PART 5 ISSUES AND RECOMMENDATIONS FOR FUTURE MANAGEMENT

5.1 Key issues identified through stakeholder and community consultation

The following issues were identified through stakeholder and community consultations during the study;

Working Group Creek Walk	Bank erosion on the southern bank was of concern, particularly in the reaches immediately below the town bridge.
	The number of access tracks along the southern side of the creek were noted.
	The effects of flood mitigation and flood management on the health of the creek was raised.
	Degradation to Saltmarsh communites and poor recruitment and regeneration in paperbank stands were noted.
	Stormwater issues were discussed at the caravan park particularly with reference to people washing cars and caravans.
	Weeds on the northern bank foreshore were discussed. Issues with dumping of garden waste in the foreshore area were noted.
Community Survey	Respondents placed a high level of importance on the estuary being a safe swimming location, being a healthy ecosystem, and having a permanently open estuary mouth.
	Respondents were generally happy with pedestrian and boating access to the estuary but were unsatisfied with disabled access (particularly beach access) and vehicle access to the creek bank (particularly the southern creek bank).
	Respondents generally believed that estuary water quality was good to very good, fish populations were moderate to good, foreshore vegetation was moderate to good, and bank stability was poor to very poor.
	The three issues attracting the highest level of very concerned responses were litter/rubbish, bank erosion, and uncontrolled vehicle access to the southern creek bank. When the level of very concerned responses was considered in addition to concerned responses the highest rating issues became litter/rubbish, habitat protection, and bank erosion. The three issues of least concern were bait collection in the creek, indigenous cultural heritage, and poor water quality after flooding.

It is considered that the majority of the community issues identified above have been addressed in this study. However, data was not able to be collected for all issues. The following section identifies key issues including data gaps and makes recommendations for future estuary management planning.

5.2 Key issues and recommendation for future management

The following issues and recommendations for future management have been identified as a result of this study;

Community identified issues

Stormwater volumes, quality, and associated impacts were not able to be assessed in this study (see *Catchment Processes* below for recommendations)

The levels of litter and rubbish and strategies for reducing litter and rubbish were not identified. It is recommended that the Estuary Management Plan review this issue.

The specific effects of flood mitigation and flood management on the health of the creek could not be addressed due to a lack of specific data and the absence of large flow events during the study. It is recommended that this issue be reviewed during the Estuary Management Planning phase.

Climate Data

With the exception of an analysis of the likely effects of climate change on Korogoro Creek estuary no further investigation is required.

Catchment Processes

Information on stormwater impacts is inadequate. In particular;

- There is no data available on stormwater discharge volumes or quality
- The current water quality testing regime is unlikely to identify specific stormwater quality issues

Water quality testing of stormwater discharge during high rainfall events and peak holiday periods is recommended.

A specific stormwater study under KSC Urban Stormwater Management Plan is recommended.

The nutrient levels that have been measured in the waters of Korogoro Creek would suggest a greater nutrient load than has been calculated here. This may be partly explained by the following factors:

- The equations used to calculate attenuation rates and time of travel for the CMSS model may not accurately represent the Korogoro Creek catchment.
- No suitable information exists for the contribution of benthic sediments to nutrient levels in Korogoro Creek. It is likely that some elevated levels of nutrients exist in the sediments of Korogoro Creek as a result of septic treatment of sewage in Hat Head village but this requires further investigation.

Bank Erosion

Mapping of bank erosion has been completed. It is recommended that priorities and appropriate strategies for rehabilitation of unstable creek banks be determined in the Estuary Management Plan.

Sedimentation

Despite evidence supporting changes in sedimentation patterns and channel infilling the changes in sedimentation are not able to be quantitatively determined. In terms of overall sedimentation, the processes responsible are large scale and little can be done to reduce the ingress of marine sediments into the channel. No further investigation of system wide sedimentation is recommended.

In terms of shoaling at entrance and in the vicinity of the boat ramp, it is recommended that options for management of sedimentation in the

vicinity of the boat ramp be investigated for the Estuary Management Plan.

Estuary Hydrodynamics

Although some scenarios used were idealised it is considered that the information on estuary flushing is of adequate quality for a system of this size and complexity to proceed with the Estuary Management Planning phase.

More accurate information on freshwater flows would assist in refining the water balance estimates.

The information on stratification and mixing is considered adequate for a system of this size and complexity.

Entrance Behaviour

The science of climate change is evolving rapidly. It is clear that there is significant potential for extensive impacts on estuarine systems such as Korogoro Creek and its catchment. Despite the obvious implications on estuary management planning, the quantification of the effects of climate change and sea level rise are considered to be outside the scope of the Estuary Management Planning Process. It is recommended that the KSC work with the NSW Government to determine likely scenarios for climate change associated impacts and adopt a proactive approach to identifying risks to both coastal ecosystems and the towns and villages they support.

Water Quality

The assembled water quality data is quite comprehensive. The few knowledge gaps remaining are:

- Intensive sampling of water quality during drainage of the Swanpool. This would greatly assist in determining the effect of flood management on Korogoro Creek by quantifying the extent of reduced pH and Dissolved Oxygen and the effects of turbulence resuspending sediment. This would also assist in determining the nutrient load from the Swanpool area.
- Analysis of water quality upstream of the floodgates would give a better idea of the effects of seepage when the floodgates remain closed.
- There is no data indicating the effects of sediment processes on Dissolved Oxygen and Nutrients. This would assist in determining the cause of elevated nutrient levels and low dissolved oxygen.
- Detailed investigation of the causes and effects of elevated chlorophyll-a levels.
- Detailed modelling of the likely effects of entrance closure on the ecosystem.

Local ecotoxicity data, indicating the response of local biota to elevated contaminant levels, would assist in determining the significance of exceedances of ANZECC (2000) water quality guidelines.

At present, monitoring of chemical and physical surface water quality variables in Korogoro Creek is limited to one sampling event every six months with only one site analysed. This may not be sufficient to detect trends in water quality over time.

Estuary Ecology

The distributions of major weeds along the estuary have been mapped. In addition, it has been identified that several native riparian vegetation communities are degraded including areas of Coastal Saltmarsh (impacted by bank erosion and access impacts) and Paperbark

communities (which are showing poor recruitment and regeneration). It is recommended that priorities and appropriate strategies for weed control and riparian regeneration be determined in the Estuary Management Plan.

Field surveys and database searches have recorded the range of flora and fauna likely to occur in the catchment and along the estuary. It is recommended that future surveys be directed at determining actual occurrences of threatened/endangered species along the creek and issues for their management where they occur.

It is recommended that issues related to the collection of tropical fish and with bait collection in the creek be addressed in the Estuary Management Plan in consultation with NSW DPI Fisheries.

Estuary Health

The health of the Korogoro Creek estuary is considered to be good when measured against available biotic factors, acceptable with regard to habitat extent and distribution, acceptable with regard to water quality indicators, and good with regard to ecosystem integrity.

Additional data that would assist with assessing the health of Korogoro Creek includes:

- Some measures of sediment quality, focussing on denitrification efficiency and contaminant levels.
- A study of the temporal and spatial variability of benthic invertebrates.
- A detailed study of temporal variation in seagrass, Saltmarsh and mangrove habitats.
- Investigation of the circumstances surrounding reported fish kills in conjunction with NSW DPI Fisheries.

Estuary Access

Uncontrolled vehicle access to the southern bank of the estuary below the town bridge is impacting bank condition, bank stability, and Coastal Saltmarsh Endangered Ecological Communities. Although not investigated, vehicle access to the western bank above the town bridge in Hat Head NP is likely to be having a similar affect on Saltmarsh communities.

It is recommended that mechanisms for reducing these impacts be investigated in consultation with the Hat Head community, KSC, DECC, and NSW NPWS as a part of the Estuary Management Plan.

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