



MAINTENANCE MANAGEMENT PLAN

MAINTENANCE MANAGEMENT PLAN (MMP) FOR FOR THE PREVENTION, CONTAINMENT OR MITIGATION EFFECTS OF AN EMERGENCY SITUATION FOR EMERGENCY OPENING OF THE UMTAMVUNA RIVER MOUTH WITHIN UGU DISTRICT MUNICIPALITY IN THE KWA ZULU NATAL PROVINCE

Section 30A Directive dated 9 September 2024 – Ref. No. 14/7/6/2/4/6/141



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ABBREVIATIONS AND DEFINITIONS

ABBREVIATIONS AND DEFINITIONS	
DFFE	Department of Forestry Fisheries and the Environment
ECO	Environmental Compliance Officer
EDTEA	Economic Development Tourism and Environmental Affairs
EKZNW	Ezemvelo KZN Wildlife
IMP	Integrated Management Plan
METT	Management Effectiveness Tracking Tool
MMP	Mouth Management Plan
ORV	Off-Road Vehicle
SAWS	South African Weather Services
UDM	Ugu District Municipality
UMMMA	Umtamvuna Mouth Maintenance Management Authority
UMMMP	Umtamvuna Mouth Maintenance Management Plan
WB	World Bank
WWF	Worldwide Fund
Biota	Animal and plant life (flora and fauna) considered collectively; the collective animal and plant life of a particular geographical region
Breaching	To make a breach in (a wall, defense, natural boundary, etc.); to break through
Ebb	The movement of the tide out to sea
Encroachment	Intrusion on a person's territory or rights
Estuary	The tidal mouth of a great river, where the tide meets the current of fresh water
Fauna	Animal life, especially the animal's characteristic of a region, period, or special environment. the diverse fauna of the island
Flora	Plants or plant life especially of a region, period, or environment
River Mouth	A river mouth is where a river flows into a larger body of water, such as another river, a lake/reservoir, a bay/gulf, a sea, or an ocean

BACKGROUND

UMtamvuna River is a river that forms the border between KwaZulu-Natal and the Eastern Cape Provinces in South Africa. The river has a wide mouth and flows into the Indian Ocean just south of Port Edward. The UMtamvuna river is approximately 162 km long with a catchment area of 1,553 km². The name means "the reaper of mouthfuls" because of the damage the river does to crops during floods. Below are Coordinates of the location of the emergency.

Emergency situation:	Coordinates:	
Umtamvuna River Mouth	Latitude (S)	Longitude (E)
	31° 4'51.38" S	30° 11'44.79" E

An assessment of the management effectiveness of protected areas managed by Ezemvelo KZN Wildlife (EKZNW) was undertaken in 2010. This assessment was based largely on the Management Effectiveness Tracking Tool (METT) developed by Worldwide Fund (WWF) and the World Bank (WB) in 2007. The Level of pressure facing different protected areas is also worth noting. Of relevance, is the very high pressure associated with Umtamvuna Nature Reserve which ranked highest in the province. This suggests that special attention needs to be given to this area to ensure that these pressures are appropriately mitigated and managed.

Table 1: METT Assessment of uMtamvuna

Protected Area	Extent	Effectiveness	Pressure
Umtamvuna Nature Reserve	2653.0 ha	60%	Very High

Estuaries are acknowledged as highly dynamic and sensitive systems with a diversity of habitats, physio-chemical conditions and biota, which provide numerous free ecosystem goods and services. Healthy systems are therefore valuable assets yet are degraded through human interference and mismanagement. The demand for prime coastal properties, agricultural and industrial activities, pollution, habitat encroachment and inappropriate development places significant pressure on estuaries and their continued natural functioning. Issues and generic causes for the degradation of estuaries include loss of habitat through infilling, manipulation of the estuary mouth, poorly situated

development, eutrophication, solid waste pollution and illegal dumping, and bacterial and faecal contamination. Overall, this system is vulnerable to negative impacts from human activities in the estuary, in the surrounding urban environment, and in the largely transformed catchment area. (Nkongweni MMP, 2013).

UMtamvuna is classified as an Open/Closed Estuary. Although estuaries provide valuable ecological, environmental and economic services, they are easily degraded through mismanagement and physical interference. One of the ways that an estuary can be managed is through river mouth breaching. River mouth breaching is when the mouth of a river or estuary opens, allowing water to flow into the ocean or a larger body of water. This can occur naturally or artificially. Artificial breaching of an estuary mouth is a pervasive activity that severely threatens the ecological structure and functioning of the system and thus needs to be a regulated process.

In terms of the National Environmental Management Act (Act 107 of 1998), specifically, the 2014 EIA regulations Notice R983, Listing Notice 1 of the Environmental Impact Assessment Regulations, 2014 (as amended) (EIA Regulations) will be triggered:

Listed activity
Activity no. 19A of Listing Notice 1 (GN. 983 of 4 December 2014, as amended)
<i>“The infilling of depositing of any material of more than 5 cubic meters into, or the dredging, excavation removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic meters from- (ii) The littoral active zone, an estuary or a distance of 100 meters inland of the highwater mark of the sea or an estuary, whichever distance is greater</i>

Artificial breaching of an estuary mouth is a pervasive activity that severely threatens the ecological structure and functioning of the system. To prevent poorly informed, ill-planned, and detrimental opening of an estuary, Mouth Management Plans (MMP) may be developed to allow for artificial breaching. A Mouth Management Plan should be based on sound scientific knowledge and understanding of estuary functioning, coupled with a knowledge of the methods and mechanisms of breaching suitable to a specific estuary (EDTEA,2020).

LOCATION OF UMTAMVUNA NATURE RESERVE

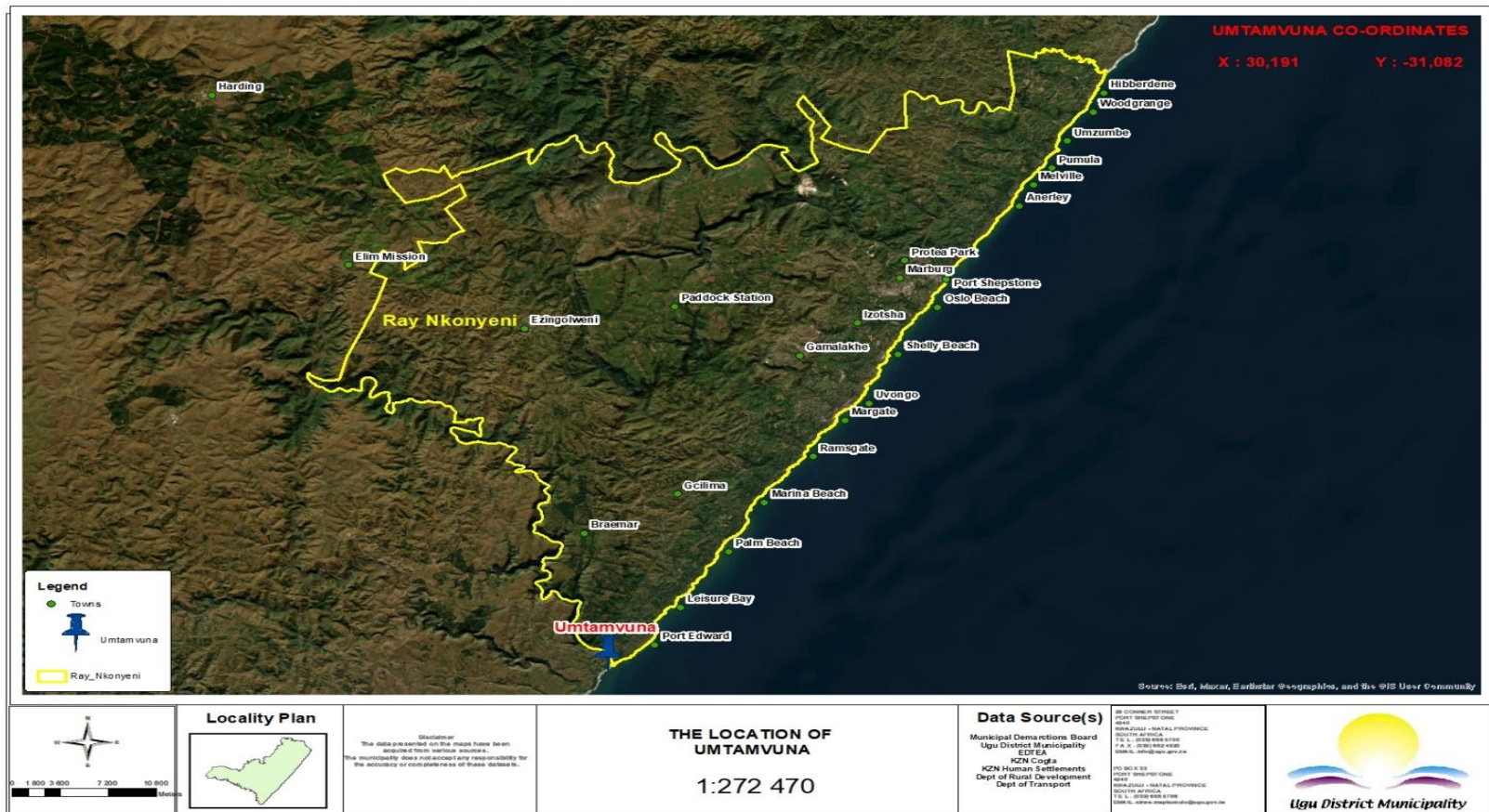


Figure 1: Point showing Umtamvuna location

Source: Ugu DM GIS (2024)

1. INTRODUCTION

Successful maintenance management of the uMtamvuna Estuary requires an understanding of the natural processes leading to open or closed mouth status. Human activities have the ability to influence, expedite or hinder these processes and the impacts occurring from particular mouth status for both natural (including biota) and anthropogenic components.

In 2009 Ezemvelo KZN Wildlife drafted an Integrated Management Plan (IMP) for uMtamvuna River which provided a situational analysis of the estuary with information that highlights the basis for planned, coordinated management interventions in this ecological system to increase benefits and curb negative impacts. A “Vision” for the future desired condition of the estuary, followed by the development of strategic objectives and management strategies to achieve this state underpin these management protocols and is presented below.

The uMtamvuna estuary mouth is naturally an open-close system. In a natural state, It opens for varying periods depending on complex, individual system relationships with size and morphology of the system and the nature of the watercourse entering it. When an estuary mouth is closed the inflowing freshwater from a river, groundwater and rainfall gradually fill the estuary (on condition that inflow exceeds evaporation and seepage losses). Therefore, the Umtamvuna Mouth Maintenance Management Plan (UMMMP) is required to manage the impacts of the estuary when it is closed for long periods of time. Maintenance Management Plan (MMP) is a legal requirement once the need to regulate periodic artificial breaching has been identified in the Mouth Management Plan or because of repeated emergency responses.

Furthermore, to prevent and manage the estuary from overflowing, artificial breaching method is used. Breaching is a method used to physically open the mouth of the river in order to lower water levels in the particular river to prevent flooding and damage to infrastructure and human life found on the low-lying areas adjacent to the river. Breaching can only take place and be considered in an emergency situation where there is imminent risk to human safety or life by back-flooding. The breaching of uMtamvuna River may be considered in the short-term to protect infrastructure (pumpstations, housing and restaurants) along the estuary from flooding, with a fair leeway period to retreat/ adapt in the medium term. Breaching of the mouth would limit the possibility of unacceptably high pollution loading into the estuary and unacceptably high sewage pollution from pipelines and pumpstations adjacent to the estuary.

Prior to the development of the Umtamvuna Estuarine Management Plan this UMMMP is considered as an interim “evergreen document” in which its protocols and functioning processes will be continually monitored and evaluated. In order to revise, upgrade and recalibrate the plan accordingly, information will be derived from lessons learned and any newly generated information. This aids in making the management of the Umtamvuna Estuary mouth adaptive.

2. VISION

The uMtamvuna Estuary mouth must be managed in a manner that will ensure that the estuarine environment is retained as a healthy, functioning ecosystem; that the resources provided by the uMtamvuna fluvial system are not compromised and, that any situation that can lead to danger or loss is minimized or averted.

3. UMTAMVUNA ESTUARY MOUTH MAINTENANCE MANAGEMENT AUTHORITY

To give full effect to the River Mouth Maintenance Management Plan, the implementation of the operational objectives of the UMMMP should be undertaken by a formally constituted body, the Umtamvuna Mouth Maintenance Management Authority (UMMMA) which reports to and obtains authorization from the Responsible Authority. The UMMMA would be based within the relevant section of the Ugu District Municipality (UDM) and its composition to be determined by liaising with representatives of the UDM together with relevant stakeholders. One of the key result areas of this UMMMP is therefore, to promote and facilitate the establishment of the UMMMA.

The currently recommended membership of the UMMMA will be representatives from:

- Ugu District Municipality (Environmental Management & Water Services; Environmental Health)
- Alfred Nzo District Municipality
- Ray Nkonyeni Local Municipality (Environmental Management Section)
- Winnie Madikizela Mandela Municipality
- Department of Forestry, Fisheries and the Environmental Affairs (DFFE)
- Economic Development Tourism and, Environmental Affairs (EDTEA)
- Ezemvelo KZN Wildlife
- Coast Watch

➤ Interested and Affected Parties

4. STRATEGIC OBJECTIVES

The strategic objective for the Umtamvuna Mouth Management Plan (UMMMP) is to develop a set of practices, based on the situational assessment that would serve as a guideline for the management plan to allow for informed decision making on:

- The leading factors that would initiate a decision to breach.
- Trigger targets for each factor.
- Whether breaching of a new mouth is justified given the above.
- The circumstances under which breaching is to take place.
- On site management of a breaching activity.
- Pre- and post- breaching assessments and reporting.

5. KEY DRIVERS INDUCING BREACHING OF THE UMTAMVUNA RIVER MOUTH

Upon closure of the Umtamvuna Estuary mouth, the key drivers that would trigger a decision on whether to breach open a mouth are:

- Environmental degradation to fauna and flora.
- A Human health hazard threat exists in the event of localised flooding of downstream developments of the low-lying areas of the Umtamvuna river.
- Infrastructural damage of an existing municipal infrastructure in close proximity to the river and private property.
- The back-flooded area behind the sandbar reaches the critical height as measured and marked on two points, the rock opposite the Pont River reserve and on the wall behind the riverside restaurant.
- The possibility of unacceptably high pollution loading into the estuary and/or unacceptably high sewage pollution from sewage works/pipelines adjacent to the estuary.
- Monitoring markers (green, yellow and red) have been painted on the wall of the restaurant (from the south side) at the mouth and on a rock opposite the Pont River reserve. These markers are synoptically synchronized such that when the mouth closes and water level rises, at a point in time, the levels would be the same at all sites.

6. KEY MANAGEMENT OBJECTIVES

Given the above, the following Key Management Objectives are proposed:

6.1 WATER LEVELS AT THE UMTAMVUNA ESTUARY MOUTH REACHES THE CRITICAL LEVEL MARKED RESPECTIVELY ON THE WALL AT THE MOUTH AND ON THE WALL OF THE WEIR

Monitoring markers (green, yellow and red) have been painted on the wall of the Riverside Watersport and Cocktail bar (from the south side) at the mouth and on a rock opposite the Pont River reserve. These markers are synoptically synchronized such that when the mouth closes and the water level rises, at a point in time, the levels would be the same at all sites



Figure 2: Rock to be marked



Figure 3: Restaurant to be marked

Utilizing the markers, the following should occur while the mouth is closed

Green: When the mouth is closed, the water level would rise into the green area. When this happens, Ugu DM is to be informed that the mouth has closed, together with information of the time of closure and the time taken to reach the Yellow Zone.

Yellow: Once the water level has reached the Yellow Zone Ugu DM will be informed. It will be possible to determine the rate of water level rise and to ascertain approximately when the Red Zone will be reached (depending on fluvial flow rates). By this time a preliminary breach date can be calculated, and the breaching team should be in readiness.

Red: Once the water levels reach the Red Zone, the breaching can be initiated. The top of the Red Zone indicates the critical level at which breaching must occur. Failure to breach

at this time will result in flooding at the Pont as well as water intrusion into the sewer reticulation system.

AERIAL MAP SHOWING POINTS OF MONITORING MARKERS

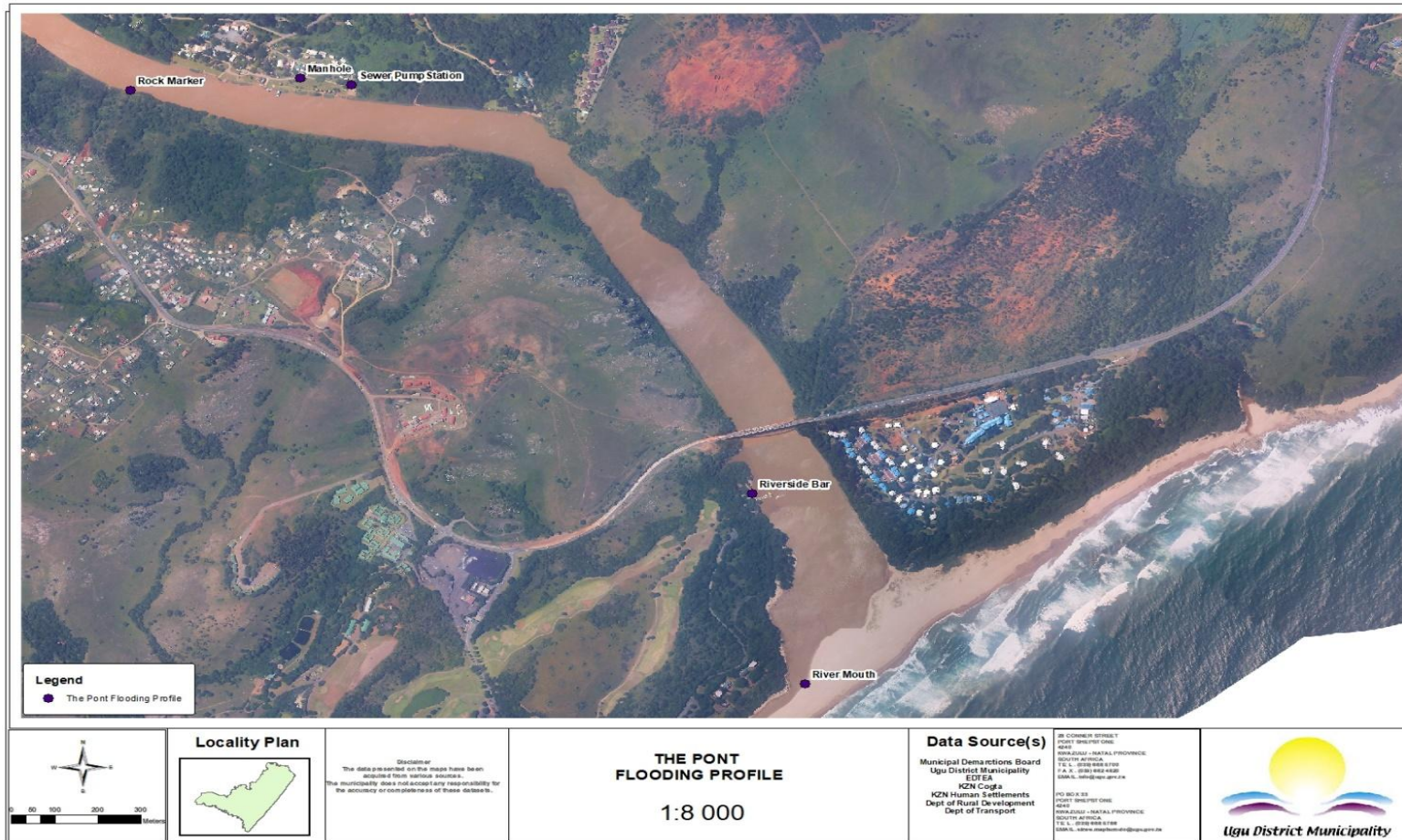


Figure 4: Aerial map showing points of monitoring markers

Source: Ugu DM GIS (2024)

TOPOGRAPHIC MAP SHOWING POINTS OF MONITORING MARKER

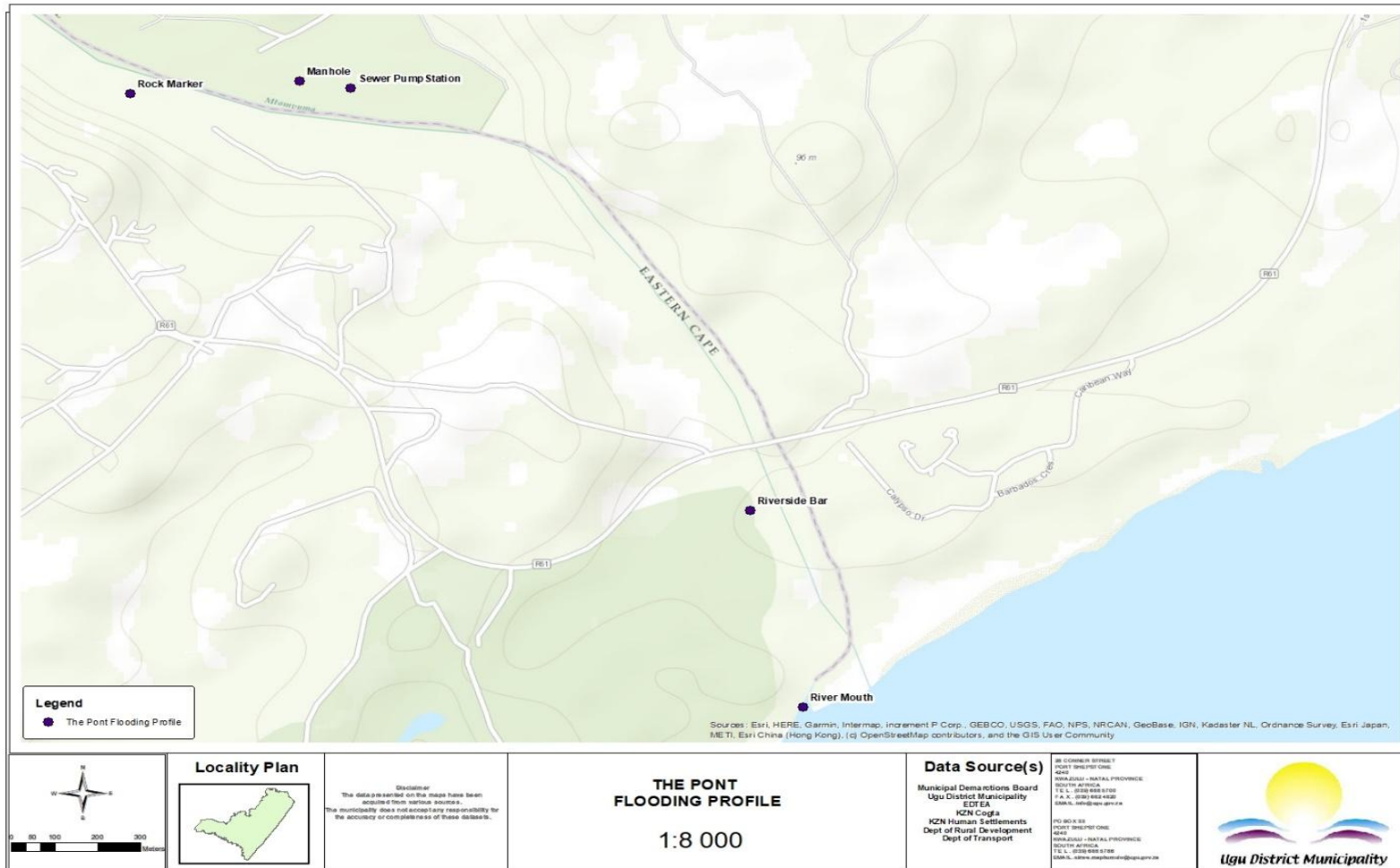


Figure 5: Topographic Map showing points of monitoring marker

Source: Ugu DM GIS (2024)

6.2 ENHANCING AND MAINTAINING ESTUARINE HEALTH AND ECOSYSTEM FUNCTIONING:

Maintaining connectivity with the sea, protecting the nursery function of the estuary and, its role as a passage for aquatic species and, the benefits of maintaining a closed mouth status should also be important aspects for the Umtamvuna Estuary Mouth Management Authority to continually appraise, particularly on occasions when breaching is necessary as per the key drivers of the threat of flooding.

6.3 PREVENTING FURTHER DEGRADATION TO THE WATER QUALITY OF THE ESTUARY PARTICULARLY DURING EPISODES OF HIGH POLLUTION INPUT.

The Umtamvuna Estuary Mouth Management Authorization will be obtained from the competent authority (DFFE) for breaching in the event of unacceptably high pollution and high-water level episodes in the estuary. The Ugu DM will then inform the competent authority when breaching.

6.4 STRATEGICALLY BREACH AT A SITE MOST LIKELY TO MAINTAIN OPEN MOUTH STATUS FOR THE LONGEST DURATION

Given that the growth and extension of the sandbar occurs from north to south, breaching must occur at the southern extremity of the sandbar. The remnant concrete blocks of the breakwater in the vicinity of this site creates added turbulence during a breach event (Brian Lange, 2015, Pers. Comm.), allowing for greater sediment entrainment and removal offshore. This effectively increases the longevity of the open mouth condition.

6.5 TIMING OF THE BREACH

Breaching of a new mouth of the estuary should be a planned activity. Ideally, the actual work on the breach should begin shortly after maximum high tide. This will allow for the work to be completed as the tide levels are falling and the ebb and flow has gained velocity. Flushing of mouth sediments in the seaward direction will therefore continue for the remainder of the duration of the ebb and flow and in this way, increase the longevity of the open mouth condition. However, should the head of water behind the sandbar not generate sufficient flushing velocity, the site engineer or appointed supervisor may delay breaching to later in the tidal cycle. Whilst the above applies as a general model for breaching, local conditions at each estuary are unique, therefore; it is important for

complete breaching records to be kept and evaluated by the Umtamvuna Estuary Mouth Management Authority to help determine optimum breaching for the Umtamvuna system.

7. ARTIFICIAL BREACHING METHODS TO BE UTILIZED DURING THE BREACHING

- Considering the environmental impacts and safety conditions, the following artificial breaching methods can be adopted when water levels reach the critical level:
 - A manual method
 - A Mechanical method
- The manual method consists of a team of workers, under the guidance of an appointed supervisor/engineer, and monitored by an ECO appointed by the Applicant (UDM) dig a trench at the designated site using shovels. The trench is normally narrow (approximately 1-2m wide) and is dug across the sandbar from the estuarine side. During the process, water follows and floods the trench as it is being extended. Once the trench is cut through to the opposite side, the breach becomes self-reinforcing, proceeds naturally and the mouth rapidly expands as water trapped behind the sandbar now has an outlet to sea.
- In both cases, it is critical that the safety of all personnel involved in the breaching is prioritized. All heavy equipment and excess personnel must be removed from the site. It is equally important that the public is notified of the planned activity.



Figure 6&7: Mechanical and Manual breaching methods

8. RECORDS

Complete records of each breach event should be compiled and maintained by the UMMMA. This should include, inter alia, the rationale; date and time; methods used; breaching team; supervisor; sandbar morphology; nearshore conditions; unusual events; weather conditions; longevity of the breach, etc. A photographic record should also be compiled. These records would serve as important sources of data for the revision of the UMMMP in due course. Records template is referred to as '[Annexure 1](#)' in this document.

9. MAINTENANCE MANAGEMENT PLAN – CONSTRUCTION PHASE OF ACTIVITIES

ENVIRONMENTAL ASPECTS	MEASURES AND ACTION PLANS	RESPONSIBILITY	TIMEFRAME
Awareness, Roles and Responsibilities for Environmental Management	The overall responsibility of environmental management and cost associated with implementation of UMMMP lies with the Applicant.	Ugu DM	Prior, During and Post Breaching
	The Municipality and employees must always adhere to the UMMMP.	Ugu DM	Prior, During and Post Breaching
	The Municipality must ensure that all permanent and temporary staff, sub-contractors and suppliers adhere to the UMMMP.	Ugu DM	Prior, During and Post Breaching
	The Municipality must nominate a Senior Official/ECO/ Senior Official/ECO directly involved in construction activities as the Site Environmental officer with the necessary expertise, who shall be responsible for ensuring the implementation of the UMMMP. The responsibilities of the Senior Official/ECO include: • Ensuring environmental awareness amongst members of the workforce is conducted. • Ensuring that the Municipality and members of the workforce are aware of the requirements of the UMMMP.	Ugu DM	Prior, During and Post Breaching

ENVIRONMENTAL ASPECTS	MEASURES AND ACTION PLANS	RESPONSIBILITY	TIMEFRAME
	• Implementing preventative and corrective actions in accordance with the requirements of the UMMMP and outcomes of the monitoring. • Reporting incidents that may occur on site as required by the UMMMP. • Reporting on compliance with this UMMMP to the UMMMA.		
	Queries and complaints are to be handled by documenting details of such communications submitting these for inclusion in complaints register bringing issues to senior official/ ECO; s attention immediately taking remedial action as per Senior Official/ECOs instructions		
	The Senior Official/ECO shall ensure the adherence to the UMMMP in the Municipality's execution of the construction activities.	Ugu DM	Prior, During and Post Breaching
Training and Induction	In terms of section 2(h) and (j) of NEMA (Act 107 of 1998 as amended), the applicant has the responsibility to ensure all personnel involved in the project are aware of, and familiar with, the UMMMP.	Ugu DM	Prior, During and Post Breaching
	Environmental Toolbox Talks should be done prior to any activity being conducted on site. Workers and staff are to be informed about environmental issues that need to be dealt with. Construction management is closely monitored by a		

ENVIRONMENTAL ASPECTS	MEASURES AND ACTION PLANS	RESPONSIBILITY	TIMEFRAME
	delegated Environmental Officer. The environmental toolbox talks must be conducted by the Senior Official/ECO. These talks are between 5-10 minutes		
Environmental Documentation & Authorizations	An Environmental File must be kept on the construction site including the applicable Environmental Authorizations; EMP; Spill Contingency Plan; and Environmental Code of Conduct.	Ugu DM	Prior and during breaching
Compliance	Should the Municipality be in breach of any of the specifications contained in the UMMMP, the Municipality shall instruct the responsible Official regarding corrective and/or remedial action required, specify a timeframe for the implementation of these actions, and /or indicate that work shall be suspended should non-compliance continue.	Ugu DM	Prior, During and Post Breaching
Site Access	Access at the construction sites must be clearly demarcated to limit unauthorized access by the public. Imported soil may only be used to create access to the site as specified by the Municipality only when necessary.	Ugu DM	Prior, During and Post Breaching
	Provide proper warning signage to make people aware of the activities within the designated areas.		
	Only the approved access route must be utilized and Unauthorized access onto adjacent private properties is strictly prohibited.		

ENVIRONMENTAL ASPECTS	MEASURES AND ACTION PLANS	RESPONSIBILITY	TIMEFRAME
Vegetation	Indigenous vegetation will not be damaged without prior consultation with Nature Conservation Service.	Ugu DM	Prior, During and Post Breaching
Animal Life	No illegal hunting, snaring, collection, gathering or capture of any animals may take place by any person. Any animals that are found must be removed from where they can be harmed.	Ugu DM	Prior, During and Post Breaching
Plant and vehicle Access onto the Beach	The appropriate beach manager must be aware of any vehicle or machine driving onto the beach and will assist in the issuing of the applicable permit from DFFE. The permit must indicate as a minimum; the model, colour and registration number of the vehicle and expiry date of the permit.	Ugu DM	Prior, During and Post Breaching
	Contractor's activities and movement of staff to be restricted to designated construction areas.		
	The Municipality is to keep a register of all plant and/or Machinery permits and advise DFFE accordingly. After approval of this UMMMP official municipal activities in respect of driving on the beach for the purpose of implementing the UMMMP are deemed permissible according	Ugu DM	Prior, During and Post Breaching

ENVIRONMENTAL ASPECTS	MEASURES AND ACTION PLANS	RESPONSIBILITY	TIMEFRAME
	to the Department of Forestry, Fisheries and the Environment in terms of Regulation 4 (1) (d) of the Regulations published in terms of section 83 of the National Environmental Management: Integrated Coastal Management Act, 2008 (Act No. 24 of 2008): Control of Use of Vehicles in the Coastal Area: (Government Notice No. R. 496 of 27 June 2014) ("the Regulations"). The Municipality must confirm the contractor's appointment for inclusion as part of the permissible use clause.		
Health and Safety	Construction activities must be undertaken according to the working hours stipulated by the Municipality.	Ugu DM	During breaching
	A safety officer must be appointed by the Municipality, as required in terms of Health and Safety Regulations, to continually monitor safety conditions within the construction area. To keep a record of H&S and to report back to the Senior Official/ECO prior to and during construction.	Ugu DM	During and post breaching
	Signs must be erected restricting public access to the site.	Ugu DM	During and post breaching

ENVIRONMENTAL ASPECTS	MEASURES AND ACTION PLANS	RESPONSIBILITY	TIMEFRAME
	The workforce is to be provided with sufficient potable water and under no circumstances are they to use untreated water from local water courses for drinking.	Ugu DM	During and post breaching
Waste	All waste generated on site must be collected and placed in a receptacle and this waste must be taken to the appropriate waste disposal site	Ugu DM	During and post breaching
Ablution	Ablution facilities should be provided for the workforce	Ugu DM	Prior, During and Post Breaching
Diesel Storage	Storage of hazardous substances must not be within 100m of any drainage lines.	Ugu DM	During and post breaching
	No diesel storage or refueling will take place in any river, stream, lake, dam or pan, in the coastal zone or within 150m of such feature.		
	A spill kit approved by relevant competent authority representatives containing absorbent material and accessories capable of effectively managing a spill of 500 liters will be kept at the construction camp		

ENVIRONMENTAL ASPECTS	MEASURES AND ACTION PLANS	RESPONSIBILITY	TIMEFRAME
	All spills should be cleaned up immediately to the satisfaction of the ECO by removing the spillage together with the polluted soil and by disposing of them at a recognized Hazardous Waste facility		
Monitoring, Reporting and record Keeping - Construction Phase	Monitoring will be undertaken by the official at a frequency deemed appropriate by the UMMMA.	Ugu DM	
	Monitoring must ensure compliance with the UMMMP.		
	The monitoring report must be submitted to UMMMA.		
Decommissioning, Closure and Rehabilitation	All left over material, debris and waste are to be removed from site and disposed off accordingly.	Ugu DM	After breaching
	Sites must be landscaped appropriately upon completion of the activity when/if necessary.	Ugu DM	After breaching
	Beach sand must not be removed from the beach.		
	A photographic record of the site must be taken before and after breaching.		

10. STANDARD OPERATING PROCEDURE FOR OPENING A RIVER MOUTH

10.1 Opening Stage

Applicant to do the following:

- Identify the need (Purpose of opening the river mouth)
- Engage Ugu DM- Mr. B Khumalo
- Engage Alfred Nzo- Mr. A Qumba
- Inform residents/ businesses of other interested parties.

Application to be approved within 48 hours.

10.2 Opening Procedure

Site preparation (clear debris, vegetation and obstacles from the river mouth)

Remove sediment and debris to ensure navigable depths

10.3 Opening Techniques

Acquire necessary equipment, materials and services

Use manual or machinery to create a stable channel

10.4 Monitoring and Maintenance

Continuously monitor water levels, flow rates and sediments

10.5 Post Opening Procedure

Water Quality Monitoring

Aquatic life Monitoring

Ensure ongoing monitoring and maintenance

10.6 Responsible Municipalities/ Departments

UGU DM

Alfred Nzo Municipality

Winnie Madikizela Mandela Municipality

Water and Sanitation Departments

KZN Wildlife

Environmental Services

11. ASSESSMENT OF RISKS, THREATS, OPPORTUNITIES ASSOCIATED WITH MAINTENANCE MANAGEMENT DECISIONS

The concept of risk in general, a risk refers broadly to situations where the outcomes are uncertain. The term “Risk” is described in two ways in the Concise Oxford dictionary:

- Firstly, risk is described as a hazard or a chance of bad consequences, loss, etc, and
- Secondly as an exposure or a chance of injury or loss. Therefore, both the hazard and exposure descriptions are relevant risk dimensions in terms of parameters used in the identification of risks.

Valsamakis et al (2005) define risk as the variation of the actual outcome from the expected outcome, which implies the presence of uncertainty. This definition indicates that there is uncertainty surrounding the outcome of an event and about the degree of uncertainty of the actual outcome that is expected.

Risk assessment is a process where the hazards and exposures are identified, the risk potential of these hazards and exposures are analyzed and estimated and a decision as to the acceptability of these risks to people, business or the environment is made. Risk Assessment is often defined as the identification of undesired events, their causes and analyzing their likelihood and potential consequences - considering existing control measures - in order to make a valued judgement as to the risk's acceptability. The Dictionary of Insurance (Bennett 2004) defines risk assessment as a collective reference to risk identification, risk analysis and risk evaluation.

The Risk Management Process is a generic process for the assessment and management of all types of risk, including environmental risks. The Risk Management Process is similar to the EIA processes, but is generally applied to a broader scope of risk concerns, including not only the environment, but also other concerns such as safety, financial, legal, etc.

The purpose of this document is to provide information required to make decisions related to hazard and exposure risks and management, associated with the mouth opening of the Umtamvuna river. These are the risk impact on the river mouths biophysical activities, and on the environment in which they operate, can be mitigated.

This document focuses on providing a generic methodology to assess the nature of a spectrum of possible risks and to provide practical methods to manage these risks. The document contains a description of the concepts, principles and tools of understanding risks, performing risk assessments for generic risk situations according to a process used locally and internationally, applying changes to control and manage risks to acceptable risk levels

12. ASSESSMENT OF RISKS, THREATS, OPPORTUNITIES ASSOCIATED WITH UMTAMVUNA MOUTH MAINTENANCE MANAGEMENT DECISIONS

12.1 Key drivers that trigger a decision on whether to breach open a mouth are:

- The back-flooded area behind the sandbar reaches the critical height as measured and marked on the wall at the mouth and on the weir wall in the restaurant at the Pont River Reserve and on a rock opposite the Pont River reserve.
- Monitoring markers (green, yellow and red) have been painted on the wall of the restaurant (from the south side) at the mouth and, on the pillar at the Pont River Reserve and on a rock opposite the Pont River reserve. These markers are synoptically synchronized such that when the mouth closes and water level rises, at a point in time, the levels would be the same at all sites.

Risk Assessment Indicators

Green: Low Risk

Yellow: Medium Risk

Red: High Risk

Table 3: Assessment of risks, threats, opportunities associated with mouth maintenance management

CONCERN/ISSUE	CURRENT STATUS	RISK ASSESSMENT
Presence of early warning system from SAWS/Disaster Management	Early warning systems are implicit with the establishment of the UMMMA and its adoption and implementation of the protocols for mouth maintenance management presented herein.	Low, given the creation and functional of the operation UMMMA
Prolonged closure of the mouth	Umtamvuna is an open-close river mouth system	High
Threats to human life as a result of high-water levels	- Water levels rise to the point of flooding - Flooding of properties around the estuary	Low
Threats to immovable property and infrastructure as a result of high-water levels	- Flooding of the low-lying areas in the riverbanks and subsequent overflows at sewage pump-stations, septic tanks and conservancy tanks, if any. - Flooding of municipal and private property	High
Threat of pollution of estuary resulting from high water levels	Flooding of sewage infrastructure depending on water levels.	High

CONCERN/ISSUE	CURRENT STATUS	RISK ASSESSMENT
Potential loss of crops or other agricultural resources (e.g. aquaculture farm) as a result of high-water levels	N/A	N/A
Threats to waterbird habitat as a result of high-water levels and loss of tidal influences	The estuary has been identified as an important bird area (Barnes 1996). Loss of tidal function occurs when the estuary mouth is closed.	High
Potential loss of estuarine fish populations, and other species, through breaching, resulting in mortalities	The estuary is historically an open-close system. Aquatic fauna of the estuary are adapted to open mouth conditions	Low
Access impacts – more difficult for people to access the middle and upper reaches of the estuary or to cross the estuary when the mouth is closed, and water levels are high	Impacts on access and recreational usage and access to open sea. Potential flooding of the low laying properties and municipal infrastructure	Medium
Impacts on recreational amenities and aesthetics	Larger water body when mouth is closed, a consideration for organizers of sailing regattas, water skiing, etc.	Low

12.2 Continuous Risk Assessment

- i. Continuous Risk Assessment is performed at an operational level, where the processes, systems and activities are monitored on an ongoing basis by the operational management

and the front-line supervision. Continuous risk assessment facilitates monitoring the effectiveness of the applied risk controls and can highlight the need to re-assess new or changing risks and non-conformances. Here the daily or regular observation and/or monitoring of the effluent, waste and emissions released from the site would be performed by site supervision, with corrective action being taken against poor risk controls or system deficiencies when detected.

- ii. Risk control is the second stage of the risk management process. At this stage the risk is minimized through design and implementation of physical risk management programmes with the following objectives:

- Reduction of the magnitude of the exposure
- Reduction of the frequency of the loss producing events
- Dealing (physically) with loss-producing events
- Recovery (physically) from the loss-producing events

Risk control entails practical methods to reduce risk at the source of the risk. Implementation and monitoring of risk control is normally performed as a line management function, with the understanding and commitment for the process being driven by top management.

13. CONCLUSION

The UMMMP is an essential document to ensure the management of the uMtamvuna estuary as well as to ensure prevention of further degradation in the water quality of the estuary, as the estuary is naturally an open-close system. Breaching has been identified by the UMMMA as the method to manage the adverse effects of the prolonged river mouth closure. The timing for breaching of the river mouth should be a planned activity authorized by the competent authority.

The UMMMP is a guiding document which aims to address the circumstances under which breaching is to take place. The implementation of a suitable breaching method between a mechanical and/or manual method, as well as the role players responsible for the onsite/offsite management of the breaching activity. The UMMMP should take note of all liability and safety issues prior and post breaching.

All breaching incidents must be recorded and reported by the Ugu District Municipality through the uMtamvuna River Mouth Breaching Incidents Records document. Monitoring will be undertaken by the official at a frequency deemed appropriate by the UMMMA, DFFE and EDTEA.

14. REFERENCES

- Breetzke, T and Mayer, C 2013. Nkongweni Estuary Interim Mouth Management Plan. A project for the Hibiscus Coast Municipality. Reference Number: M01.DUR.0000017
- Council for Scientific and Industrial Research, 2017. *Artificial Breaching Protocol for the Western Cape Estuaries*. CSIR, Stellenbosch. DWAF. 2006. *Kromme/Seekoei Catchments Reserve Determination Study - Technical Component*. Report No. RDM/K90/04/CON/0705, Department of Water Affairs, Pretoria
- Economic Development Tourism and Environmental Affairs, 2020. Protocol For Request to Breach Estuary Mouths in Kwa-Zulu Natal - Mouth Maintenance Management Plans
- Merriam-Webster.com Dictionary, Merriam-Webster, <https://www.merriam-webster.com/dictionary/flora>. Accessed 22 Oct. 2024
- National Environmental Management Act NEMA: (Act 107 of 1998) Section 2 (h) and (j) of as Amended:
(h) Community wellbeing and empowerment must be promoted through Environmental Education, the raising of Environmental Awareness, the sharing of knowledge and experience and other appropriate means.
(j) The Right of workers to refuse to work that is harmful to human health or the Environment and to be informed of dangers must be respected and projected.
- Ryno Ferreria, (2018). Breaching of Gamtoos River Mouth- Jefferys Bay, South Africa- YouTube <https://www.youtube.com/watch?v=xbDJdjZ6czc>
- Ugu District Municipality 2022/2023-2026/2027 Final Integrated Development Plan
- UMtamvuna Nature Reserve Integrated Management Plan (2009)

Annexure A



UMtamvuna River Mouth Breaching Incidents Records

Notified Parties	Name and Surname	signature
Ugu District Municipality Representative		
DFFE Representative		
Site Supervisor		

1.Request to breach

Reason/Motivation for Breaching	Date Reported	Time Reported	Reported By:

2. Breaching Records

Date of Breaching	Starting Time	Finishing Time	Method Used	Weather Conditions	Nearshore Conditions (e.g. Tidal conditions)	Unusual Events	Breaching Team Supervisor Name & Signature

- All breaching activity of the UMtamvuna River Mouth incidents should be recorded in the UMtamvuna River mouth Breaching Incidents records template.
- Before and After Pictures with dates should be kept and attached with each incident record.
- The ECO is responsible for ensuring the records are kept for each incident.