APPENDIX A: INTERIM ENTRANCE MANAGEMENT PROTOCOLS

REVISION/CHECKING HISTORY

REVISION NUMBER	REVISION DESCRIPTION	DATE	CHECKED BY		ISSUED BY	
0	Interim	April 2006				

OBJECTIVES

Structural works to the entrance of Killick Creek in the 1950s have resulted in a mostly permanent connection between the estuary and the ocean. During extended dry weather conditions, however, the entrance can tend toward closure. Since 2002, the entrance of Killick Creek has closed on a number of occasions necessitating Council to reopen the entrance using earthmoving equipment (see Figure A1).

Figure A1 Artificial Entrance Opening of Killick Creek: April 2004

In addition to reopening a closed entrance, Council has, from time to time, carried out dredging within the entrance channel to reposition the alignment of the channel close to the southern rock wall. Council has justified this "meander correction" by a perceived threat to the coastal foredunes on the northern side of the entrance (within Hat Head National Park).

These Interim Entrance Management Protocols are designed to provide clear direction to Council with respect to any physical works within the entrance of the Killick Creek estuary. The objectives of undertaking any entrance works are to:

- Maintain high water quality within the estuary;
- Maintain high recreational opportunities within the estuary;
- Allow for opportunistic usage of the boatramp within the entrance channel; and
- Ensure conservation of ecosystem values, within the natural variability expected of the estuary.

WORKS REQUIRED

No permanent infrastructure is required to meet these protocols, however, they do require the rapid mobilisation of earthmoving equipment suitable for deployment within the estuary entrance channel, such as an excavator with swamp tracks.

Also, a local Council officer should be provided with a hand-held water quality probe, to be used to monitor water quality within the estuary when the entrance is closed.

WATER QUALITY CRITERIA

Water quality conditions are to be used as a trigger for implementation of entrance management actions. The conditions relate to waters behind the entrance berm when the estuary is closed, and represent the threshold for acceptable water quality for primary recreation activities within the waterway.

Interim water quality criteria are presented in Table A-1. The criteria have been based loosely on ANZECC (2000) guidelines and have been established to protect the estuarine environment and recreational values of the waterway.

Table A-1 Interim Water Quality Thresholds for Killick Entrance Works

Water quality constituent	Threshold
Dissolved oxygen	4 mg/L (minimum)
pH	6.0 (minimum)
Temperature	35°C (maximum)
Secchi depth (bathing period)	1.0 metres
Secchi depth (non-bathing period)	0.5 metres
Faecal coliforms	600 counts/100mL (maximum) (1)
Enterococci	60 counts/100mL (maximum) (2)
Odour	Significant malodour generation (3)

(1) Alternative threshold is four (4) consecutive records greater than 150 counts/100mL

(2) Alternative threshold is four (4) consecutive records greater than 35 counts/100mL

(3) Although subjective, this threshold would be based, to some degree, on the impact any odour generation has on the patrons of the adjacent Caravan Park and other users of the estuary and its foreshores.

Refer to ***Operational Procedures*** *for monitoring frequency.*

A hand held water quality multi-probe is to be used to determine results for dissolved oxygen, pH and temperature, while secchi depth is to be determined using a secchi disc attached to the end of an incremented pole. Water samples are to be collected and provided to Council's microbiological laboratory for analysis in respect to faecal coliforms and enterococci. Sampling procedures shall be

followed in accordance with laboratory requirements, with samples delivered to the lab not less than 24 hours after sampling. Samples are to be chilled during storage and transportation to the laboratory.

Water quality conditions are to be determined by averaging results from sampling at a minimum of three sites within the lower estuary, behind the entrance berm, no less than 50 metres apart. With respect to bacteria, a combined sample using waters taken from a minimum of three sites within the creek should be provided to the laboratory for analysis.

Modifications to these criteria may be made in the future following further consideration of environmental impacts and associated implications for recreational used of the estuary, as well as management of upstream agricultural lands.

OPERATIONAL PROCEDURES

Operational procedures for management of the Killick Creek entrance are based on the condition of the entrance (that is, whether it is closed, imminently closed, or open), and water quality conditions within the creek once the entrance is closed. The procedures are summarised in Figure A-2.

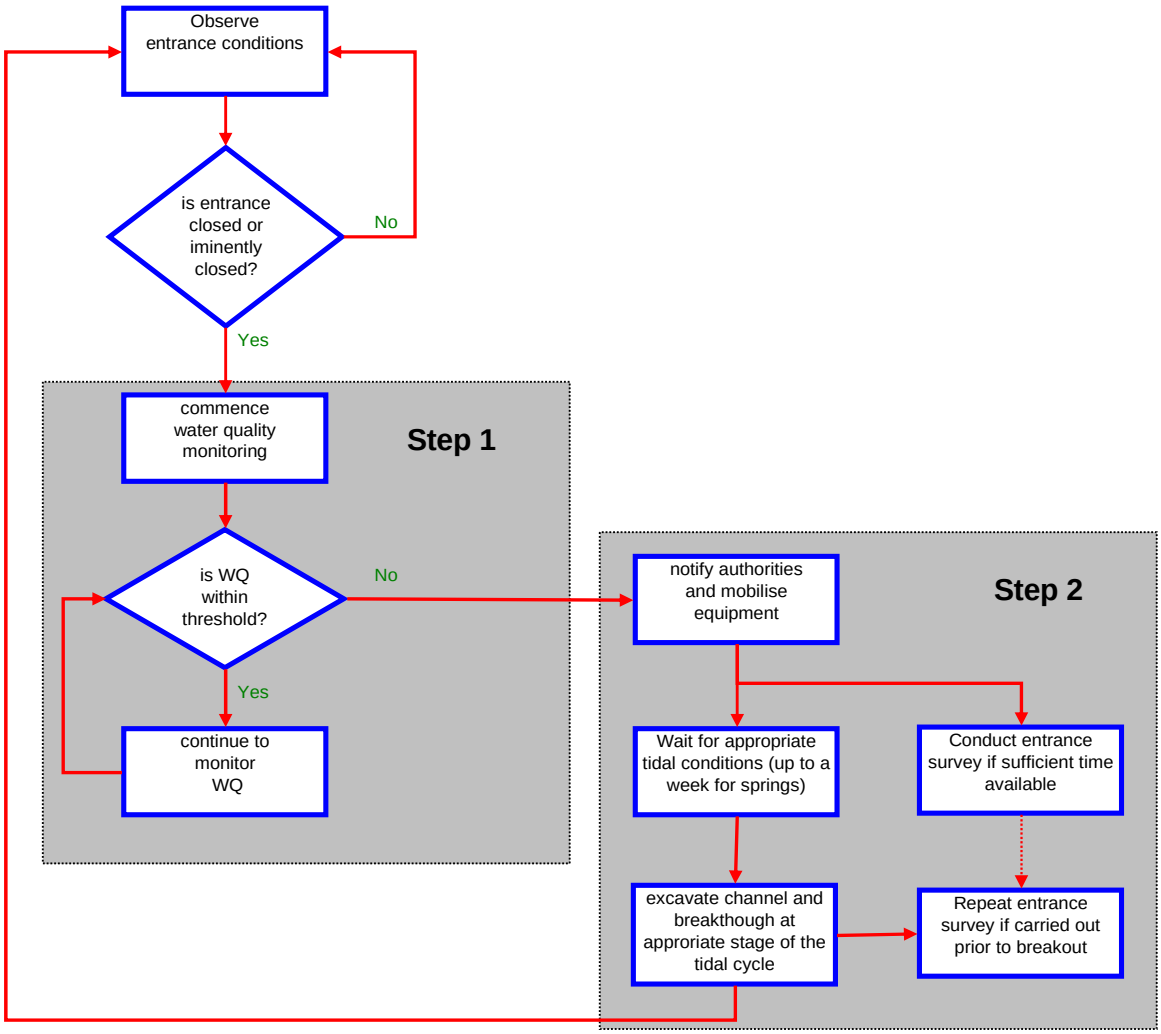

Figure A-2 Procedural Steps for Killick Creek Entrance Management

If it is reported that the entrance of Killick Creek has become closed, or is considered to close within the next few days, then the following steps will be carried out:

Step 1. Council officers will be directed to carry out periodic water quality monitoring of the estuary. Water quality monitoring shall be carried out daily in respect to the physico-chemical parameters (using a hand-held water quality probe and secchi disc), and weekly in respect to bacteria (faecal coliforms and enterococci). Monitoring of all parameters will be carried out immediately after rainfall events (rain exceeding 5mm in 24 hours). Council officers will immediately notify Council of the results for physico-chemical parameters, and will provide chilled water samples for bacterial analysis to Council's lab within 24 hours of sampling.

The frequency of monitoring may be modified by Council based on the water quality results.

Council will compare the water quality results with the specified criteria (refer Table A-1), taking into consideration the different criteria depending on the timing of closure (i.e. within bathing season or not).

If the water quality criteria are met, then water quality monitoring will continue until the entrance opens naturally, or the water quality degrades to below the criteria.

If the water quality criteria are not met, then proceed to Step 2.

Step 2. Council officers will contact appropriate representatives of the Department Natural Resources (DNR), Department of Primary Industries (DPI – Fisheries) and the Department of Lands (DoL) to notify them of the closed entrance, the degraded water quality, and the need for artificial intervention.

Council officers will arrange for appropriate earth moving equipment to be mobilised to Crescent Head for excavation of the entrance channel. Mobilisation of equipment should be timed to coincide with the most appropriate tidal conditions for entrance breakout.

Optimum tidal conditions for entrance breakout would be spring tides with a strong diurnal variation in consecutive highs and lows. While waiting for appropriate tidal conditions, Council should conduct a ground survey of entrance conditions. Survey should cover the entire entrance berm area extending from the beach swash zone at low tide to the estuarine channel upstream of the berm, as well as from adjacent foredunes on the northern side of the entrance to the rock wall and rocky headland on the southern side (refer Figure A-3). Survey transects should be carried out at approximately 10 – 20 metre intervals.

A channel shall be excavated between the ocean and the creek through the entrance berm. The channel should generally be positioned close to the rock wall to maximise opportunity for concurrently redressing any issues associated with access difficulties between the boatramp and the ocean (refer Figure A-4). The channel shall grade towards the ocean and will have a width of approximately 5 metres. The invert of the channel shall be at a level of approximately -0.5m AHD. Break-though of estuary waters to the ocean should be timed to occur shortly after the ocean tide turns from high to low for the lowest tide predicted for that day. This will maximise the duration for water level difference between the creek and the ocean, thus maximising the

potential for natural scour of the channel before the next high tide (however, it is envisaged that the entrance is unlikely to be opened with significant hydrostatic head, thus limiting the potential for a self scouring channel).

Appropriate actions should be carried out to ensure public health and safety during the breakout operations.

Following entrance breakout, ground surveys of entrance conditions should be carried out, particularly if pre-breakout surveys were undertaken. Surveys should be carried out immediately after breakout (i.e. within 1 day), and then repeated approximately 1 week later to determine the rate of initial marine infill within the new entrance channel. Subsequent surveys of the entrance, several weeks and months later could also be undertaken to help determine and quantify entrance dynamics and berm recovery processes.

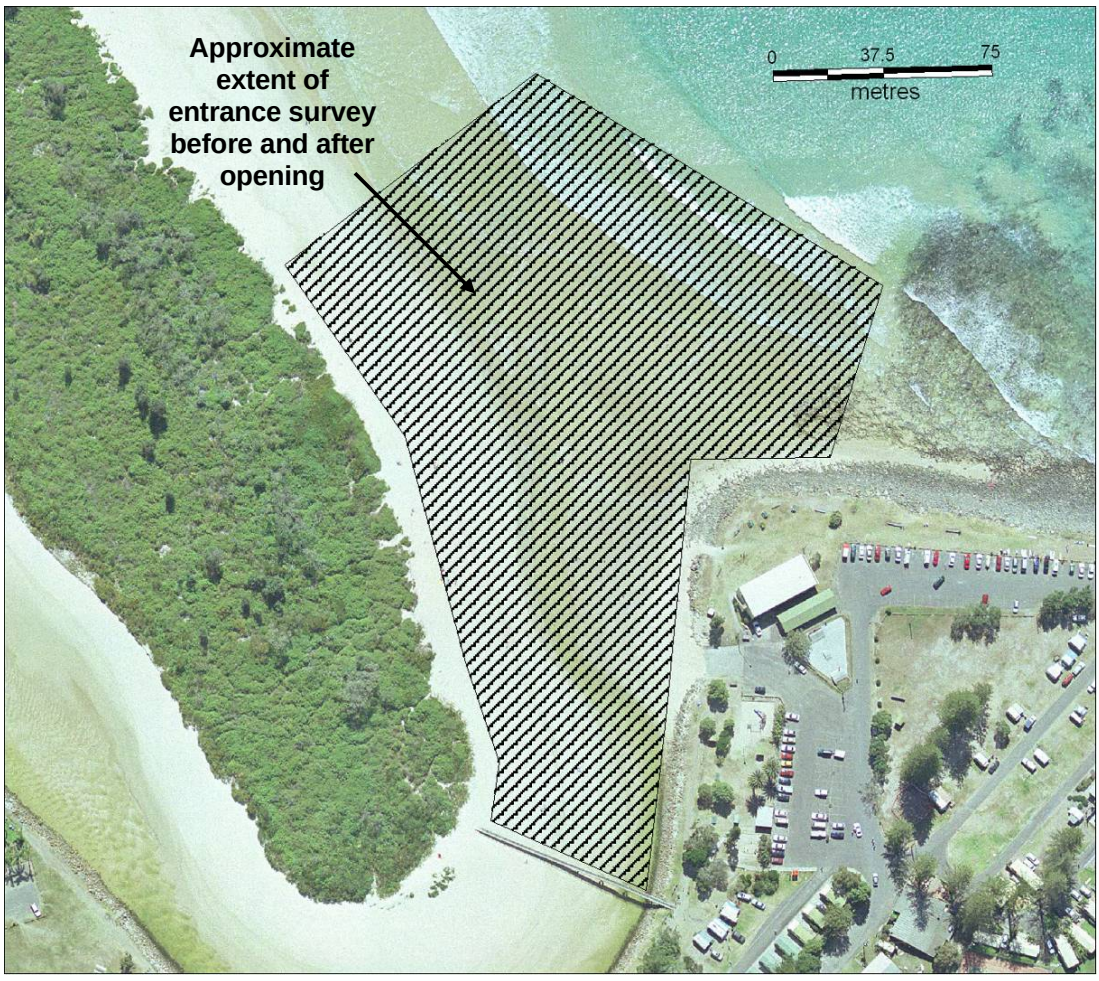

Figure A-3 Approximate extents of entrance surveys

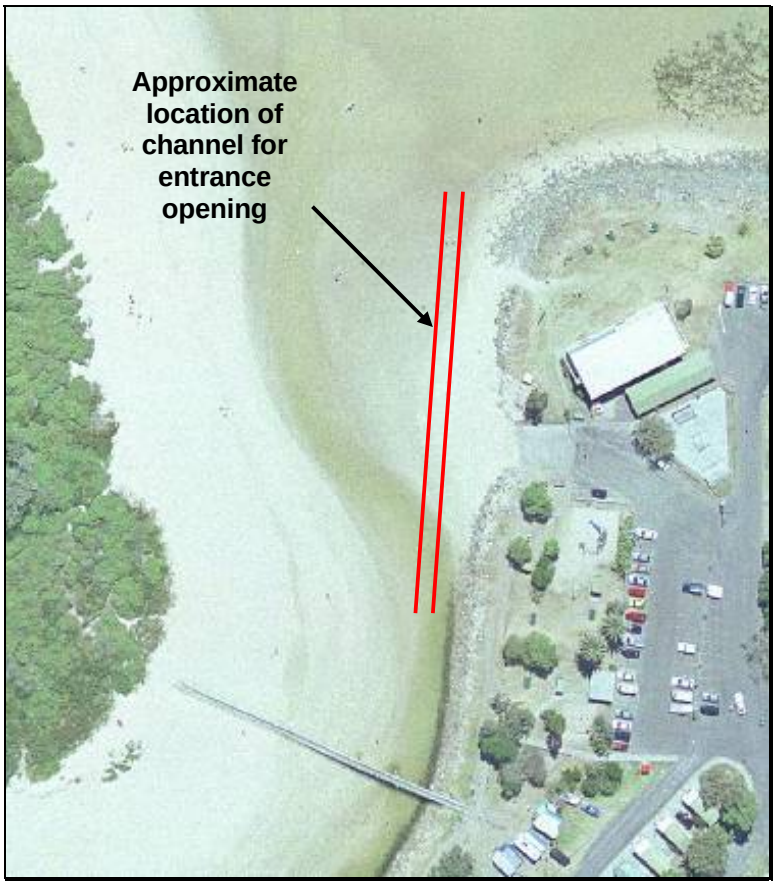

Figure A-3 Approximate position of pilot channel for inducing artificial breakout

MEANDER CORRECTION WORKS

"Meander correction" dredging of the entrance has historically been undertaken by Council in an attempt to realign the entrance channel following modification by flood tide shoal development adjacent to the end of the southern rock wall (refer air photo on Page A-1). Potential erosion and undermining of the coastal foredune justified the works.

Continuation of the "meander correction" dredging has not been recommended in the Estuary Management Study and Plan (refer Strategy EM-1, Section 6.3.1.3) until further investigations determine the actual threat to the coastal dune system. Consequently, no works associated with "meander correction" are included in these interim Entrance Management Protocols at this stage. Issues relating to beach access (particularly via the footbridge) in the event of realised dune erosion, will need to be managed on a case-by-case basis during the 'experimental' period (when meander correction is prohibited), which may then need to be considered when determining recommendations for long term management.

Following further investigations, if DEC (NPWS) indicates that sensitive or endangered habitat is at risk due to the erosion (as the dunes at risk on the northern side of the entrance are contained within Hat Head National Park), or if the erosion results in unfavourable tidal and wave penetration

conditions within the estuary, or if there are significant access restrictions to the beach from the footbridge, then these protocols shall be amended to include additional "meander correction" entrance works.

DREDGING OF ENTRANCE SHOALS

Dredging of shoals within Killick Creek is recommended by the Estuary Management Plan (refer Strategy H). Dredging is required to maintain tidal flushing of the estuary, maintain a marinised estuarine environment, and to maintain efficient discharge of flood waters from the estuary during drainage of inundated floodplains within the Lower Macleay (Belmore Swamp) and Upper Maria catchments.

This Entrance Management Policy does not address broadscale dredging of entrance shoals. Such works would be carried out under the provisions of the Estuary Management Plan.

INTEGRATION WITH KILLICK CREEK FLOODGATE MANAGEMENT POLICY

Interim protocols for the Killick Creek Floodgate Management Policy are provided in Appendix B of the Estuary Management Plan. These protocols allow for the unimpeded flow of floodwaters to Killick Creek during flood events, as well as intermittent releases of water from the upstream agricultural drainage system within Belmore Swamp and Connection Creek (which potentially has poor water quality).

Prior to the release of flood or drainage waters to Killick Creek, achieved by removing dropboards located on the upstream side of the floodgate structure, the entrance of Killick Creek must be open. Consequently, if removal of dropboards is proposed, in accordance with the Floodgate Management Policy, and the entrance to Killick Creek is closed, then the provision is given to artificially open the entrance in accordance with the procedures outlined herein (i.e. Step 2 in Figure A-2).

CONSENTS AND APPROVALS

Excavation works within an entrance channel will require prior authorisation by a number of government agencies. First, however, the works will need to be permissible under Council's Local Environmental Plan (LEP). At present, the entrance of Killick Creek is 'unzoned', which leads to ambiguity with respect to validity of works and approvals.

Council is in the process of reviewing their LEP. It is recommended that Council makes provision within the new LEP for carrying out entrance works (with clear definition of the type of works and the purpose of the works) as a permissible activity with consent. The consent process should involve preparation of an Environmental Impact Assessment (e.g. Statement of Environmental Effect) and assessment in accordance with heads of consideration under Part 79C of the *Environmental Planning and Assessment Act, 1979*.

It will be important that consent for the works and approval by the relevant government agencies is on-going (for a duration of up to 5 years, say), so that works can be undertaken quickly without the need for written consent in the event of entrance closure. Extension of the consent and approvals

would need to be supported by an updated environmental impact assessment, which would likely incorporate the outcomes of monitoring undertaken as part of previous entrance dredging works.

Approvals and/or authorisation of the works are required from:

Department of Lands: As the works are to be carried out on Crown Land, written consent is required from the Department of Lands, under the provisions of the *Crown Lands Act, 1989*.

Department of Primary Industries: A dredging permit is required from DPI-Fisheries for any subaqueous excavation of bed material, under the provisions of the *Fisheries Management Act, 1994*, if a permit is not provided by another government authority.

All government agencies would still be notified of the entrance management intention prior to undertaking of any works.

RESPONSIBILITIES

The primary responsibility for implementation of the Killick Creek entrance management protocols are with Kempsey Shire Council. These responsibilities include direction and supervision of all works on site to ensure that they are carried out in accordance with these protocols and relevant standards and codes of practice.

The nominated Council officer(s) for implementation of these protocols have not yet been named.

Council is also to notify various government agencies prior to undertaking entrance works. Relevant contact officers from these government agencies have not yet been nominated.

REPORTING

Results of water quality monitoring and entrance surveys shall be reported to the Coast and Estuary Management Committee on a regular basis during periods of entrance closure and following entrance management works.

An annual report shall be prepared by Council officers and presented to the Committee and Kempsey Shire Council regarding the effectiveness of these protocols and recommending modifications, as necessary.

PROTOCOL REVIEW

On an annual basis, Council will consider the need for changes to the protocols, specifically in relation to the criteria that define when actions are initiated. Any changes to the protocol thresholds or operational procedures will first need to be ratified by Council and the Coast and Estuary Management Committee prior to implementation.

It is recommended that these protocols are also reviewed on a more detailed basis during the environmental impact assessment required to gain consent for the works, and subsequent assessments that would be required to renew the consent (every 5 years or so, depending on Council and other agency requirements).

CURRENT CONTACTS

Agency	Contact	Phone and email details
Kempsey Shire Council	Ron Kemsley	6566 3248 ron.kemsley@kempsey.nsw.gov.au
DNR	John Schmidt	6562 0707 John.Schmidt@dipnr.nsw.gov.au
DPI-Fisheries	Marcus Riches	6626 1370 marcus.riches@dpi.nsw.gov.au
Department of Lands	Brian Semple	
DEC – National Parks	Colin Campbell	

PROTOCOL AGREEMENT

Agency	Signatory	Signed	Date
Kempsey Shire Council	General Manager	.....	
DNR	Regional Director	.....	
DPI-Fisheries	Regional Director	.....	
Department of Lands	Regional Director	.....	
DEC-National Parks	Regional Director	.....	
Kempsey Coast and Estuary Management Committee	Chair	.....	