state, except for an area of tree dieback that extends from the shoreline (the cause of which is yet unknown). The land here is owned by the Crown.
- the area on the north eastern shore of the broadwater which contains a number of rainforest communities and aboriginal midden sites. The land is owned by the FAC
- a parcel of bushland and wetland isolated by Coolangatta Airport and surrounding developments to the east of the broadwater. Previously thought to contain endangered plant communities Land ownership is divided between the Crown and the FAC
- the wetland areas along the southern shores of the broadwater under Crown ownership
- the wetland areas to the south of the broadwater adjacent to Cobaki Village Development. This land is privately owned with the exception of the south east corner which is owned by the Council
- wetlands along the western bank of Cobaki Creek currently under private ownership
- the broadwater itself and the artificial islands contained within. A large section of the waterway is within the boundary of FAC owned land

# VALUABLE HABITATS



## LEGEND

-  Wetland/Coastal Woodland & Scrub/Wet Schlerophyll Forest (Crown ownership)
-  Wetland/Coastal Woodland & Scrub/Wet Schlerophyll Forest (Private ownership)
-  Rainforest/Swamp Forest/Coastal Wetlands (Crown ownership)
-  Coastal Woodlands and Wetlands
-  Wetlands (Crown ownership)
-  Wetlands (Council ownership)
-  Wetlands (Private ownership)
-  Bushland habitat (Crown ownership)
-  Bushland habitat (Private ownership)
-  Migratory bird habitat
-  Water habitat (Crown owned)
-  Water habitat (FAC owned)
-  Impacted water habitat (FAC owned)



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## 4 MANAGEMENT CONSTRAINTS AND OPPORTUNITIES

Inevitably many of these habitat areas have been adversely impacted by anthropogenic influences such as dredging or various forms of development. Other areas are under threat from proposed developments. There are however opportunities available to protect and conserve existing habitats, enhance degraded habitats, instigate measures to reduce further impacts, and to introduce the value of the broadwater to visitors and raise public awareness.

The constraints and opportunities identified in the course of constructing the framework for the plan of management have been:

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### 4.1 Boundary Constraints

- proposed Cobaki Lakes Residential Development (development consent given) - western boundary
- Coolangatta Airport Master Plan - north east boundary
- proposed industrial development - eastern boundary
- existing residential developments - eastern boundary
- private ownership of land and possible developments along Piggabeen Road Realignment - southern boundary
- Cobaki Village and Piggabeen residential developments - southern boundary
- FAC ownership of sections of broadwater

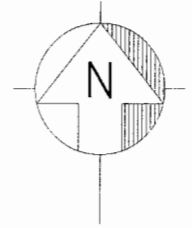
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### 4.2 Ecological Constraints

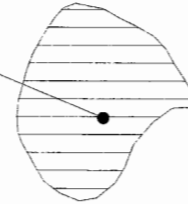
- dredging operations within FAC boundaries of broadwater affecting circulation patterns and flushing leading to anoxic conditions in deep dredge holes
- dredging proposals need close liaison and consultation with Native Title Claimants / Custodians prior to commencement of any dredging proposals to ensure native title interests have either been extinguished or that the continuation of such interests will not be jeopardised
- isolation of bushland habitat (located to the east of Cobaki Broadwater) by FAC Master Plan
- potential impacts on waterway from possible routing of Tugun bypass
- significant migratory bird habitat affected by proposed runway extensions depicted in Coolangatta Airport Master Plan
- significant wetland areas to the south of the broadwater may be affected by redevelopment of private land
- extensive low lying saltmarsh/ wetland area along eastern side of Cobaki Creek contained within Cobaki Lakes development may be impacted
- sediment and nutrient inputs from existing and proposed development within surrounding catchment potentially affecting water quality
- unknown cause of dieback in stands of Melaleucas and Casuarinas on western shore of broadwater

# COBAKI BROADWATER MANAGEMENT PLAN

## CONSTRAINTS



TUGUN LANDFILL  
- possible groundwater leachates



WESTERN BOUNDARY CONSTRAINT  
-Broadwater management zone  
constrained by proposed  
Cobaki Lakes development.

Current FAC Ownership  
- potential for trading with  
State Crown land for airport  
extension

DREDGING  
- Current dredging operation  
within airport property boundary  
affects circulation patterns and  
flushing of Broadwater.  
-Deep holes create anoxic  
conditions unsuitable for aquatic  
habitat.

WETLAND

OUTER BOUNDARY CONSTRAINT  
- Coolangatta Airport Master Plan

Recent dieback of stands  
of Melaleucas and Casuarinas,  
cause unknown

SIGNIFICANT HABITAT  
- Valuable rainforest community.  
- FAC land

COBAKI  
BROADWATER

Airport stormwater input

NORTH EAST BOUNDARY CONSTRAINT  
-Fringing broadwater zone  
constrained by airport  
masterplan

OUTER BOUNDARY CONSTRAINT  
- Proposed Cobaki Lakes  
residential development

Proposed airport runway extension  
Proposed runway

WETLAND

SIGNIFICANT HABITAT  
- Migratory shorebird roost site  
within vicinity of proposed  
airport extension.

Proposed distributor road  
and creek crossing

Proposed industrial development

PWD maintenance dredging

BOUNDARY CONSTRAINT  
- Existing Cobaki Broadwater  
Village development

Existing canal estate  
residential development

SOUTHERN BOUNDARY CONSTRAINT  
- Broadwater management zone  
constrained by private land and  
likely development

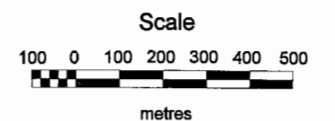
PIGGABEEN ROAD REALIGNMENT  
- Possible future residential  
development with improved  
access

SIGNIFICANT WETLAND  
- Private land  
- Potential for development  
unknown

Existing residential development

Existing low lying saltmarsh  
area, part of Cobaki Lakes  
land but currently not shown  
for development

CATCHMENT  
- Sediment/nutrient inputs



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### 4.3 Ecological Opportunities

Ecological opportunities that exist around Cobaki Broadwater include:

- habitat replacement or enhancement as compensation for any development which may destruct or degrade any wetland
- the creation of fish and seagrass habitats through capital dredging operations
- preservation of a habitat reserve on the north west shoreline of the broadwater
- investigation of tree dieback on north west shore of the broadwater
- fresh / saltwater wetland creation adjacent to proposed Cobaki Lakes development which will provide a habitat for migratory birds, both existing and those which may be affected by airport extensions. Such a wetland would also act

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as a nutrient and sediment filter for runoff discharged from future residential developments

- preservation of wetland areas adjacent to Cobaki Village through the acquisition of privately owned lands that currently act as a significant habitat areas and useful nutrient filter for adjacent residential developments
- encouragement of a riparian corridor along the edge of developable lands to connect valuable wetland habitats located along the southern boundary of the broadwater
- creation of a fish nursery within the eastern pocket of Cobaki Broadwater. This would require the bed of the broadwater to be reworked so that a uniform depth is achieved suitable only for young fish populations and to discourage birds  
Access by boats would be restricted so that area is isolated from fishing activities.

- 
- retention of rainforest habitat within FAC owned land on eastern shore of broadwater and rehabilitation of dredge disposal site to incorporate as significant habitat area
  - corridor connection from eastern pocket of bushland to broadwater - vegetation enhancement through Crown land ( 'pony club paddock' )

### 4.4 Recreational Opportunities

- interpretive walking trail around perimeter of entire broadwater reserve. Structure of trail to encourage viewing of habitat areas and to educate users on the ecological value
- improved navigational access to broadwater to encourage low key recreational boating and fishing activities

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### 4.5 Dredging Opportunities

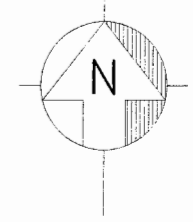
An opportunity exists to extend the current dredging operations within Cobaki Broadwater in a manner that will provide ecological enhancement to the water body as a habitat zone.

The development of a sensitive dredging plan may enhance the estuarine aquatic habitat as well as the intertidal foraging habitat for short legged wading birds. It would aim to improve flushing and rectify current water quality problems caused by deep holes in the eastern section of the broadwater. This would in turn encourage fish and seagrass communities to utilise the area as an important habitat.

The potential works associated with the airport master plan will undoubtedly require considerable amounts of fill material and it may be both feasible and environmentally sensible to gain this material from the removal of sediments from the broadwater.

COBAKI BROADWATER MANAGEMENT PLAN

# OPPORTUNITIES



**DREDGING EXTENSION**  
 - Create suitable seagrass and fish habitat whilst providing essential fill materials for airport expansion  
 - improved tidal flushing and navigation access to Cobaki Creek

**BUFFER ZONE**  
 - Retention of visual buffer zone along walking trails

In the event of extension to runway there is the potential for FAC to trade broadwater and rainforest land for state crown land needed for airport extension

Retain prime rainforest habitat  
 - access via walking trail  
 - potential for views across water

Rehabilitate dredge disposal site

**PRESERVE BUSHLAND**

Opportunity to create fish nursery grounds in portion of broadwater

**HABITAT RESERVE**  
 - Preserve wetland

**WALKING TRAIL**  
 - Encourage use of and extend current tracks as walking trails fringing areas of valuable habitat  
 - Increase awareness and educate users of trails on ecological value of adjacent areas

Creation of habitat corridor to connect valuable ecological area to broadwater habitat zone

**PRESERVE WETLAND**

Preserve migratory bird roosting area

Incorporate walking trail or boardwalk to provide complete loop

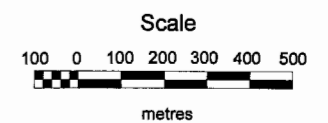
**SALT OR FRESHWATER WETLAND CREATION**  
 - Significant potential habitat  
 - Provides nutrient/pollutant /sediment filter for proposed adjacent residential development site  
 - Opportunity to create replacement habitat for migratory shorebirds and relocate shorebird population from roost site adjacent to proposed airport extension  
 - Creation of wetland may include natural salt water marshes and mangroves in close proximity to the broadwater with wetland areas of a more brackish nature located further inland.

**PRESERVE WETLANDS**  
 - Significant habitat zone  
 - Provides nutrient/pollutant /sediment filter for adjacent residential developments

Possible walking trail along gazetted road and riparian corridor connecting Kennedy Drive to Cobaki Broadwater Village

**DREDGING EXTENSION**  
 - Aim to improve flushing through rectification of bed levels that are currently causing anoxic conditions to prevail in certain areas.  
 - Improvement of water quality in order to encourage fish populations and the growth of seagrasses

Encourage riparian corridor and buffer zone



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This scenario however would require a careful analysis of the environmental benefits and the economics of dredging operations.

#### **4.6 Land Utilisation/ Negotiation/ Acquisition Opportunities**

- trade of FAC owned section of broadwater and adjacent rainforest areas on eastern shoreline with Crown Land required by FAC for Coolangatta Airport runway extensions
- utilisation of lowland saltmarsh / wetland areas adjacent to Cobaki Creek (owned by Cobaki Lakes) for use as wetland nutrient filter and habitat area
- acquisition of wetland areas to south of broadwater adjacent to Cobaki Village to be protected as valuable habitat.

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### **5 DEVELOPMENT IMPLEMENTATION CONSIDERATIONS**

There are a number of statutory and policy requirements outlined by the New South Wales National Parks and Wildlife Service and the Department of Land and Water Conservation that require consideration in the development of a management plan for Cobaki Broadwater.

A number of threatened species and their habitats are known to occur, or potentially occur in the Cobaki Broadwater area which should be provided with appropriate protection. The recently gazetted *Threatened Species Conservation Act 1995* provides a framework for the management of threatened species and the activities that affect those species. All management decisions and planning should adhere to the requirements of this Act.

As the surrounding regions of Cobaki Broadwater contain a number of valuable wetland

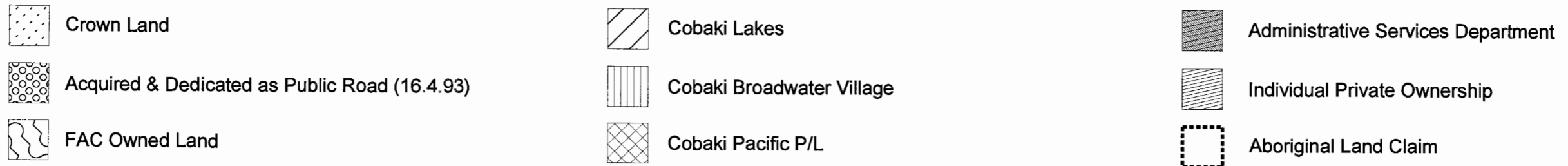
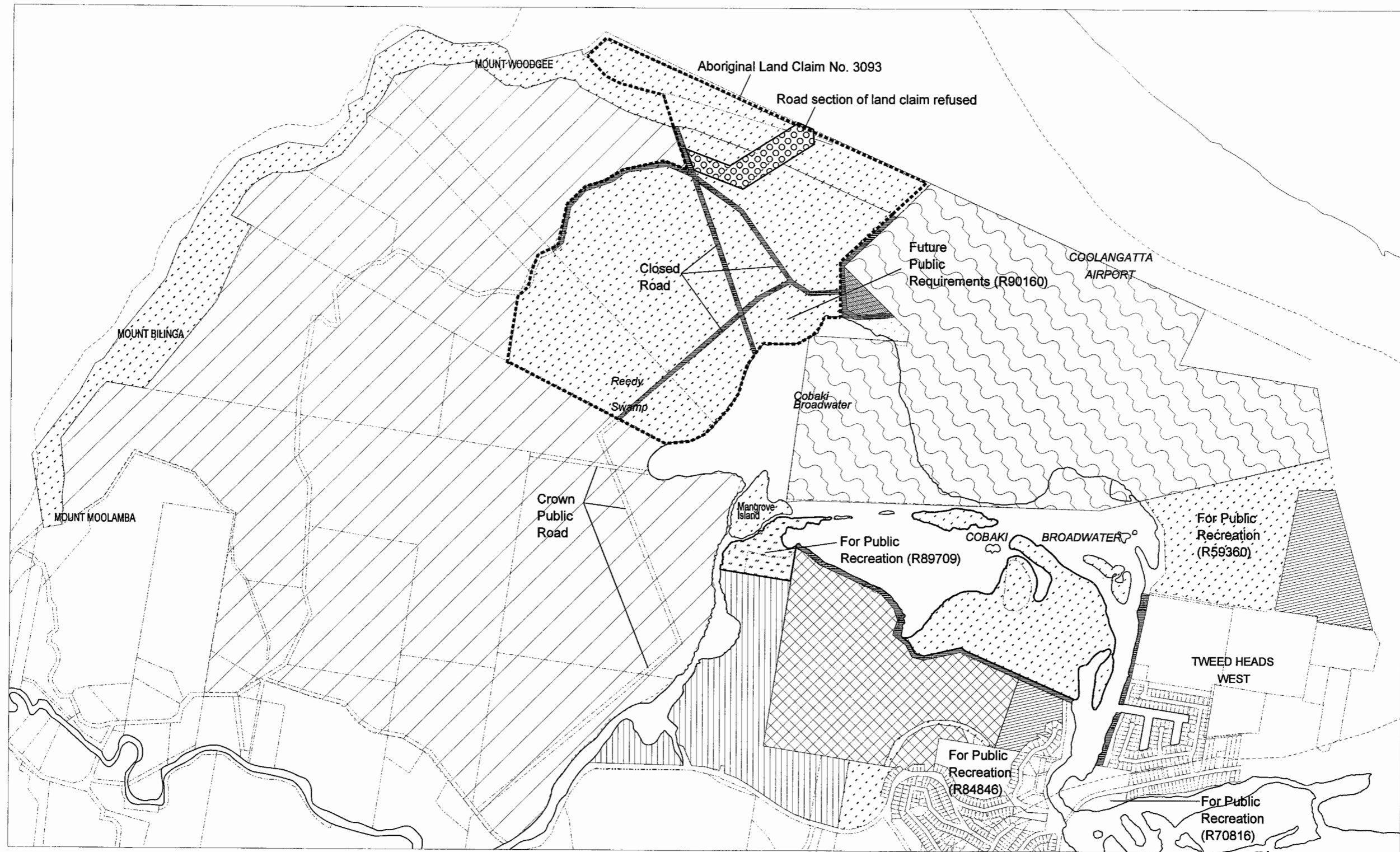
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areas management of the broadwater should also be consistent with the principles of the NSW Wetlands Management Policy.

### **6 SOURCE DATA**

Information of relevance to Cobaki Broadwater has been extracted from the various source documents related to the lower Tweed Estuary and is summarised in the following figures. A current land ownership plan is also included.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION CADASTRAL BOUNDARIES AND LAND OWNERSHIP



# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## ECOLOGY

Water depths within Cobaki Broadwater are extremely shallow ie. on average they are less than one metre at mean low water. Approximately fifty percent of the substrate within the broadwater is subaerially exposed at mean low water. The depth of the remainder of the substrate is below the mean low water mark and may only be exposed at spring low water. This may be considered to be a valuable habitat area for aquatic birds, however no extensive usage of this area has been recorded in recent years. The area that remains submerged at low water is generally unsuitable for short legged wading birds. It therefore remains that the majority of the broadwater is slightly too deep for wading birds although the intertidal component does provide habitat. There are also no good permanent high tide roosts for migratory shorebirds.


Whilst sections of the broadwater may be considered too deep for aquatic birdlife it remains too shallow for fish and prawns, especially at low water. During summer the temperature tolerances of fish and prawns may be exceeded in the shallower areas. There is also less protection from predatory birds. Consequently only juvenile fish and prawns would be found here. Shallow substrates may also not be an optimum environment for benthic invertebrates for the same aforementioned reasons.





Deep holes created by dredging in the broadwater can be favoured by large fish and prawns. Local fishermen report that good catches of school prawns are occasionally caught in these deep holes.


The close proximity of Coolangatta Airport and bird roosting sites to each other has led to at least one major air strike by birdlife that utilise the broadwater habitat zone. It has been reported that the economic cost of a single bird strike can be up to 18million dollars, depending on the type of aircraft involved.


The FAC Master Plan for Coolangatta Airport also indicates extensions to the main runway that will affect an existing roosting site currently utilised by migratory shorerbirds. This may adversely affect the bird population as well as increasing the bird strike risk.


 Bird roosting areas

 Bird feeding areas

 Major bird roosting site

 Minor bird roosting site

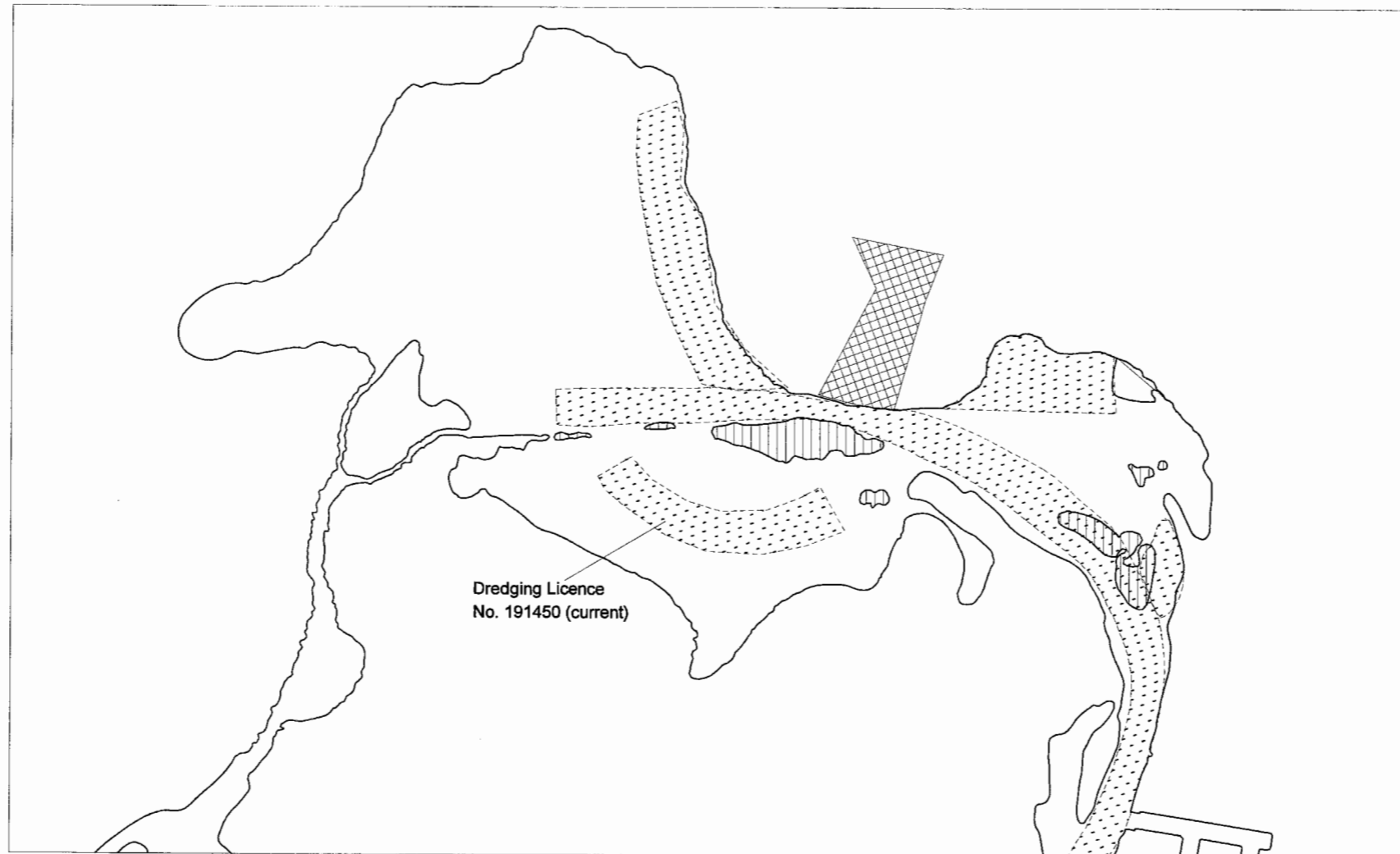
 Bird roosting site

 Dredging operations have reduced significantly the extent of seagrass beds. This has inevitably led to a reduction of habitat available to aquatic fauna.

NOTE: Flora and fauna records from Wildlife Atlas and ROTAP databases available from NSW NPWS.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## DREDGING EFFECTS



Dredging has occurred in the broadwater in four major dredge events since 1884. These events have occurred during the following time periods;

- ~ 1884 - 1897
- ~ 1977 - 1978
- ~ 1984 - 1986
- ~ 1984 - Present

The creation of deep holes through localised dredging within the broadwater has resulted in stratification and led to a decline in water quality indicated by anoxic conditions which are generally unsuitable for most aquatic flora, fauna and benthic communities.

Dredging and associated turbidity plumes have reduced the areas of seagrasses quite significantly.



Historically, Cobaki Broadwater was regularly dredged to provide access for cane tugs, banana boats and cream boats. The main channel through the broadwater was dredged around the 1920s. The removal of fine grained materials from the broadwater during dredging operations has the potential to increase the turbidity of surrounding waters.



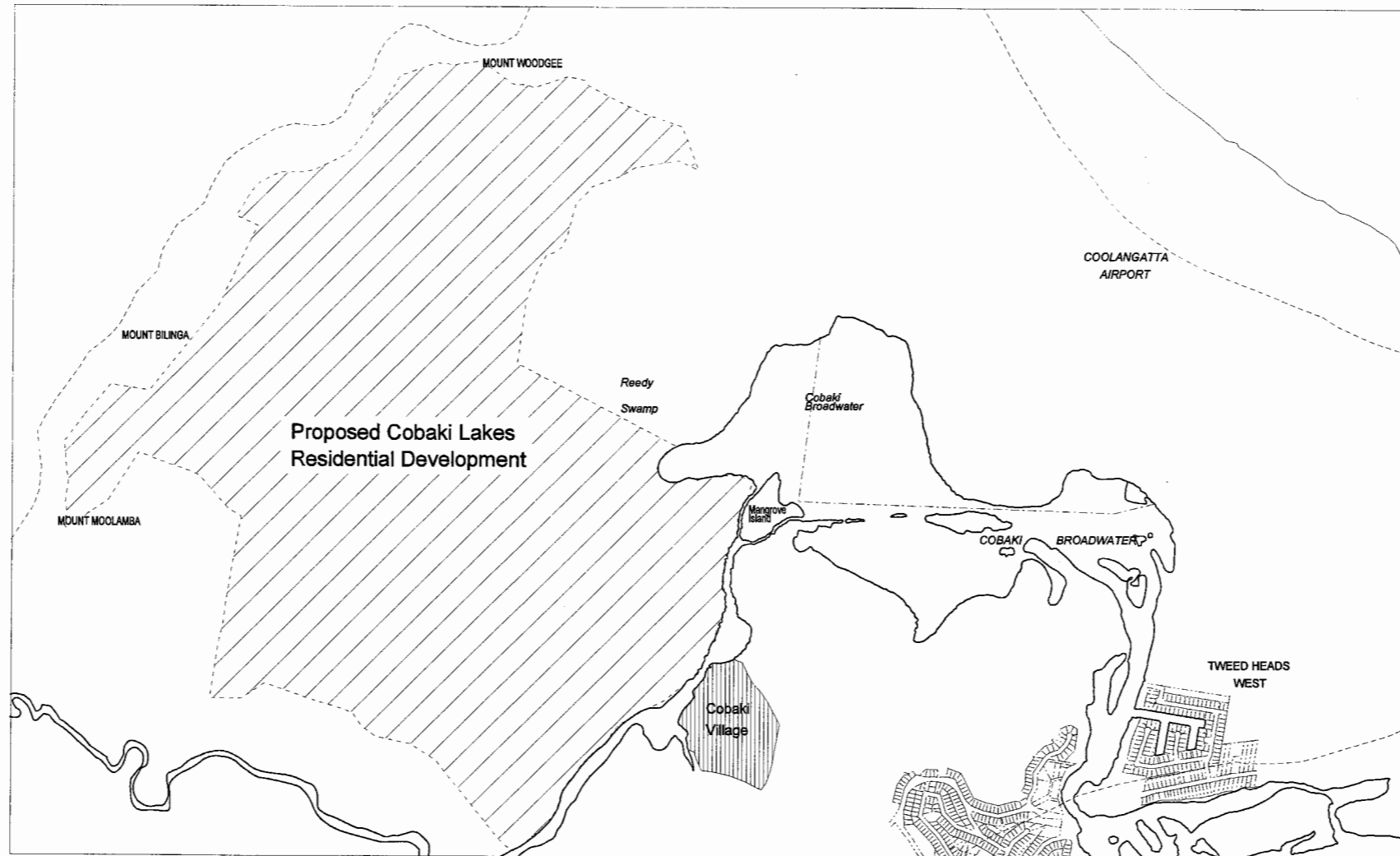
Dredge spoil from operations within Cobaki Broadwater has historically been disposed of within the broadwater itself thus the creation of a number of artificial islands now colonised by mangroves. This kind of disposal has the potential to create secondary turbidity plumes around the selected site.



Current operations utilise an onshore disposal site adjacent to the broadwater and its associated habitats thus creating a disturbed site that results in the reduction of valuable habitat areas available to local flora and fauna.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## SILTATION



Estimates of non point source sediment loading rates have been made for the catchment that feeds the Tweed River. The resulting data shows that proposed urban developments have the potential to generate a sediment load through increased surface runoff in the order of 1000 kg/ha/yr as opposed to 250 kg/ha/yr from relatively undisturbed areas. Commercial/Industrial sites generate approximately 750 kg/ha/yr and rural areas generate up to 40 000 kg/ha/yr. As the only data available in the source documentation it is assumed that these figures apply to the Cobaki Broadwater Catchment.

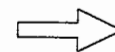
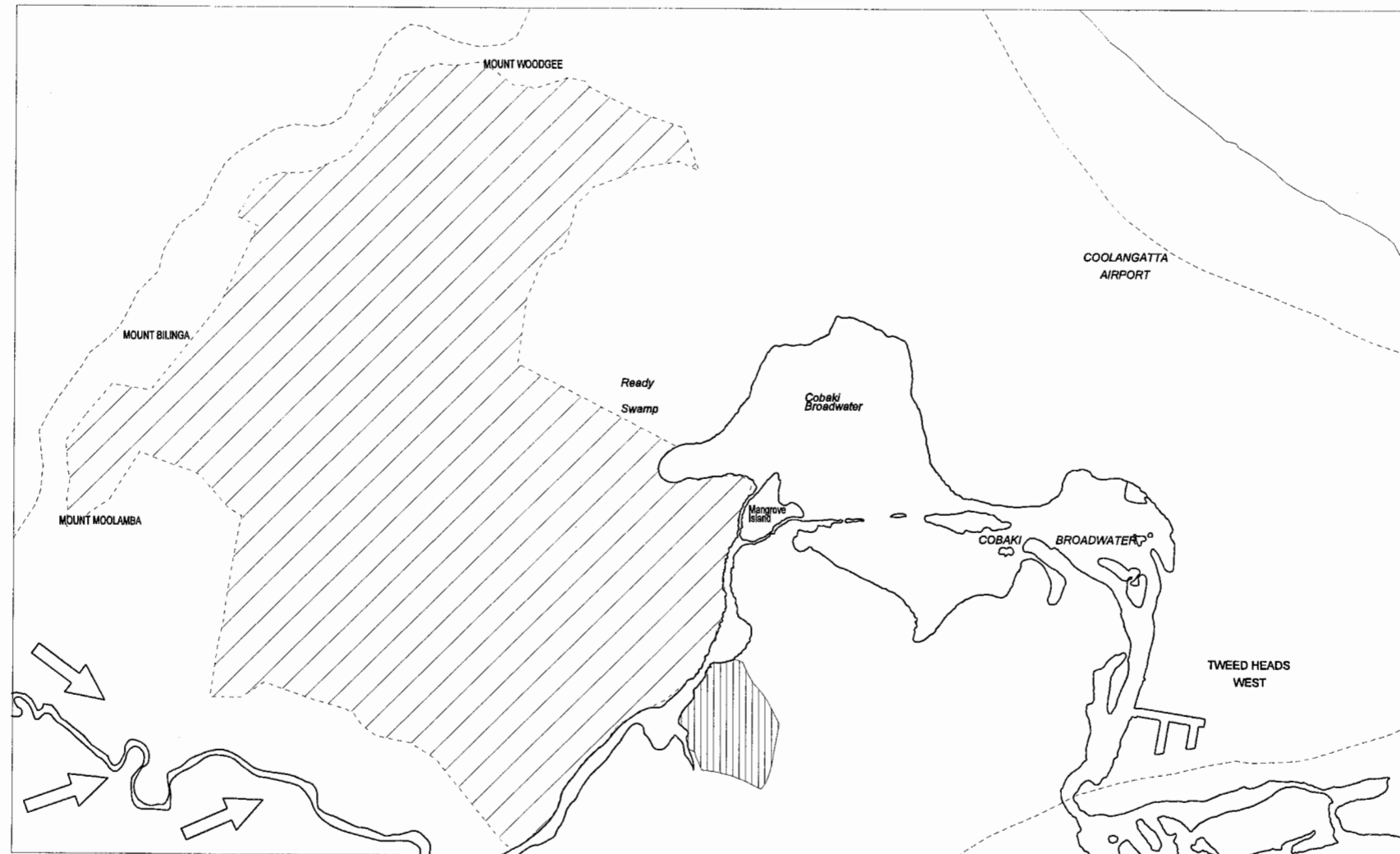
The predominant source of sediment inflow is agricultural runoff and construction areas.

Natural infilling of Cobaki Broadwater has continued since the sea level stabilised 6000 years ago.

Present day sediments in the broadwater are a mixture of largely river sand and mud over the central and upstream areas, and reworked marine sand and mud closer to the entrance.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## CATCHMENT MANAGEMENT



Currently rural and residential developments that deposit sediment into Cobaki Creek are located in the upper sections of the catchment area of Cobaki Broadwater in the vicinity of Cobaki and Piggabeen. It is in these areas that there are significant tracts of agricultural activity and sections of rezoned land that are being excavated and reworked for the purposes of development.

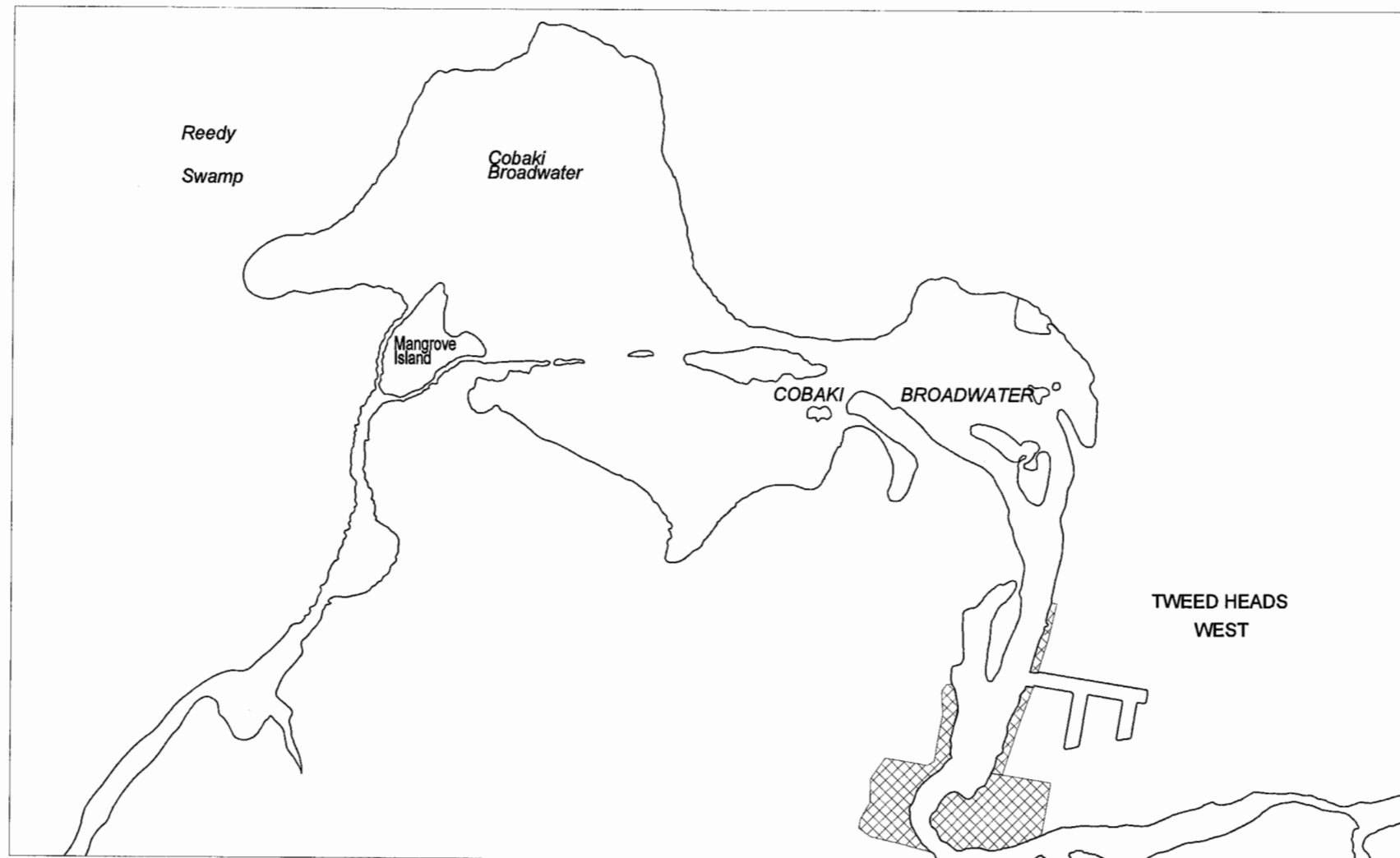


Proposed developments that may have a more direct impact upon the broadwater such as Cobaki Lakes are to be controlled by Development Control Plans (DCP) put in Place by Tweed Shire Council DCP No. 17 that deals with the proposed Cobaki Lakes Development includes a Management Plan for the control of soil erosion during construction. This plan proposes a set of procedures including bunding and detention basins that aim to minimise pollution caused by the discharge of silt laden runoff into Cobaki Creek and Cobaki Broadwater. Revegetation of disturbed areas is to take place immediately upon completion of the proposed earthworks. All works are to be monitored by both the contractor and the Environmental Officer responsible for this development.

The Tweed Valley has extensive deposits of acid sulphate soils. In particular the proposed Cobaki Lakes Development adjacent to Cobaki Broadwater has deposits of these soils that cover 24% of its area. Potential hazards exist to water quality and aquatic fauna from land disturbance causing acid sulphate soil runoff.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## RECREATION



The formal recreational facilities in the vicinity of Cobaki Broadwater are

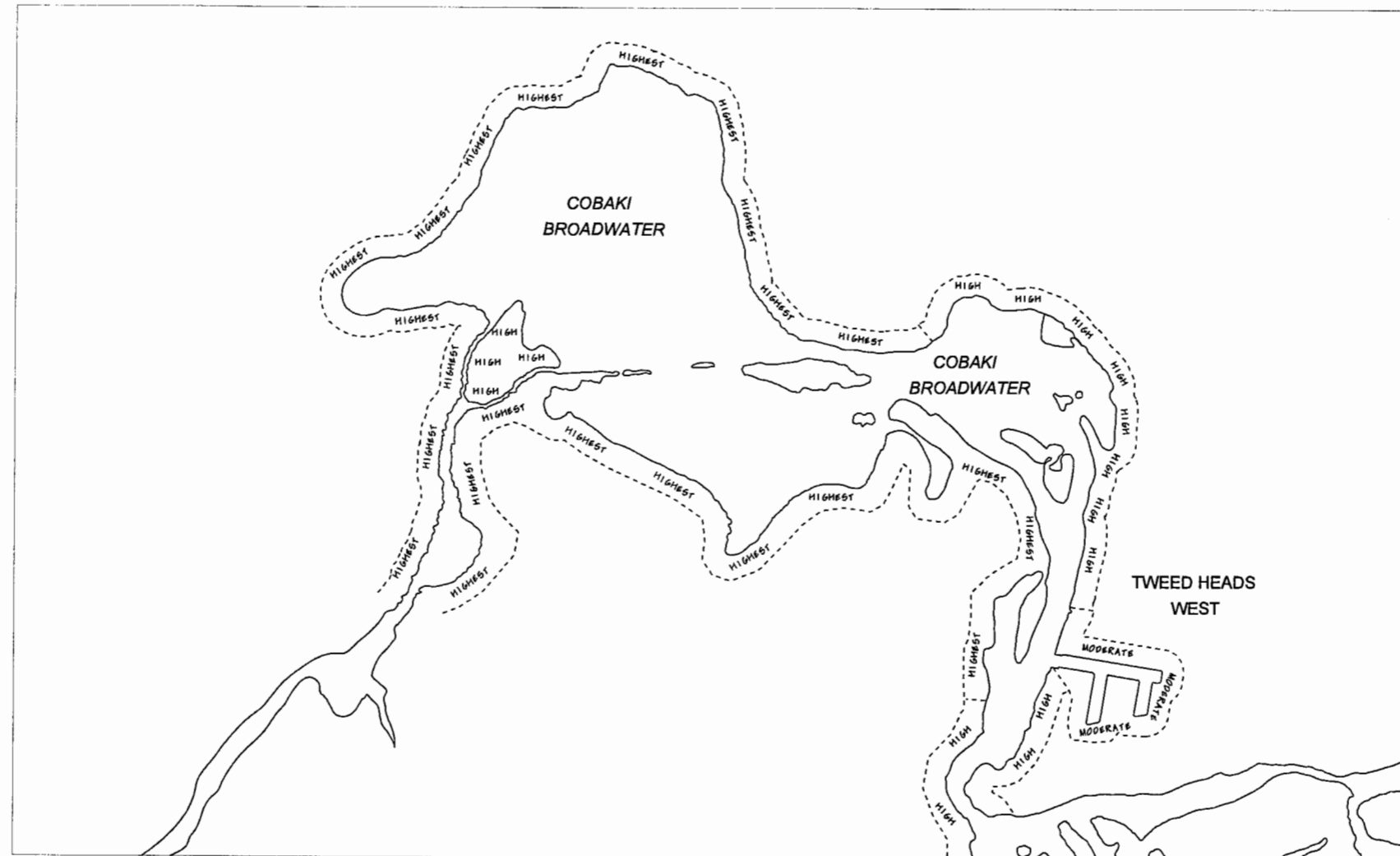
- \*Plover Place/Tringa Street Reserves
- \*Pioneer Park
- \*Boyd Family Park

Cobaki Broadwater is considered a recreational attribute. Shallow depths limit access to high tide only.

Up until the late 1940s the broadwater was regularly used by tourist cruise launches.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## AESTHETICS



MODERATE

The foreshore area around the canal estate development near the entrance to Cobaki Broadwater is only considered to be of moderate visual quality. This visual quality unit is one of fully developed residential properties with dominant built form and varying levels of vegetation ranging from nil to a medium density vegetation zone along the foreshore and encompassing a variable density of waterfront structures.

HIGH

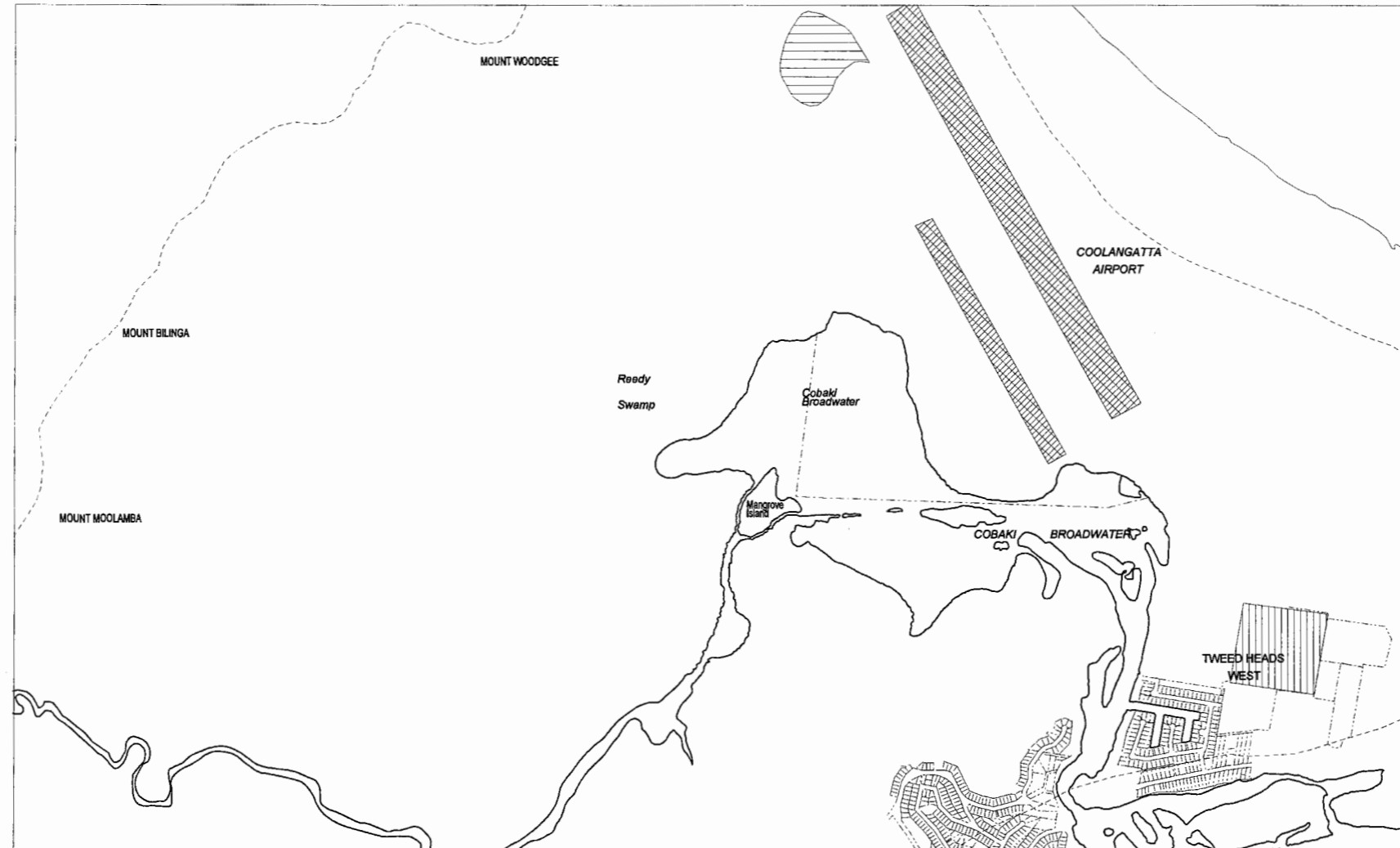
Along the eastern foreshore and upon Mangrove Island located at the mouth of Cobaki Creek, the visual quality is considered high. These areas lie within the visual quality unit of reserves, government lands, zoned "open space" lands and freehold properties in close proximity to these lands and in continuous high quality bushland, landscaped or topographic feature environment on the foreshores and slopes, with unobtrusive or nil commercial/industrial, residential or institutional development on the slopes or hinterland beyond and with nil to minimal waterfront development.

HIGHEST

Most of the foreshore of Cobaki Broadwater is categorised under the highest form of visual quality. This comes from the foreshore being mostly a visual unit of high density bushland, landscaping and or agricultural land ascending continuously to the ridgeline with nil to minimal residential development on the slopes and with nil to minimal waterfront development.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## INDUSTRY



Industrial sites that exist in the vicinity of Cobaki Broadwater include;  
 \*Gold Coast City Council Commercial Refuse Tip (Tugun Landfill)  
 \*Coolangatta Airport - Federal Airports Corporation (FAC)  
 \*Tweed Heads West Sewage Treatment Works



Habitat areas of the broadwater can be directly affected by the presence of Coolangatta airport ie. bird strikes and stormwater runoff that drains directly into the broadwater from a catchment that drains off the western side of the main runway.



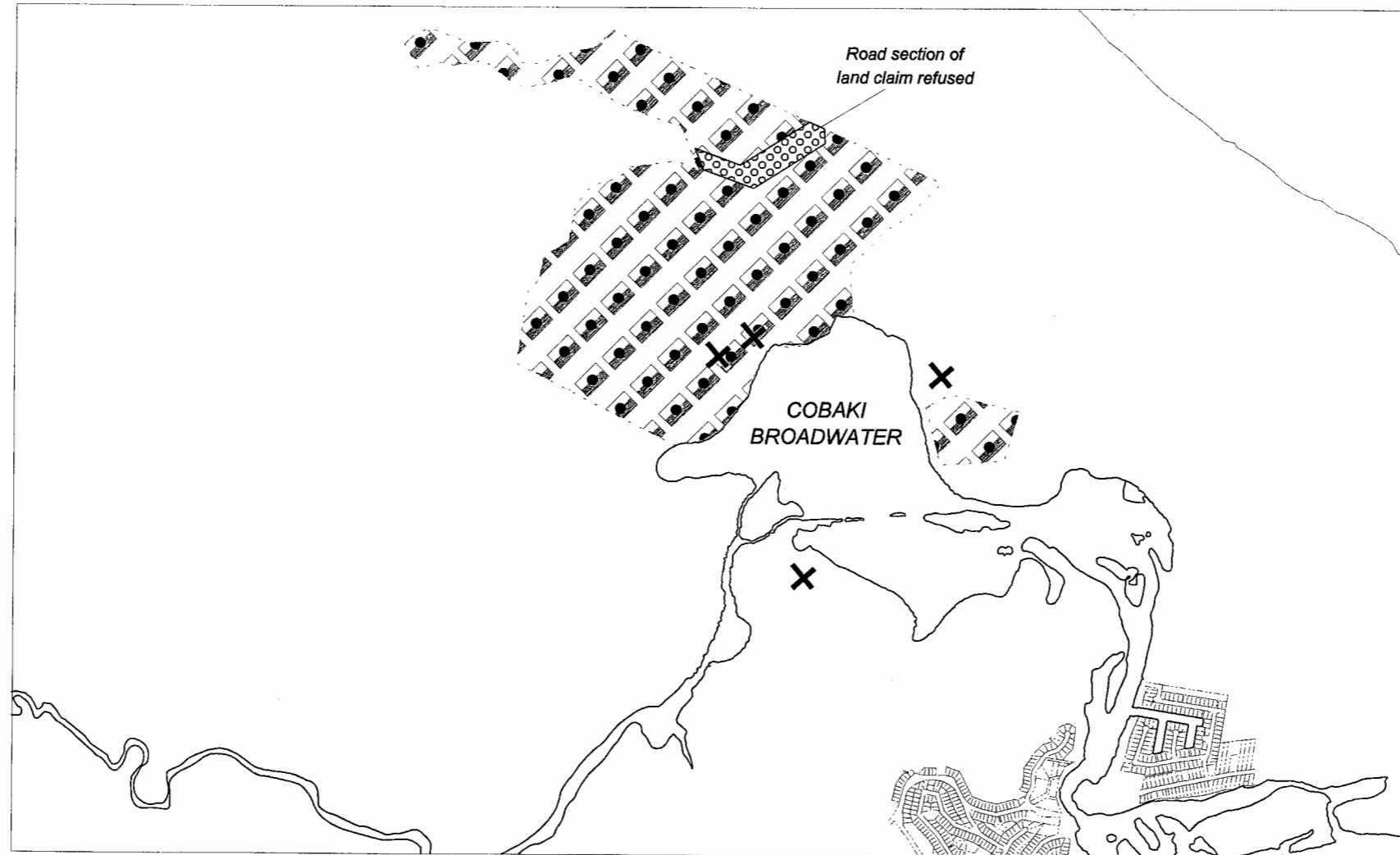
The entry of leachate which is contaminated with heavy metals is occurring from the Gold Coast City Council Commercial Refuse Tip into Cobaki Broadwater, according to a recent survey.



Nutrient pollutants from discharges into Terranora Creek by the Tweed Heads West Sewage Treatment Works have the potential to be carried into the broadwater by tidal action.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## ARCHAEOLOGY



Whilst the archaeological potential of Cobaki Broadwater has been previously rated as high, almost no sites of significant archaeological value have been located to date.

The only site of any significance discovered has been an area adjacent to Coolangatta airport. The study conducted here recorded shell middens and artifact sites in a sand dune complex east and north of Cobaki Broadwater between the wetland lake margins and the dunal system which extended east to the modern shoreline. Some of these sites have been disturbed by recent anthropogenic influence.



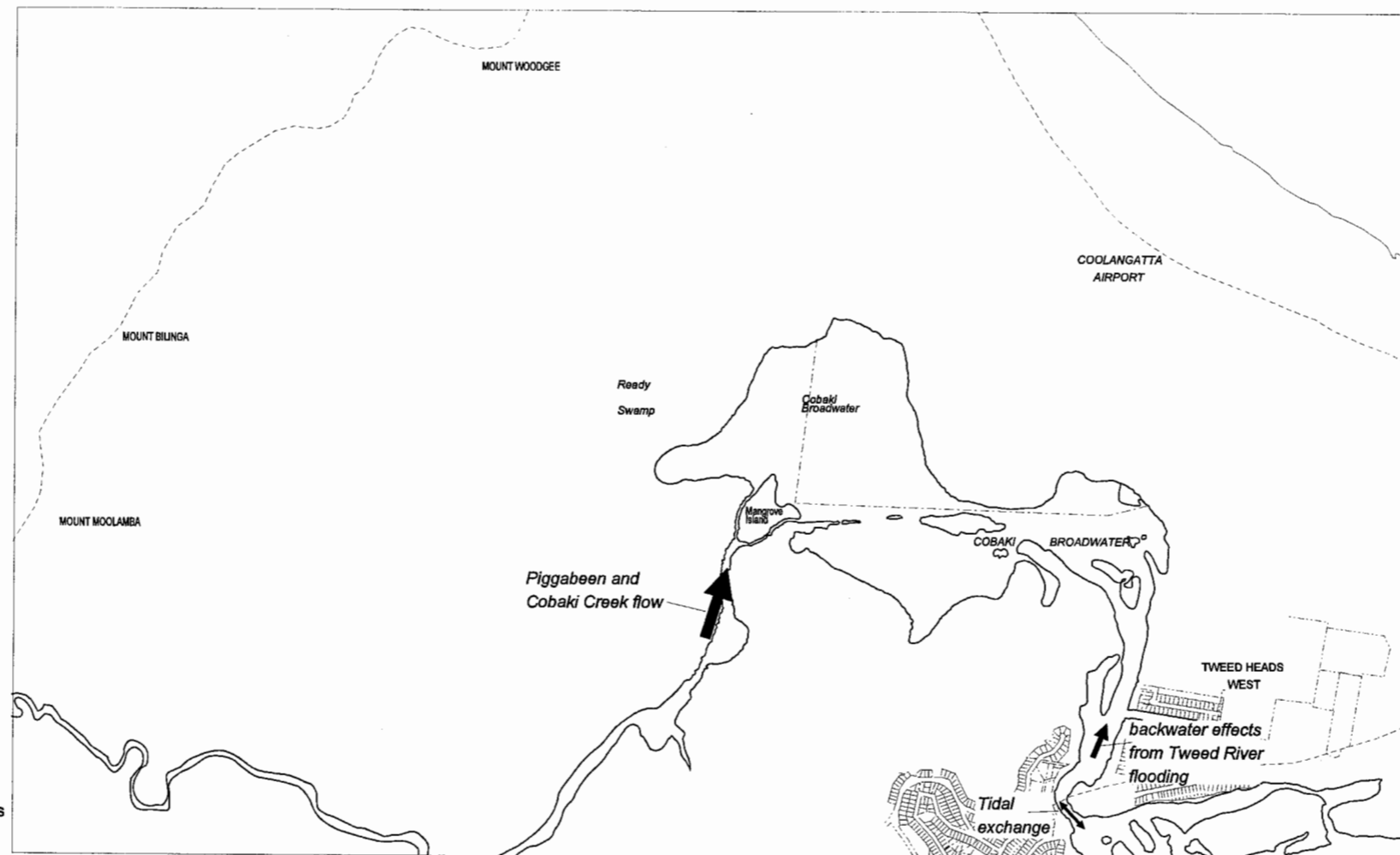
Previous studies have found that the survey area is predominantly vegetated with mangroves and other wetland species, which does not lend itself to a high level of archaeological potential.



Land claims have been submitted by the Tweed Byron Local Aboriginal Land Council for parcels of land to the north and east of the broadwater.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## HYDROLOGY



Water quality in Cobaki Broadwater is generally acceptable, though the clarity of the water suffers due to the resuspension of fine sediments during periods of wind and wave action.

It has been found that within the Lower Tweed estuarine environment tidal action does not provide an adequate flushing mechanism for the broadwater environments (Cobaki and Terranora). This leads to an increase in the tendency for water borne contaminants to accumulate.

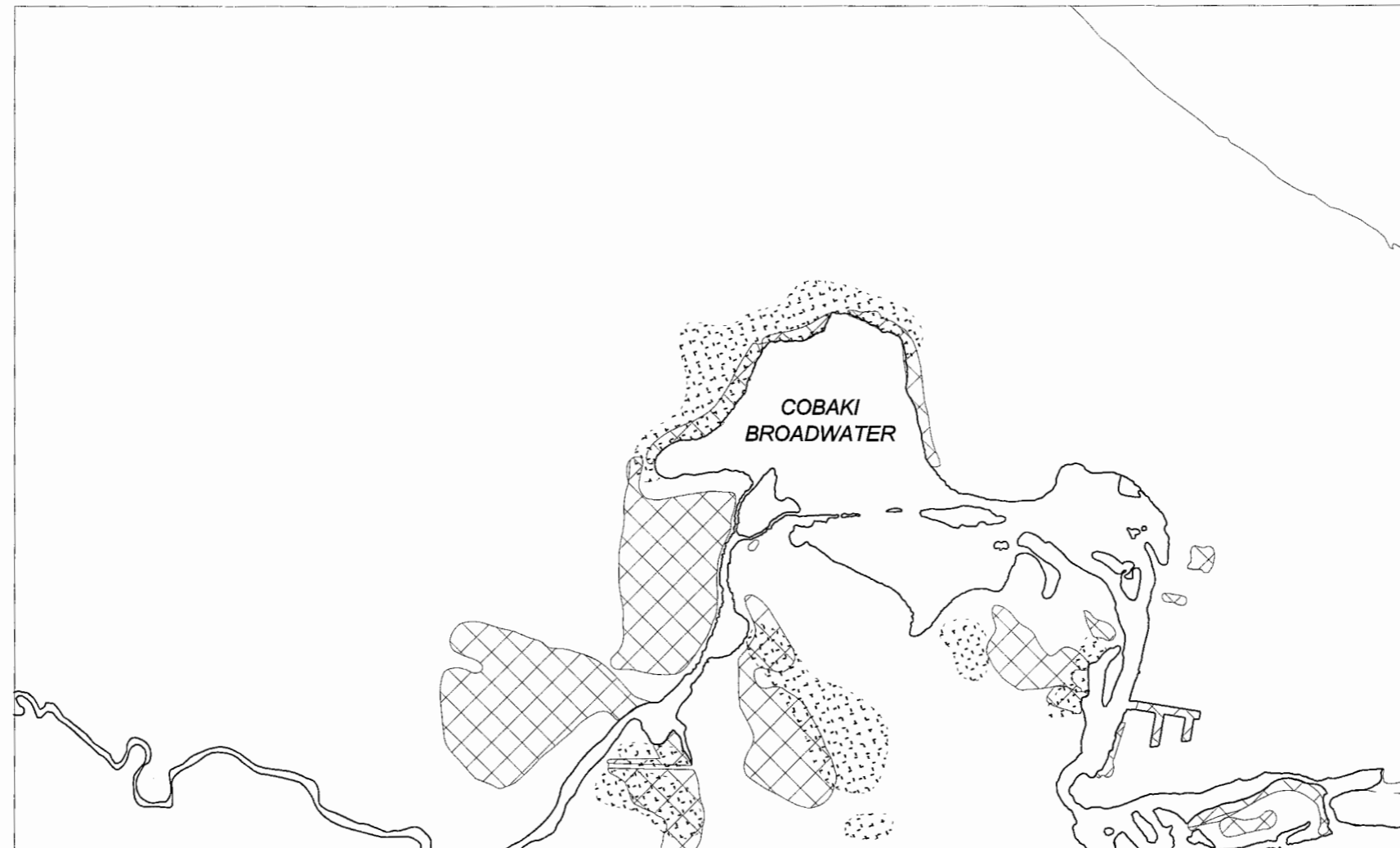
Dredging operations may adversely affect the water quality within the broadwater through the creation of turbidity plumes during dredging and the subsequent stratification which occurs within dredge holes.

Principal sources of sediment and nutrient pollutants are from rural runoff, construction areas, stormwater runoff and sewage discharges.

A basic hydrographic survey is not available for Cobaki Broadwater at this point in time.

# COBAKI BROADWATER MANAGEMENT PLAN SOURCE INFORMATION

## BITING MIDGE AND MOSQUITOES



*Culicoides molestus* is the most predominant of the biting midge species found in the vicinity of Cobaki Broadwater. It colonises beaches in canal developments and can also be found breeding on most sandy river foreshores and suitable river sandbars. It is most commonly found breeding in clean flocculated sand, in the open or under light mangrove cover between the mean tide level and mean high water springs.

Adults of the species may travel up to one kilometre from their breeding area. Urban developments that exist in higher elevations near the breeding ground may be more adversely affected than those that lie in lower elevations immediately adjacent to it.

Midge control in the lower Tweed area has been based upon organophosphate larvicide which does not target adults. Other methods such as fill profile techniques are now being considered.



Mosquitoes that are most commonly found in the vicinity of the broadwater are saltmarsh mosquitoes, *Aedes vigilax*. They breed in brackish pools created after the highest spring tides or heavy rain. These occur mostly within saltmarsh and mangrove areas but may also be present as a result of poor agriculture or development practices.

Control of saltmarsh mosquitoes includes a technique known as "runneling" in which low impact shallow drains are dug through saltmarshes to allow tidal flushing and access by aquatic predators to the breeding pools. Another technique that may be adopted includes a biological larvicide known as *Bacillus thuringiensis*.