iSimangaliso
Wetland Park

World Heritage Convention Act 1999 (Act. No. 49 of 1999)
Proclamation Number 4477 of 2000
Dated 24 November 2000
Regulations 1193 dated 24 November 2000

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AMENDED DRAFT BASIC ASSESSMENT REPORT

Proposed Dredging of the Msunduzi River and Beach Channel within iSimangaliso Wetland Park, uMkhanyakude District Municipality.

PREPARED IN COMPLIANCE WITH THE REQUIREMENTS OF THE EIA REGULATIONS, GN 326 OF 2017 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT,

ACT NO. 107 OF 1998

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REPORT REFERENCE: IND/DRMS/EIA01

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	Name and Designation	**Signature**
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Disclaimer

The opinions expressed in this draft Basic Assessment Report (dBAR) are based on the information supplied to Indaloenhle Environmental Consultants. Indaloenhle Environmental Consultants has exercised all due care in reviewing the supplied information. Whilst Indaloenhle Environmental Consultants has compared key supplied data with expected outcomes, and duly interrogated all information supplied to us, the accuracy of the results and conclusions from the review are entirely reliant on the accuracy and completeness of the supplied data. Indaloenhle Environmental Consultants does not accept responsibility for any errors or omissions in the supplied information and does not accept any consequential liability arising from commercial decisions or actions resulting from them. Opinions presented in this report apply to the site conditions and features as they existed at the time of Indaloenhle Environmental Consultants' investigations, and those reasonably foreseeable. These opinions do not necessarily apply to conditions and features that may arise after the date of this dBAR, about which Indaloenhle Environmental Consultants had no prior knowledge nor had the opportunity to evaluate.

EXECUTIVE SUMMARY

PROJECT BACKGROUND AND INTRODUCTION

Indaloenhle Environmental Consultants Pty Ltd is appointed by the iSimangaliso Wetland Park Authority to provide the requisite professional environmental services and obtain Environmental authorisation from the competent authority for the proposed clearance of vegetation and silt that has been deposited in the Msunduzi River and Beach Channel.

The St Lucia estuary and lake system is located within a World Heritage site and Ramsar listed wetland of international importance, under the management of the iSimangaliso Wetland Park Authority. The St Lucia estuary mouth system is complex and comprises of the Mfolozi River, Msunduzi River, Mzinene, Hluluwe,Nyalazi, Mphathe and the Mkhuze River. Back-flooding of the Msunduzi River, which leads to the inundation of commercial and small-scale farmland with water on the Mfolozi floodplain, has became problematic since the estuary mouth closed in 2014, affecting commercial and small grower agricultural operations on the lower Mfolozi flats and within the Sokhulu area. An "assisted breach" of the combined St Lucia/Mfolozi/Msunduzi mouth was conducted on 6 January 2021, and the mouth remained open until 3 June 2021; however, this did not alleviate the back-flooding issue onto farmlands.

An Independent Panel of Experts, appointed by the DFFE to investigate the impacts of the breach, made recommendations for future management of the system, of which they found that there was no observed or measured removal of sediment, common reeds and alien invasive species or relief to small and large-scale farmers from back-flooding following the breach. They determined that back-flooding is caused by the blockage of the Msunduzi channel as a result of extensive reed growth and accumulated sediment. The report (Independent Panel of Experts, 2022) recommended clearing the Msunduzi and beach channel of vegetation and sediment to allow water to flow freely from the floodplain to the mouth, and dune maintenance to limit vegetation encroachment. Despite the mouth naturally breaching again, following high seasonal rains during April 2022, the farmland on the Msunduzi-Mfolozi floodplains remained back flooded.

A proposal to clear a channel in the lower Msunduzi River and Beach Channel, compiled by Bosch Projects (Ref.: 493/87/1/1040) on behalf of the Mfolozi Sugar Planters LTD on 25 October 2022, was submitted by the iSimangaliso Wetland Park Authority (hereinafter referred to as the "Authority") on 22 March 2023 to the DFFE as part of the motivation for a Section 30A application for emergency clearing of the blockages. The application was refused by the DFFE (3 April 2023), amongst the reasons being: that it didn't constitute an emergency, that it triggered three listing notices of the NEMA Environmental Impact Assessment (EIA) Regulations, the lack of information on the disposal of spoil, the potential for significant estuarine and marine environmental impacts and that there was no baseline information. As such, the proposal to dredge the sediments and clear the vegetation is required to go through a Basic Assessment process, along with specialist studies, for the required environmental authorisations.

The project requires authorization in terms National Environmental Management Act (Act 107 of 1998, NEMA) and the National Water Act 36 of 1998, which will be undertaken in accordance with the EIA Regulations, 2017 (GN No. R.327), as amended, and Section 21 water uses, respectively.

In terms of the NEMA, a Basic Assessment (BA) Process is required for a development that constitutes activities identified in Section 24 of the act. In terms of Section 24(1) of NEMA, the potential impact on the

environment associated with these activities must be considered, investigated, assessed, and reported to the Competent Authority, the Department of Forestry Fishery and the Environment (DFFE) to grant Environmental Authorisation. In addition, the proposed project requires authorization from the Competent Authority, the Department of Water and Sanitation (DWS) for specific water uses listed under Section 21 of the National Water Act No. 36 of 1998 (NWA). The Water Use Licence Application process will be undertaken concurrently with the Environmental Authorization application.

KEY FINDINGS AND OBSERVATIONS

- The specialist studies conducted showed that show that the cause of back-flooding resulted from significant channel and mouth constriction, debris blockages, vegetation growth within the uMfolozi and slightly higher flows within the White uMfolozi during the past 5 years.
- The increased restriction of the mouth resulted from significant vegetation growth and sedimentation of Honeymoon Bend.
- The field survey showed:
    - During high tide, the incoming salt wedge travelled approximately 3km upstream from the St Lucia mouth, along the Beach Channel and up the uMfolozi.
    - The St Lucia estuary is significantly super-elevated due to the constriction at Honeymoon Bend.
    - Pollution and pesticide concentrations associated with the sediment are low and should pose a low risk to the receiving environment.
    - Debris dams and dense vegetation along the channels reduce water drainage towards the mouth.
    - Approximately 1,000-3,200 m^3 of woody debris should be removed from the lower uMfolozi.
    - Approximately 28,000-56,000 m^3 of vegetation should be removed along the uMsunduzi, 15,000-30,000 m^3 along Main Drain, and 25,000- 49,000 m^3 along the uMfolozi.
    - Approximately 40,000.00-50,000.00 m^3 of sediment is required to be dredged from the lower uMsunduzi to improve drainage.
    - There is significant tidal restriction between the St Lucia mouth and The Narrows due to the sedimentation and vegetation growth at Honeymoon Bend. This is a direct result of the artificial link canal constructed in 1983. To improve tidal exchange flows, approximately between 0.4 Mm^3 and 1.6 Mm^3 (dredging down to 0.5 m and 2 m respectively) of sediment and vegetation is required to be dredged from Honeymoon Bend.

The lower uMfolozi and uMsunduzi have experienced significant siltation and channel constriction over the past decade. This has changed flow pathways and lowered drainage efficiency, resulting in elevated water levels, sediment deposition and vegetation growth along the channels and on the lower floodplain.

The proposed dredging along the uMsunduzi will increase the drainage efficiency of the water on the floodplain. It will lower the water level to that of the base level (highest point along the uMsunduzi bed,

the beach channel bed, sea level or lowest point along the beach berm when the mouth is closed). The rate of back-flooding during large flood events will not be reduced significantly, and water elevation changes associated with mouth closure will be unimpacted, resulting in back-flooding.

The sediment that needs to be dredged to improve the drainage of the low-lying agricultural fields consists largely of fine silt and clay. Pollution and pesticide concentrations associated with the sediment are low and should pose a low risk to the receiving environment (like the sediment deposited annually on the floodplain).

The dredging of the uMsunduzi is a short-term solution needing ongoing monitoring and maintenance to prevent similar siltation levels. It is strongly recommended that the siltation and reed growth at Honeymoon Bend be removed, and the 1983 link canal cut off from the system, as this is likely a key driver of the sedimentation and vegetation growth at Honeymoon Bend. Monitoring and adaptive management will be instrumental in managing the system's functioning towards the desired outcomes.

PROPOSED INTERVENTIONS

the preferred intervention options are:

- Phase 1: Vegetation clearing of the Msunduzi. The preferred method of vegetation removal will be decided at procurement stage, weighing up the alternatives of efficiency vs least environmental impact. Vegetation is to be disposed of onto the river banks (refer Fig. 10), sufficiently away and elevated so that it doesn't get washed back into river channels, and left to naturally decompose.
- Monitoring of vegetation, possible sediment build-up, water levels to determine if backflooding relief, and hydrographic survey.
- Phase 2: Dredging of the sediment lobe on the Msunduzi. The preferred dredging method and equipment will be decided at procurement stage, weighing up the alternatives of efficiency vs least environmental impact. Spoil is to be pumped to designated spoil sites, 60 m away from river banks, with the option to pump/deposit to surrounding farms, subject to willingness, agreements and ease of access.
- Preferred access for both Phase 1 and Phase 2 craft and equipment is via the St Lucia Sugarloaf jetty. The exact channel to be cleared will be decided in consultation between the Park authority, ECO and contractor, depending on which channel looks easiest to navigate and clear.

ENVIRONMENTAL LEGISLATION

This dBAR has been compiled in accordance with the requirements of Appendix 1 of the amended 2017 NEMA EIA Regulations (as noted in Regulation 21 (3) of the GN R326 and includes details of the activity description; the site, area, and property description; the public participation process; the impact assessment; and the recommendations of the Environmental Assessment Practitioner (EAP).

In terms of the Environmental Impact Assessment (EIA) regulations of 2014 (as amended), the Msunduzi River and Beach Channel project requires an Environmental Authorisation, from the Department of Forestry, Fisheries and the Environment (DFFE). The triggered activities are listed under Listing Notices 1 & 3 (published in Government Notices No. R 327 and No. R 324 respectively), and as such, a BA Process needs to be followed. The listed activities that have been applied for

are provided in Table 1 below.

Table 1: Listed Activities triggered in the 2014 NEMA EIA Regulations (as amended) - (Basic Assessment)

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended.	Describe the portion of the proposed project to which the applicable listed activity relates.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a water course.	Excavation, removal or dredging of sediments of more than 10 cubic meters from a watercourse. • approximate sediment dredge volume of 40,000.00-50,000.00 m3 in lower uMsunduzi to improve drainage.
27	"The clearance of an area of more than 1 hectare but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity or (ii) for maintenance purposes undertaken in accordance with a maintenance management plan"	• Approximately 28,000-56,000 m^3 of vegetation should be removed along the uMsunduzi, • 25,000- 49,000 m^3 the uMfolozi. • Approximately 1,000-3,200 m3 of woody debris should be removed from the lower uMfolozi. • Sugarloaf jetty clearance for access is 1000.00m^3 This activity is a linear activity for the purpose of maintenance and will be undertaken in accordance to a maintenance management plan.
Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **{d) KwaZulu-Natal** **(ix)World Heritage Sites**	**iSimangaliso Wetland Park is world heritage site is intending on clearing vegetation** • Approximately 28,000-56,000 m^3 of vegetation should be removed along the uMsunduzi, • 25,000- 49,000 m^3 the uMfolozi. • Approximately 1,000-3,200 m3 of woody debris should be removed from the lower uMfolozi. • Sugarloaf jetty clearance for access is 1000.00m^3

PUBLIC PARTICIPATION PROCESS

Public consultation is a legal requirement throughout the BA process. The Public Participation Process included:

- Placing notice boards on site; 29 November 2023
- Identifying and registering Interested and Affected Parties (I&APs) and relevant stakeholders.

- Providing notice to I&APs and stakeholders of the intent to submit an application for EA and the release of the Draft Basic Assessment Report (BAR) for public review.
- Publishing an advertisement in a local newspaper notifying the public of the release of the Draft BAR for public review. 17 January 2024 iSolezwe, 21 January 2024 Sunday Times, 22 January 2024 Zululand Observer.
- Keeping a register of all comments by and responses to registered I&APs and stakeholders for inclusion in the Final BAR.

OUTCOMES FROM THE SPECIALIST FINDINGS

Specialist Study	**Conducted by:**	**Affiliation**
Hydraulics & Geomorphology	Dr Justin Pringle[1], Dr Bennie de Waal[2] & Prof Andrew Green[1]	1 – UKZN *Hydraulics & Environmental Fluid Mechanics department* 2 – Geomorphological services
LiDAR	Mr Trevor Pike	GroudTruth Consulting
Aquatic	Ms Caleena *De Carvalho*	Afzelia Environmental Consultants
Vegetation	Mr Bryan Paul	Afzelia Environmental Consultants
Marine	Ms Lisa Guastella	Alan Smith Consulting
Palaeontological (desktop)	Dr Alan Smith	Alan Smith Consulting
Agricultural statement	Mr Johann Lanz	Johann Lanz – soil scientist

Baseline sedimentological and morpho dynamic functioning

The floodplain and wetlands of the uMfolozi and uMsunduzi Rivers are heavily farmed, but ongoing channel migration and avulsion make farming unpredictable. To overcome this, the river channels were straightened, and several drains were installed to drain water off the land used for agriculture. The uMfolozi River is currently elevated above the level of the floodplain, with levees keeping the flows contained along the artificially maintained floodplain channels. Any surface water on the floodplain will drain away from the uMfolozi River towards the uMsunduzi River. The uMfolozi floodplain has avulsion points at the head of the floodplain and along the lower floodplain, where smaller avulsion events redistribute water and finer sediment across the lower floodplain near the St Lucia mouth.

The uMfolozi system is characterised by complex flood and sediment transport conditions within and between years. Annual sediment transport is not directly linked to annual discharge, indicating that processes at the catchment level (land use, land cover, sediment storage, etc.) play a role in sediment

availability and subsequent transport and deposition. Estimates of annual sediment yield range from 0.68 to 4 x 10^6t.a^{-1}. Estimates for the remainder of the St Lucia catchment, excluding the uMfolozi River catchment, are 1.21 x 10^6t.a^{-1}. These high sediment loadings drive sedimentation at the terminal end of the channelised uMfolozi, resulting in sediment buildup on the lower uMfolozi-uMsunduzi floodplain and river channels, especially during prolonged periods of mouth closure when the floodplain is inundated, and velocities are very low and favour sediment deposition.

Marine Assessment

A number of environmental impacts caused by the proposed vegetation removal and dredging of accumulated sediments from the river channels have been identified. The proposed Phase 1, removal of vegetation (only) blocking the river channels, will have a lower intensity and overall environmental impact than dredging (proposed as Phase 2) and should be undertaken first. Should the vegetation removal, undertaken as Phase 1, facilitate sufficient throughflow in the channels to drain the backflooded areas, the more costly (in terms of environment and financial) dredging activity could possibly be avoided. If monitoring (after vegetation removal) indicates the sediments are still blocking the channels, preventing drainage of the Mfolozi flats farmland areas, then dredging will be required. Dredging impacts marine organisms negatively through entrainment, habitat degradation, noise, turbidity and remobilization of contaminants and sedimentation. In both cases, it is recommended that the Mfolozi/St Lucia estuary mouth is maintained open in order to facilitate out flow of sediments that might be mobilised through vegetation removal and dredging activities.

Owing to the influence of the activities being confined to a localised area (where the activity is taking place), most of the construction phase impacts were calculated to be of low to very low consequence and insignificant to low significance. However, during the operational phase the dredging of the Msunduzi channels potentially has more widespread and longer-lasting impacts, resulting in higher consequences of mostly medium to high significance. These can be reduced by following the recommended mitigations, which can be incorporated into the EMMPr.

Field survey and Lidar Survey

A LiDAR survey was flown to update the lower floodplain's topographic data and map the geomorphology and vegetation. A field survey was conducted in August 2023 to collect basic bathymetric, flows, sediment and physico-chemical data for the beach and lower uMsunduzi channels. The results showed that:

- The St Lucia estuary is significantly super-elevated due to the severe constriction at Honeymoon Bend
- The salt wedge, associated with tidal exchange flows, travelled approximately 3km upstream of the Beach Channel to the confluence of the uMfolozi and uMsunduzi Rivers.

- The lower uMsunduzi River is significantly choked with vegetation, and a lobe of sediment is present within the uMsunduzi River approximately 4km upstream from the St Lucia Mouth, preventing tidal exchange and drainage.

- Excessive vegetation growth within the uMsunduzi River near Four Drain was preventing efficient

drainage for the back-flooded farmlands.

Vegetation Study

According to KwaZulu-Natal Biodiversity Spatial Planning Terms and Processes, Version 3.3 (2016) the study area is located within an Ecological Support Area. According to the same dataset, no Critical Biodiversity Areas (CBA) Irreplaceable or Optimal are found within the study area. Any planned activities associated with this project must therefore ensure that the existing natural biodiversity pattern, ecological processes and drivers, as well as any movement corridors (daily or seasonally / episodic – e.g. migration of certain species) are not inhibited in any way, and persist throughout the project life-cycle.

The study contains five (5) vegetation types, namely **1)** Mangrove Forest, **2)** Non-terrestrial (estuarine functional zone); **3)** Northern Coastal Forest; and **4)** Subtropical Alluvial Vegetation; and **5)** Swamp Forest.

According to the National Biodiversity Assessment (NBA), study area does not occur within any ecosystems with a national (Skowno et al. 2019) threat status of VU, EN or CR. The entire proposed dredging will take place either outside of any ecosystems recorded within this dataset, or within ecosystem with a threat status of LC. The following is a list of the affected ecosystems:

- *Mangrove Forest (FOa3) – LC;*
- *Swamp Forest (FOa2) – LC;*
- *Northern Coastal Forest (FOz7) - LC; and*
- *Subtropical Alluvial Vegetation (AZa7) – LC;*

During the field assessment, no rare or endangered species were identified. However, one (1) species (Barringtonia racemosa) was observed throughout the study area, which is protected by the National Forest Act, 1998 (Act No. 84 of 1998). If the Applicant wishes to clear, or prune any of the specimens found within the study area, then an application to do so must be submitted to the Department of Forestry, Fisheries and the Environment. Although not observed at the time, it is also likely that Avicennia marina and Ficus trichopoda may be found within the woody community, outside of the proposed dredging zone, but which are also specifically protected. None of these species however, could be seen from the boat when assessing both rivers and therefore will be located outside of the direct impact zone.

Aquatic Study

The uMsunduzi and uMfolozi watercourses occur within a protected area, World Heritage Site, namely the iSimangaliso Wetland Park and RAMSAR site. The proposed portion of the watercourses which will be dredged and cleared of vegetation occur within the EFZ. This area has been demarcated as having high ecological sensitivity and very high importance, although this system is currently not in a favourable ecological state (Category D). Agricultural activities are prevalent within the floodplain and the project activities have been proposed to assist in back-flooding.

The impacts associated with the proposed channel clearing and dredging were deemed to be moderate to low with mitigation. Low risks were associated with the vegetation removal and moderate risk impacts were associated more with the dredging activity and dumping of the spoil within the floodplain. Impacts from dredging would include habitat loss, increased sedimentation, smothering of benthic organisms, changes in flow, and resuspension of contaminants (if available)

IMPACT ASSESSMENT

The studies conducted to inform this impact assessment include specialist assessments of the impacts of vegetation clearance and dredging if needed in phase 2 . All impacts identified and assessed, as well as the proposed mitigation measures and management actions are set out in Chapter 5. All mitigation and management measures proposed by the specialists, including those additional impacts and management measures identified by the EAP have also been incorporated into an Environmental Management Programme report (EMPr)and Maintenance Management Plan (MMP) (Appendix G of this report) which will be used during implementation of the proposed activity to manage impacts and monitor compliance. Specialist reports are included in Appendix E of this report.

The overall impacts are summarized below:

Impact	**Significance without mitigation**	**Significance with mitigation**
Watercourse ecology	Medium	Low -
fauna and flora	Low-Medium	Low -
Noise and air quality	Low	Low -
Waste management	Low-Medium	Low -
Heritage	Low	Low -
Soil and erosion	Low-Medium	Low -
Socio-economic safety and security	Low	Medium +

Impact details (summarized)

IMPACT	SIGNIFICANCE (before mitigation)	SIGNIFICANCE (after mitigation)
MAINTENANCE PHASE		
Alteration to water quality	**MODERATE**	**LOW**
Increase in mobilized sediment (turbidity)	**MODERATE**	**LOW**
Mobilised pollutants attached to sediments. Can cause the resuspension of sediments. This may increase the levels of nutrients available to marine organisms.	**LOW**	**LOW**
Bioaccumulation of contaminants within the water column affecting aquatic species	**LOW**	**LOW**
Release of hydrocarbons into water and within the soil which can be toxic to intolerant aquatic species	**MODERATE**	**LOW**
Increase in Suspended Particulate Matter (SPM) negatively affects visual predators such as fish and birds	**LOW**	**LOW**
Suspended particles, released into the water column from the disposal of dredge sediments, can decrease water transparency and release nutrients and hazardous substances affecting marine organisms, e.g., inorganic nutrients, heavy metals, and organic contaminants.	**LOW**	**LOW**
Affects photosynthesis in aquatic plants as well as interfering with the feeding mechanisms of some aquatic organisms too, causing harm at multiple levels in the food chain.	**LOW**	**LOW**
Use of dredger on land may cause diversion or flows	**MODERATE**	**MODERATE**
Removal of Phragmites may increase flows through systems	**LOW**	**LOW**
Removal of native species and outcompeting by invasive species	**LOW**	**LOW**
Suffocation of submerged vegetation from sediment	**LOW**	**NEGLIGIBLE**

-Alteration to nutrient cycling and productivity as well as light penetration affecting plant composition and richness.	**LOW –**	**LOW –**
Suffocation of benthic communities from spoil	**LOW –**	**LOW –**
Compaction of soils from dredger within wetlands	**MODERATE –**	**MODERATE**
Alteration to gradient from aggradation and degradation processes	**LOW–**	**LOW –**
Dust Creation	**LOW**	**NEGLIGIBLE**
Noise disturbance, ambient and in water column, human disturbance– affects aquatic and avi-fauna.	**MEDIUM**	**LOW –**
Impact on Archaeological Remains	**LOW –**	**NEGLIGIBLE –**
Impact on Paleontological Resources	**LOW –**	**NEGLIGIBLE –**
Impacts Resulting from Material Stockpiling	**LOW**	**MODERATE**
OPERATIONAL PHASE		
Removal of vegetation will mobilise sediment and reduce water quality. Turbid waters may suffocate benthic species . (**vegetation clearing)**:	**MODERATE**	**LOW –**
Fish species are less likely to be impacted due to their ability to vacate an area which is experiencing disturbance. Benthic organisms are also more likely to be buried within the spoilwhich will be discharged in large quantities in the designated area. (**dredging)**:	**LOW**	**LOW**
Aggradation and degradation processes will alter the gradient affect downstream hydrology and geomorphology. (Vegetation phase)	**LOW –**	**NEGLIGIBLE–**
The operation of the machinery within and along the channel banks may result in bank erosion and trampling of marginal or instream vegetation. The spoil which is deposited within the floodplain may be redeposited into the channel during flooding events or extreme high tides. This will result in increased turbidity, smothering of submerged vegetation and habitats and the potential contamination of water resources if the spoil has been contaminated with agrochemicals. (Dredging)	**LOW –**	**LOW -**
Trampling or vehicle damage to sensitive vegetation and faunal habitats during dredging operations (EMMPr to address to reduce)	**LOW**	**LOW**
Clearing Phragmites within the channel will improve flow of water through systems which may increase flows and alter aquatic habitat that has been adapted to infrequent or periodic saturation. (vegetation clearing):	**MODERATE**	**LOW–**
Toxic spills potentially result in fatalities of aquatic fauna sensitive to water quality changes, leading to a further shift in species composition, favouring tolerant species. During the dredging process, bottom sediments will be disturbed and resuspended. This will result in temporary increases in turbidity during the dredging process and for a short period after the activity. (dredging)	**MODERATE**	**MODERATE–**

The **No-Go option** must always be considered in an environmental assessment. The No-Go alternative represents the option not to proceed with the proposed project and requires a comparison between the intervention options with that of not proceeding with the project. The no-go alternative is to do nothing and allow for the natural processes determine the nature of the estuary, and more specifically the Msunduzi and uMfolozi Rivers and the back flooded areas. Sediment will continue to flow into both rivers, and it is likely that *P. australis*, amongst other species (including *Pistia stratiotes*) will proliferate further and entirely close off the channel and restrict it to a small visible channel with a significantly reduced open water column. The community of St Lucia depend highly on farming practices and have been significantly impacted over the years, both economically and socially. **The No-go Alternative is not preferred**.

The **preferred alternative Phase 1** of the project proposal involves the following proposed interventions:

i. Clearing the vegetation and debris blockages within the lower Mfolozi and the Msunduzi (10 hotspots). This will increase conveyance within both rivers and could naturally erode the lobe of sediment within the lower Msunduzi.

ii. Once the vegetation and debris are removed, undertake a hydrographic survey of the lower Mfolozi and Msunduzi rivers to better inform areas requiring dredging (if required).

iii. Install real-time monitoring equipment.

iv. Ongoing monitoring of vegetation or woody debris buildup within the lower Mfolozi and Msunduzi and removal (refer the areas to be monitored in Figure 17).

The detailed option is in chapter 5 of this report.

CONCLUDING REMARKS AND RECOMMENDATIONS

This dBAR provides an assessment of the potential benefits and negative impacts anticipated by the proposed vegetation clearing of the Msunduzi and Mfolozi channels and drainage canals on the uMfolozi flats (Phase 1) and the dredging of sediments blocking the lower Msunduzi River (Phase 2).

Based on the findings of the environmental impact assessment, there is unlikely to be any significant negative environmental impacts and socio-economic benefits are evident. Owing to the influence of the activities being confined to a localised area (where the activity is taking place), most of the dredge phase impacts were calculated to be of low to very low consequence and insignificant to low significance. However, during the operational phase the dredging (Phase 2) of the Msunduzi channels potentially has more widespread and longer-lasting impacts, resulting in higher consequences of mostly medium to high significance – many of these were positive impacts. Any negative impacts can be reduced by following the recommended mitigations, which have been incorporated into the EMMPr and MMP .

The proposed Phase 1, removal of vegetation (only) blocking the river channels, will have a lower intensity and overall environmental impact than dredging (proposed as Phase 2) and should be undertaken first. Should the vegetation removal, undertaken as Phase 1, facilitate sufficient throughflow in the channels to drain the backflooded areas, the more costly (in terms of environment and financial) dredging activity could possibly be avoided. If monitoring (after vegetation removal) indicates the sediments are still blocking the channels, preventing drainage of the Mfolozi flats farmland areas, then dredging (Phase 2) will be required. Dredging impacts marine organisms negatively through entrainment, habitat degradation, noise, turbidity and remobilization of contaminants and sedimentation.

In both cases, it is recommended that the Mfolozi/St Lucia estuary mouth is maintained open in order to facilitate out flow of sediments that might be mobilised through vegetation removal and dredging activities.

The **no-go alternative** would lead to the dominance of opportune species and land use activities that would have significant socio-economic impacts on a local economy already under significant pressures. It also would mean that land, in significant quantities, is likely to be abandoned and not managed. Falling outside of the ISimangaliso Wetland Park Authority, this would have further negative impacts such as the proliferation of alien invasive plants species that are currently widespread in the area.

In order to ensure the effective implementation of the mitigation and management actions for the proposed dredging, the Maintenance Management plan and Environmental Management Programme included as **Appendix G incorporates** mitigation measures necessary to ensure that the project is planned, implemented, and operated in an environmentally responsible manner.

Taking into consideration the findings of the various specialist studies and the issues raised by interested and affected parties and organs of state, it is the EAP's reasoned opinion that the proposed activity **should receive Environmental Authorisation** in terms of the EIA Regulations, 2014, subject to the following conditions:

» The Environmental Management Programme (EMMPr) and Maintenance Management Plan (MMP) forming part of this EIA Report must be implemented during the design, implementation and operational phases of the development.

» An independent Environmental Control Officer must be appointed in all phases and must carry out the responsibilities of that role as defined in the EMMPr and MMP.

» Authorised activities should commence within ten years of the date of the environmental authorisation and should be completed within ten years from commencement.

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GLOSSARY

Activity [Development] – an action either planned or existing that may result in environmental impacts through pollution or resource use.

Alternative – a possible course of action, in place of another, of achieving the same desired goal of the proposed project. Alternatives can refer to any of the following but are not limited to site alternatives, site layout alternatives, design or technology alternatives, process alternatives or a no-go alternative.

Applicant – the project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.

Bench Wetland - an area of mostly level or nearly level high ground [relative to the broad surroundings], including hilltops / crests [areas at the top of a mountain or hill flanked by down-slopes in all directions], saddles [relatively high-lying areas flanked by down-slopes on two sides in one direction and up-slopes on two sides in an approximately perpendicular direction], and shelves / terraces / ledges [relatively high-lying, localised flat areas along a slope, representing a break in slope with an up-slope one side and a down-slope on the other side in the same direction].

Biodiversity – the diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.

Dredge – Dredging is the removal of sediments and debris from the bottom of lakes, rivers, harbours, and other water bodies.

Cumulative Impacts – impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present, or reasonably foreseeable future activities to produce a greater impact or different impacts.

Direct Impacts – impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

Ecological Reserve – the water that is necessary to protect the water ecosystems of the water resource. It must be safeguarded and not used for other purposes. The Ecological Reserve specifies both the quantity and quality of water that must be left in the national water resource. The Ecological Reserve is determined for all major water resources in the different water management areas to ensure sustainable development.

Ecosystem – a dynamic system of plant, animal [including humans] and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.

Environment – In terms of the National Environmental Management Act [NEMA] [Act No 107 of 1998] [as amended], "*Environment" means the surroundings within which humans exist and that are made up of:*

a) the land, water, and atmosphere of the earth

b) micro-organisms, plants, and animal life

c) any part or combination of [a] or [b] and the interrelationships among and between them; and

d) the physical, chemical, aesthetic, and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Assessment– the generic term for all forms of environmental assessment for projects, plans, programmes, or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments, and risk assessments.

Environmental Authorisation [EA] – an authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

Environmental Assessment Practitioner – the individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

Environmental Impact – a change to the environment [biophysical, social and / or economic], whether adverse or beneficial, wholly, or partially, resulting from an organisation's activities, products, or services.

Environmental Impact Assessment [EIA] – the process of identifying, predicting, evaluating, and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

Environmental Issue – a concern raised by a stakeholder, interested, or affected parties about an existing or perceived environmental impact of an activity.

Environmental Management – ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme – A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. This EMMPr focuses on the dredge phase, operation [maintenance] phase and decommissioning phase of the proposed project.

Expansion – means the modification, extension, alteration or upgrading of a facility, structure, or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Fatal Flaw – issue or conflict [real or perceived] that could result in developments being rejected or stopped.

General Waste – household water, dredge rubble, garden waste and certain dry industrial and commercial waste which does not pose an immediate threat to man or the environment.

Hazardous Waste – waste that may cause ill health or increase mortality in humans, flora, and fauna.

Hypsometry – measurement of the elevation and depth of features of the earth's surface relative to mean sea level (msl).

Indirect Impacts – indirect or induced changes that may occur because of the activity. These types if impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place because of the activity.

Integrated Environmental Management – a philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy [and principles] is interpreted as applying to the planning, assessment, implementation, and management of any proposal [project, plan, programme, or policy] or activity – at local, national, and international level – that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools [such as strategic environmental assessment and risk assessment], environmental management tools [such as monitoring, auditing, and reporting] and decision-making tools [such as multi-criteria decision support systems or advisory councils].

Interested and Affected Party – for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, means an interested and affected party contemplated in Section 24[4] [a] [v], and which includes – *[a] any person, group of persons or organisation interested in or affected by such operation or activity; and [b] any organ of state that may have jurisdiction over any aspect of the operation or activity*.

Mitigate – the implementation of practical measures designed to avoid, reduce, or remedy adverse impacts or enhance beneficial impacts of an action.

No-Go Option – in this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.

Ramsar - a wetland site designated of international importance, especially as Waterfowl Habitat, under the Ramsar Convention, also known as "The Convention on Wetlands"; an intergovernmental environment treaty established in 1975 by UNESCO.

Rehabilitation – a measure aimed at reinstating an ecosystem to its original function and state [or as close as possible to its original function and state] following activities that have disrupted those functions.

Representative Concentration Pathway - a climate modelling scenario of long-term global emissions of greenhouse gases, short-lived species and land-use-land-cover, which stabilizes radiative forcing to a specified level by the year 2100. The levels typically used are 4.5 and 8.5, meaning 4.5 and 8.5 Watts per meter squared (W m^{-2}), respectively.

Sensitive Environment – any environment identified as being sensitive to the impacts of the development.

Significance – significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change [i.e., magnitude, intensity, duration, and likelihood]. Impact significance is the value placed on the change by different affected parties [i.e., level of significance and acceptability]. It is an anthropocentric concept, which makes use of value judgements and science-based criteria [i.e., biophysical, social, and economic].

Stakeholder Engagement – the process of engagement between stakeholders [the proponent, authorities, and I&APs] during the planning, assessment, implementation and / or management of proposals or activities.

Sustainable Development – development which meets the needs of current generations without hindering future generations from meeting their own needs.

Watercourse – means:

a] *a river or spring*

b] *a natural channel or depression in which water flows regularly or intermittently.*

c] *a wetland, lake, or dam into which, or from which, water flows; and*

d] *any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 [Act No. 36 of 1998] and a reference to a watercourse includes, where relevant, its bed and banks.*

Wetland – means land, which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

World Heritage Site – a place that is listed by the United Nations Educational, Scientific and Cultural Organization (UNESCO) as having special cultural or physical significance.

ACRONYMS

BA	Basic Assessment
BAR	Basic Assessment Report
BGIS	Biodiversity Geographic Information Systems
BID	Background Information Document
CBA	Critical Biodiversity Area
CDO	Community Development Officer
CLO	Community Liaison Officer
CMA	Catchment Management Agency
CP	Conservation Plan
CSAG	Climate Systems Analysis Group
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs (now DFFE)
DFFE	Department of Forestry, Fisheries and the Environment (formerly DEA)
DWS	Department of Water and Sanitation
DBAR	Draft Basic Assessment Report
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment [refers to environmental.
EIS	Ecological Importance and Sensitivity
GA	General Authorisation [refers to type of water use licence authorisation]
GA	General Arrangement [refers to drawing / illustration of structures]
GIS	Geographic Information System
GPS	Geographical Positioning System
IAPs	Interested and Affected Parties
IDP	Integrated Development Plan
LLO	Local Liaison Officer

LSA	Later Stone Age
MAB	Modular Ablution Blocks
msl	mean sea level
NBSAP	National Biodiversity Strategy and Action Plans
NEMA	National Environmental Management Act [Act No. 107 of 1998] [as amended]
NEM: BA	National Environmental Management Biodiversity Act [Act No. 10 of 2004]
NEM: WA	National Environmental Management Waste Act [Act No. 36 of 1998] [as amended]
NEM: AQA	National Environmental Management Air Quality Act [Act No. 39 of 2004]
NFA	National Forests Act [Act No. 84 of 1998]
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act
NWA	National Water Act
NGO	Non-Governmental Organisation
OHSA	Occupational Health and Safety Act [Act No. 85 of 1993]
OUV	Outstanding Universal Value
PWS	Present Ecological State
PPP	Public Participation Process
PU	Planning Unit
RCP	Representative Concentration Pathway
REC	Recommended Ecological Category
RISFSA	Road Infrastructure Strategic Framework for South Africa
SADC	South African Development Community
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Internet System
SANBI	South African National Biodiversity Institute
SANRAL	South African National Roads Agency Limited
SAPS	South African Police Services

SARTSM	South African Road Traffic Signs Manual
SDF	Standard Design Flood
SWL	Static Water Level
SMP	Storm water Management Plan
UNESCO	United Nations Educational, Scientific and Cultural Organization
VRAI	[Riparian] Vegetation Response Assessment Index
WMA	Water Management Agency
WUL	Water Use Licence

PROCESSING OF PERSONAL INFORMATION

Indaloenhle Environmental Consultants is required by the EIA Regulations, GNR 326 of 2017 and the National Environmental Management Act to maintain a register of interested and affected parties including of people who have commented, attended meetings, or requested registration. This requires us to collect and process certain personal information as defined in the Protection of Personal Information Act, 2013. The following personal information has been collected, with the required consent, for the purpose of public participation from registered I&APs and will be collected from anyone who comments or registers:

- Name, contact details and address;
- A copy of any comments submitted; and
- Details of any interest declared in the granting or refusal of the application.

Should you register and/or comment, your name and your comments will be included in published documents. Your contact details, address, and interest declaration will be provided to the competent authority and must also be provided to any appellants in the event that the environmental authorisation is appealed in terms of the Appeal Regulations, GNR 993 of 2014. Personal information will be stored by Indaloenhle Environmental Consultants Pty Ltd , , and on a cloud storage system which may include servers outside the Republic of South Africa. Old Main Road, Kloof , 3610 . You may at any time request access to or rectify this personal information by contacting us on info@indaloenhle.co.za .

INTRODUCTION

1.1 OVERVIEW

The Lake St Lucia estuarine system, located in the north of the province of KwaZulu-Natal (KZN), is a dominant feature of the iSimangaliso Wetland Park, and from a biodiversity point of view, is one of the country's most significant estuaries (iSimangaliso Wetland Park, 2016). The estuary and lake system are also located within the iSimangaliso Wetland Park World Heritage Site and listed Ramsar wetland of international importance, under the management of the iSimangaliso Wetland Park Authority. There is a long history of human intervention of the Mfolozi and Msunduzi delta and estuary mouths, which has affected the mouth dynamics and ecological function.

Back-flooding of commercial and subsistence farmland in the floodplain became problematic since the estuary mouth closed in 2014, affecting commercial and small grower agricultural operations on the lower Mfolozi flats and within the Sokhulu area. An "assisted breach" of the combined St Lucia/Mfolozi/Msunduzi mouth was conducted on 6 January 2021, and the mouth remained open until 3 June 2021; however, this did not alleviate the back-flooding issue.

The project rationale is that clearing of the vegetation and sediment clogged Msunduzi channel will alleviate backflooding on the Msunduzi and Mfolozi Flats areas. Once drained, this will allow commercial and small-grower farmers to farm their areas that have been unable to farm since backflooding inundated their lands.

1.2 OBJECTIVES OF THE STUDY

Historically, the St Lucia Lake, uMfolozi and uMsunduzi Rivers shared a common mouth before the artificial separation of the uMfolozi and Msunduzi Rivers from the St Lucia Estuary in the 1950's. A new uMfolozi mouth was opened to the sea south of the St Lucia Estuary, and the St Lucia Estuary mouth was dredged to maintain a connection to the ocean. This ceased in the early 2000's, The St Lucia mouth subsequently closed because of lack of suffcient water due to drought conditions. " In 2018, the South African High Court ruled that the mouth of the adjoining uMfolozi River could no longer be artificially breached to alleviate back-flooding in adjacent farmlands within the uMfolozi floodplain. However, in 2021, iSimangaliso Wetland Park Authority decided with the St Lucia community to artificially breach the St Lucia mouth, which saw the appointment of an Independent Panel of Experts to assess the breaching effects on the system and advise on best management actions going forward. One conclusion was that "*Breaching the St Lucia mouth does not offer relief to farmers in the uMfolozi-Msunduzi floodplain. Back-floodng in this region is caused by the blockage of the Msunduzi channel by extensive reed growth and*

accumulated sediment. Clearing the Msunduzi and beach channel of vegetation and sediment will allow water to flow freely from the floodplain to the mouth."

In March 2023 iSimangaliso requested approval from the Department of Forestry, Fisheries and the Environment (DFFE) to dredge the Msunduzi River and beach channel in terms of a Section 30A directive in terms of the National Environmental Management Act, 1998 (act no. 107 of 1998). This was refused, and an application process for environmental authorisation was initiated. A key request was to establish baseline conditions for the functioning of the various systems and predict their response (based on scientific modulation) to various management scenarios, including a sedimentological, geomorphological and hydraulic appraisal of the affected areas. The above-mentioned report was to provide baseline information of the various systems and the hydraulic and geomorphological implications of dredging and clearing the lower Msunduzi and uMfolozi Rivers to relieve back-flooding as stipulated by the TORs, and hence advise the Basic Assessment process.

The Basic Assessment Report must satisfy the requirements of Appendix 1 of the amended 2017 NEMA EIA Regulations (as noted in Regulation 21 (3) of the GN R326).

- Conduct a consultative process.
- Determine the policy and legislative context within which the proposed activity is undertaken and how the activity complies with and responds to the policy and legislative context.
- Identify the alternatives considered, including the activity, location, and technology alternatives.
- Describe the need and desirability of the proposed project.
- Undertake an impact and risk assessment process inclusive of cumulative impacts [where applicable]. The focus being to determine the geographical, physical, biological, social, economic, heritage and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine:
    - the nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    - the degree to which these impacts:
        - can be reversed.
        - may cause irreplaceable loss of resources; and
        - can be avoided, managed, or mitigated.
- Through a ranking of the site sensitivities and possible impacts the activity will impose on the site to:
    - identify suitable measures to avoid, manage or mitigate identified impacts; and
    - Identify residual risks that need to be managed and monitored.

Figure 1 below illustrates the approach / methodology employed in this Basic Assessment process.

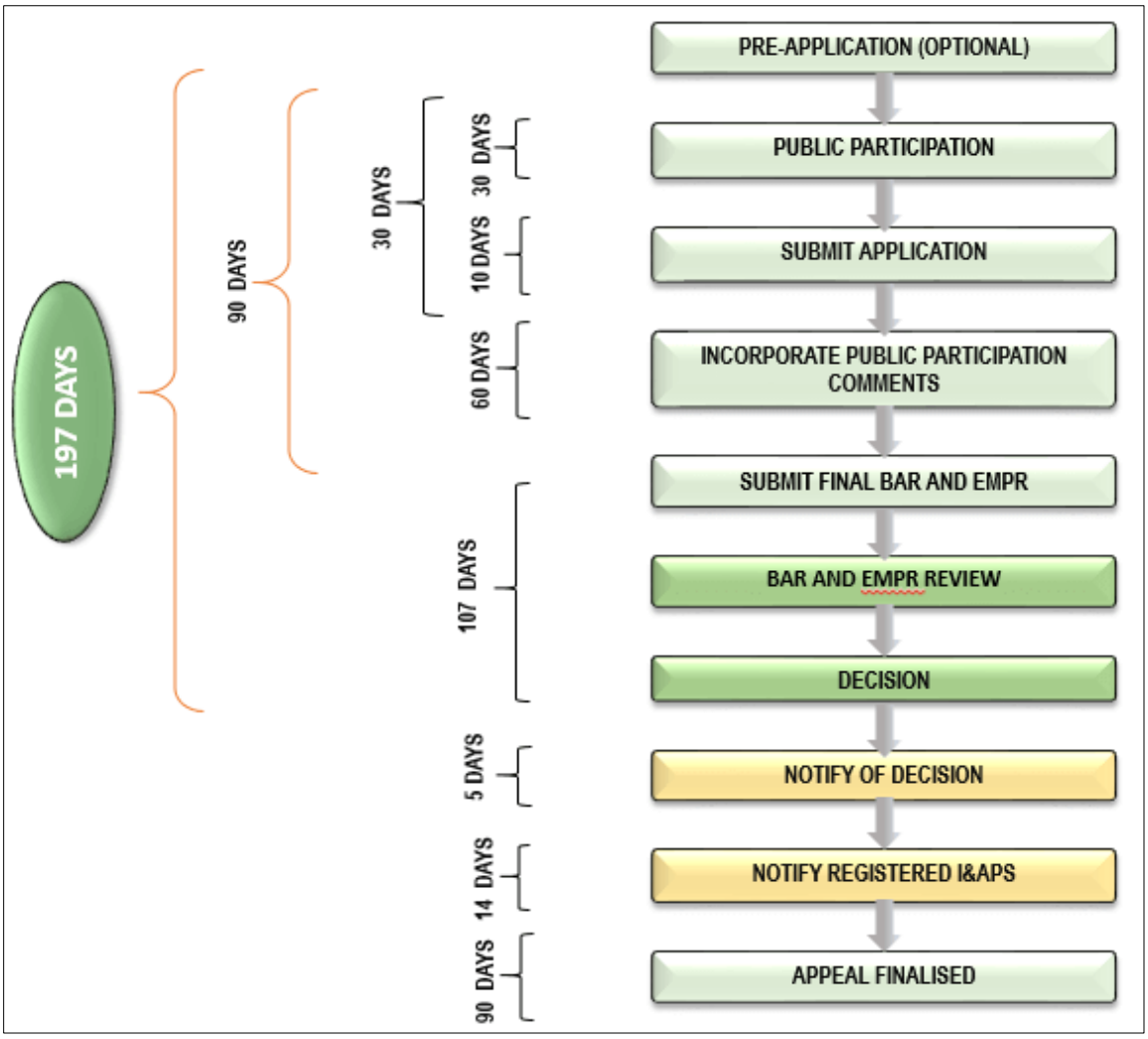


Figure 1: Basic Assessment Process

1.3 SCOPE OF WORK AND LOCATION OF ACTIVITY

1.3.1 SCOPE

This study is in response to the Scope of Work as provided by iSimangaliso Wetland Park Authority. The **project rationale** is as follows:

The iSimangaliso Wetland Park Authority has taken deliberation to clear the vegetation and remove sediments from the Msunduzi River channel, in line with the recommendations of the Panel of Experts Report (2022), thereby allowing water to flow freely to the St Lucia estuary mouth, in order to obtain a required Msunduzi and beach channel depth for optimal water flow from the catchment region to the estuary mouth.

The hydrology of the upper and lower regions of the Msunduzi River will require monitoring during dredging phases, and the use of advanced modelling technology (site and desktop assessment) is required to assess the implementation of the dredging method, conditions of the dredged channel, back flooding rate and the downstream flow of water to the catchment region. The model should simulate management scenarios and include the maintenance of the dredging volume, the impacts of the dredged spoil (vegetation and sediment) and provide forecast solutions to mitigate the impact on the environment in order to maintain the environmental integrity of the St Lucia estuary, which include the monitoring of suspended sediment yields into the St Lucia estuary system.

The monitoring and management of the dredging process will enable the iSimangaliso Wetland Park Authority to take timely decisions and implement adaptive and corrective measures for the maintenance of a free-flow river channel.

The **terms of reference** are:

a) Development of baseline information on hydrological and geomorphological conditions in the upper and lower regions of the Msunduzi Channel and beach channel using simulated data plots that will contribute to a better understanding to silt deposition from the Mfolozi farmers into the channel.

b) Develop a method statement on the dredging model to be used. Detailing, best engineering solutions to be utilised to minimize impact.

c) Advise, through hydrographic surveys, on the positive and negative implications of dredging, method employed and the hydraulic performance of the proposed dredged channel during the pre, post and interim phases.

d) Assessment of back flooding rate and the forecast of the hydraulic performance and the geomorphology of the proposed dredged channel for ongoing monitoring and management of dredging.

e) Quantification and removal technique of the volume of dredging spoil (vegetation and soil) during the pre, post and interim phases from the river system.

f) Advise on the impact of the pre, post and interim phases of dredging on the risk of erosion of the riverbanks.

g) Advise on the impact of the pre, post and interim phases of dredging on the St Lucia estuary catchment region, how this will impact the estuary mouth system, the marine component and suspended sediment (size of grains, chemical and toxicological) and the hydrology (water chemistry, turbidity) as a whole, as well as the associated environmental, social and economic implications. Also advise on the classification of the sediment and the most efficient method of disposal of the dredge spoil from an ecological, socio-

economic and financial point of view. The classification and assessment of the method of disposal must bear in mind the size of grains, chemical and toxicological nature and the hydrology (water chemistry, turbidity) and the marine system (in-shore and offshore) of the St Lucia mouth.

h) Provide recommendations on mitigation measures to be implemented to mitigate negative impacts on the ecological function of the catchment systems and its associated users to maintain environmental integrity. These mitigation measures should be based on the mitigation hierarchy and prioritized again from an ecological best practice point of view, taking into consideration the potential introduction of alien vegetation in the catchment region.

1.3.2 SITE LOCATION

The affected area was described in the Scope of Work as the lower Msunduzi River channel blockage and the linking beach channel to the St Lucia Estuary and mouth. The subject area is effectively the lower Mfolozi and Msunduzi floodplain through to the St Lucia Estuary, some of which falls within the iSImangaliso Wetland Park World Heritage Site (refer Chapter 1.4).

Figure 2 shows the subject area in relation to the entire World Heritage Site and Figure 3 shows an adapted, zoomed in, Google Earth image providing detail of the subject area in relation to the Park boundary. While the backflooded areas are mostly out of the Park boundary, the blocked river areas deemed to be causing the problem, and where intervention is considered to be required, are within the Park. Central geographic co-ordinates are provided in Table 1.

Table 1: Central geographic coordinates of the proposed project site

Geographic coordinates	Latitude	Longitude
St Lucia estuary mouth (approx.).	28°23'24.51"S	32°25'25.48"S
Lower Msunduzi River blockage (central, approx.)	28°24'43.76"S	32°25'00.00"S
Flooded farmlands (central, approx.)	28°28'37.73"S	32°20'38.89"S
Sugarloaf slipway (required for site access)	28°23'07"S	32°25'02"S



Figure 2: Map showing the entire iSimangaliso Wetland Park World Heritage Site in northern KwaZulu-Natal and the study site in the south of the Park area.

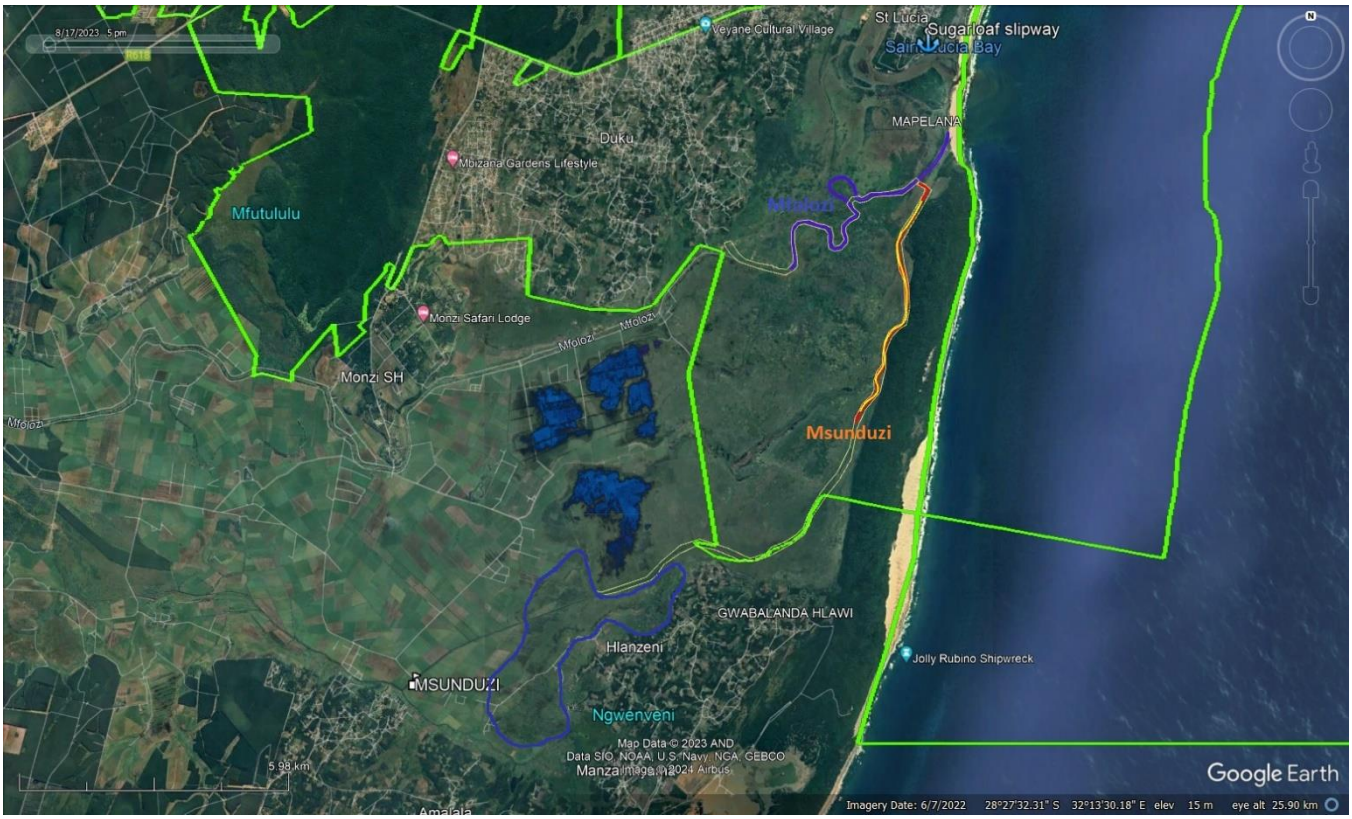


Figure 3: Google Earth imagery (24 January 2023) of the study area, showing the extent of backflooding (dark blue) of commercial sugar cane fields in the LiDAR surveyed area, indicated by hypsometry 0 to 2.5 m msl water levels. The approximate backflooded Sokhulu small grower and cane growing area to the south (out of the surveyed area and not shown by the hypsometry) is indicated by the blue outline. The Park boundary is indicated in green and the Mfolozi and Msunduze channels blocked by vegetation and sedimentation are indicated in blue and orange/red, respectively.

1.4 WORLD HERITAGE SITE & RAMSAR CONTEXT

1.4.1 ISIMANGALISO WORLD HERITAGE SITE

The area of the proposed activity falls within the iSimangaliso Wetland Park World Heritage Site (refer Fig. 2), falling under the management of the iSimangaliso Wetland Park Authority. iSimangaliso was proclaimed a UNESCO World Heritage site in December 1999 in terms of the World Heritage Convention Act, 1999 (Act 49 of 1999), an Act that incorporated the World Heritage Convention into South African legislation.

As a World Heritage site, iSimangaliso is an area of exceptional and outstanding universal heritage significance and is one of the world's outstanding natural and cultural treasures, exhibiting outstanding universal values for which the Park is world-renowned. The natural values include outstanding examples

of ecological processes, superlative natural phenomena and scenic beauty, and exceptional biodiversity and numbers of threatened species (IMP, 2020). The iSimangaliso Wetland Park qualifies as a World Heritage Site of Outstanding Universal Value (OUV) based on three of the total ten criteria, viz.

Criterion (vii): geographically diverse with superlative scenic vistas and exceptional aesthetic qualities. Three natural phenomena are judged outstanding:

(1) Shifting salinity states within Lake St. Lucia, which are linked to wet and dry climatic cycles, with the lake responding accordingly with shifts from low to hyper-saline states.

(2) Spectacle of large numbers of nesting turtles on the beaches and the abundance of dolphins and seasonal migrations of whales and whale sharks off-shore.

(3) Huge numbers of waterfowl and large breeding colonies of pelicans, storks, herons and terns.

Criterion (ix): The combination of a variety of landforms and exceptional species diversity. Maputaland Centre of Endemism, submarine canyons on the continental shelf, coral reefs and the interplay of major floods and coastal storms. iSimangaliso is also of sufficient size and retains most of the key elements that are essential for long-term functioning of the ecosystems.

Criterion (x): The five interlinked ecosystems found in iSimangaliso provide habitat for a significant diversity of African biota, including a large number of threatened and/or endemic species. The outstanding diversity of habitats (terrestrial, wetland, coastal and aquatic) supports a wide variety of animal species, some at the northern and many at the southern limit of their range.

In terms of this project, it is mainly elements of Criterion (ix) and (x) that applies, for Criterion (ix) more specifically the Maputaland Centre of Endemism and the interplay of major floods and coastal storms. Although listed as a World Heritage site on the basis of its natural values, the World Heritage Convention Act also obliges the iSimangaliso Authority to present, promote and conserve the cultural heritage of the Park (IMP, 2020).

The fact that the area of the proposed activity falls within the iSimangaliso Wetland Park World Heritage Site means that the project must also follow the requirements as outlined in the UNESCO "*Guidance and Toolkit for Impact Assessments in a World Heritage Context*", 2022. This provides a framework for state parties, project stakeholders and independent experts, with practical guidance on how to commission, conduct and review impact assessments for World Heritage Sites to ensure solutions for both protecting World Heritage sites and supporting good quality and appropriate sustainable development.

The **Principles for impact assessment** are aligned with NEMA, with an obvious focus on the protection of the Outstanding Universal Value (OUV) of the WHS. Some key principles relevant to the project proposal are outlined below:

"The States Parties to the Convention have an obligation to identify, protect, conserve, present and transmit to future generations their cultural and natural heritage, as well as ensuring that the heritage has a function in the life of the community. Decisions about any proposed actions should ensure the protection and conservation of the OUV of their World Heritage properties." Thus, "Impact assessment

can be used to evaluate the need for a proposed action, and its consequences, so that environmental, social and economic outcomes can be achieved without damaging the OUV".

- Any impact assessment on a World Heritage property should specifically address the OUV, in addition to other heritage/ conservation values.
- If the proposed action proceeds, follow-up is required during and after its implementation and during decommissioning and recovery; monitoring will indicate if and when further responses are needed to ensure that World Heritage is continuously protected.
- Impact assessment should be carried out by specialists with the relevant expertise and should have effective, inclusive and equitable public participation.
- There is a need to address feasible alternatives in order to establish the most sustainable option that both protects the OUV of World Heritage properties and achieves the objectives of the proposed action.
- Impact assessment should consider cumulative impacts and climate change.
- The impact assessment's recommendations should contribute to better management, monitoring, risk mitigation and feedback to improve future impact assessments.

The recommended impact assessment process is aligned with the principles of NEMA, but with an emphasis on addressing the OUV of the heritage site.

A: Public participation: It is advised that stakeholders and local communities are engaged early so that they can contribute and have a meaningful influence on the process.

B: Proactive problem solving involves considering the proposed action throughout its development, to determine whether it is needed, whether an alternative approach would be more sustainable, whether any negative impacts could be avoided or minimized, and whether any positive impacts could be produced or enhanced.

The following proactive process is recommended:

1. Screening: Is an impact assessment needed?
2. Scoping: What should be assessed?
3. Baseline assessment
4. The proposed action and alternatives (including no-go)
5. Identifying and predicting impacts
6. Evaluating impacts
7. Mitigation and enhancement
8. Reporting
9. Reviewing the report
10. Decision-making
11. Follow-up

1.4.2 RAMSAR STATUS

The site falls within the St Lucia System Ramsar wetland site of international importance, inscribed in 1988. The St Lucia System Ramsar site corresponds to the approximate area from Sodwana Bay in the north to the Railway ledges, south of Maphelane, in the south (refer Fig. 2), but excluding the uMkhuze Park to the west, and includes the St Lucia lakes and estuary, as well as the lower uMfolozi floodplain and Msunduzi River.

The area meets criteria 1a 1c, 2a, 2b, 2d, 3a, 3b, 4a and 4b, as justification for inclusion as follows:

1a: The St Lucia System is an outstanding example of a natural wetland system on the south-east coast of Africa.

1c: The St Lucia System is an outstanding example of a wetland which plays a substantial hydrological, biological and ecological role in the natural functioning of a coastal system.

2a & 2d: The St Lucia System supports a large and diverse assemblage of plants and animals, many of which are either rare, vulnerable or endangered. Several endemic species also occur.

2b: The St Lucia System is of special conservation value for maintaining the genetic and biological diversity in the Maputaland coastal area.

3a & 3b: The St Lucia System supports a rich diversity of avifauna including waterfowl species, and at times very large concentrations occur.

4a & 4b: The St Lucia System supports populations of a large number of indigenous fish species, including populations of several endemic species. Lake St Lucia is a highly important nursery for fish.

1.5 DETAILS OF PROJECT PROPONENT

Table 2: Details of the applicant

Applicant	**iSimangaliso Wetland Park Authority**	
Representative	Mr Sibusiso Bukhosini	
Physical Address	The Dredge Harbour Private Bag X05 St Lucia 3936	
Telephone	035 5901633	
Fax	n/a	
E-mail	info@isimangaliso.com	

1.6 DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

The environmental team of Indaloenhle Environmental Consultants [hereafter referred to as Indaloenhle Consultants] are appointed as the Environmental Assessment Practitioner [EAP]. Indaloenhle Environmental Consultants is therefore undertaking the proposed project.

Indaloenhle Environmental Consultants has been involved in and / or managed several environmental assessments in South Africa to date. A specialist area of focus is on assessment of linear developments [national and provincial roads, pipelines and power lines], bulk infrastructure and supply [e.g. wastewater treatment works, pipelines, landfills], electricity generation and transmission. For the detailed experience of the EAP, refer to Appendix H of this dBAR.

Table 3: EAP details

Indaloenhle Environmental Consultants	**Organization**	**Indaloenhle Environmental Consultants**
	Contact Persons	Ms. Mbalenhle Mtshali
	Address	62 Old Main Road, Kloof, 3610
	Telephone	031 003 4241
	E-mail	mbali@indaloenhle.co.za
	Qualification	BSS. Environmental Management EAPASA (Reg. EAP – *2019/660*) IAIAsa - 6390
	Experience	14+ Years

1.7 STRUCTURE OF THE REPORT

This report has been structured to comply with the format required by the National Environmental Management Act [NEMA] [Act No. 107 of 1998] [as amended] and the UNESCO Guidance and Toolkit for Impact Assessments in a World Heritage Context (2022), the processes of which are aligned. The report contents are as follows:

Table 4: BAR outline

Chapter	Content overview
1. Introduction /Basic Assessment Data	This chapter includes the approach to the study and details of the project proponent and EAP.
2. Project Context Motivation	Contextualises the study area and provides a motivation and need for the proposed development.
3. Description of Project	Includes a detailed description of the proposed activities.

4. Environmetal Legislative Context	Includes an explanation on all applicable legislation and the relevant listed activities applied for
5. Descrpition of biophysical environment	A description of the biophysical and social environment. Consideration of alternatives [design / layout and no-go] for the project. Overview of the public participation process conducted to date. This section also highlights the key findings of the specialist studies conducted and other environmental considerations. Includes the impact assessment methodology. The impacts identified are rated and a significance score obtained.
6. Public Particpitation Process	"Public Participation Process", means a process by which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, an application
7. Impact Residual risk assessment	Residual risk refers to the risk level after implementing control processes to mitigate the inherent risk. The level of residual risk depends on the effectiveness of the implemented controls
8. Study findings and Conclusion	Conclusions are interpretations of the findings and supported evidence is found in this chapter

1.7.1 SCOPE OF ASSESSMENT AND CONTENT OF THE BASIC ASSESSMENT REPORT

Section 3 of Appendix 1 of GN R 517, as amended, specifies the content requirements for a Basic Assessment Report. The table below indicates how this BAR complies with these requirements.

Table 5: NEMA BAR requirements and chapter reference

Section 3	*NEMA EIA Regulations – Appendix 1 Requirement*	*Section in Report*
(a)	details of- (i) the EAP who prepared the report; and	Section 1.6
Section 3	NEMA EIA Regulations – Appendix 1 Requirement	Section in Report
	(ii) the expertise of the EAP, including a curriculum vitae;	**Appendix H**
(b)	the location of the activity, including- (i) the 21-digit Surveyor General code of each cadastral land parcel;	**Section 2.2**

	(ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	**Section 3.2**
(d)	a description of the scope of the proposed activity, including- (i) all listed and specified activities triggered; (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 3.2 and (i) executive summary table 1 and chapter 4.1 (ii)executive summary table 1 and chapter 4.1
(e)	a description of the policy and legislative context within which the development is proposed including (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	**Section 4**
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	**Chapter 2**
(g)	a motivation for the preferred site, activity and technology alternative;	**Chapter 3.3**

(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including - (i) details of all the alternatives considered; (ii) details of the PPP undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by I&APs, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	**(i) Section 3.3** **(ii) Chapter 6 and Appendix F** **(iii) Appendix F PPP** **(iv)Chapter 5**
C	NEMA EIA Regulations – Appendix 1 Requirement	**Section in Report**
	(v) the impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	**Chapter 7** **Chapter 7** **Chapter 7** **Chapter 7** **Chapter 7**

(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including - (i) a description of all environmental issues and risks that were identified during the EIA process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	**Chapter 7**
(j)	an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	**Chapter 7**
(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix	**Section 3 Table 12** **Chapter 8**
Section 3	NEMA EIA Regulations – Appendix 1 Requirement	**Section in Report**
	6 to these Regulations and an indication as to how these findings andrecommendations have been included in the final report;	
(l)	an environmental impact statement which contains— (i) a summary of the key findings of the EIA; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	**Section 8.1.3** **Appendix A** **Chapter 7**
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the	**Chapter 9 Appendix E**

	proposed impact management outcomes for the development for inclusion in the EMMPr;	
(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	**Chapter 8**
(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	**Chapter 8**
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	**Chapter 8**
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	**N/A**
(r)	an undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to I&APs and any responses by the EAP to comments or inputs made by I&APs; and	**Appendix H** **Chapter 10**
(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	**N/A**
(t)	any specific information that may be required by the competent authority; and	**N/A**
(u)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	**N/A**

2. PROJECT CONTEXT AND MOTIVATION

2.1 BACKGROUND

Indaloenhle Environmental Consultants Pty Ltd is appointed by the iSimangaliso Wetland Park Authority to provide the requisite professional environmental services and obtain Environmental authorisation from the competent authority for the proposed clearance of vegetation and silt that has been deposited in the Msunduzi River and Beach Channel.

The St Lucia estuary and lake system is located within a World Heritage site and Ramsar listed wetland of international importance, under the management of the iSimangaliso Wetland Park Authority. The St Lucia estuary mouth system is complex and comprises of the uMfolozi, Msunduzi, Mzinene, Hluluwe, Nyalazi, Mphathe and the Mkhuze rivers. Back-flooding of the Msunduzi River, which leads to the inundation of commercial and small-scale farmland with water on the Mfolozi floodplain, has became problematic since the estuary mouth remained predominantly closed since 2014, affecting commercial and small grower agricultural operations on the lower Mfolozi flats and within the Sokhulu area. An "assisted breach" of the combined St Lucia/Mfolozi/Msunduzi mouth was conducted on 6 January 2021, and the mouth remained open until 3 June 2021; however, this did not alleviate the back-flooding issue onto farmlands.

An Independent Panel of Experts, appointed by the DFFE to investigate the impacts of the breach, made recommendations for future management of the system, of which they found that there was no observed or measured removal of sediment, common reeds and alien invasive species or relief to small and large-scale farmers from back-flooding following the breach. They determined that back-flooding is caused by the blockage of the Msunduzi channel as a result of extensive reed growth and accumulated sediment. The report (Independent Panel of Experts, 2022) recommended clearing the Msunduzi and beach channel of vegetation and sediment to allow water to flow freely from the floodplain to the mouth, and dune maintenance to limit vegetation encroachment. Despite the mouth naturally breaching again, following high seasonal rains during April 2022, the farmland on the Msunduzi-Mfolozi floodplains remained back flooded.

A proposal to clear a channel in the lower Msunduzi River and Beach Channel, compiled by Bosch Projects (Ref.: 493/87/1/1040) on behalf of the Mfolozi Sugar Planters LTD on 25 October 2022, was submitted by the iSimangaliso Wetland Park Authority (hereinafter referred to as the "Authority") on 22 March 2023 to the DFFE as part of the motivation for a Section 30A application for emergency clearing of the blockages. The application was refused by the DFFE (3 April 2023), amongst the reasons being: that it didn't constitute an emergency, that it triggered three listing notices of the NEMA Environmental Impact Assessment (EIA) Regulations, the lack of information on the disposal of spoil, the potential for significant estuarine and marine environmental impacts and that there was no baseline information. As such, the proposal to dredge the sediments and clear the vegetation is required to go through a Basic Assessment process, along with specialist studies, for the required environmental authorisations.

The project requires authorization in terms National Environmental Management Act (Act 107 of 1998, NEMA) and the National Water Act 36 of 1998, which will be undertaken in accordance with the EIA Regulations, 2017 (GN No. R.327), as amended, and Section 21 water uses, respectively.

In terms of the NEMA, a Basic Assessment (BA) Process is required for a development that constitutes activities identified in Section 24 of the act. In terms of Section 24(1) of NEMA, the potential impact on the environment associated with these activities must be considered, investigated, assessed, and reported to the Competent Authority, the Department of Forestry Fishery and the Environment(DFFE) to grant Environmental Authorisation. In addition, the proposed project requires authorization from the Competent Authority, the Department of Water and Sanitation (DWS) for specific water uses listed under Section 21 of the National Water Act No. 36 of 1998 (NWA). The Water Use Licence Application process will be undertaken concurrently with the Environmental Authorization application.

2.2 SURVEYOR GENERAL NUMBERS / PROPERTY DESCRIPTIONS

the Surveyor General number and property details are provided in Table 6.

Table 6: Surveyor General Number

Geometry Identifier	4165607
Parcel Type	F
Geometry Area	36505319.42
Farm name	UMFOLOZI SWAMPS 17457 GV
21 Digital Code	N0GV000000001745700000
Provincial Name	KWAZULU-NATAL
Major Region	GV
Major Region Code	N0GV0000
Parcel	17457

2.3 SURROUNDING LAND USES

Table 7: Surrounding land uses in proximity to the proposed project site.

Natural area	**Y**	Light industrial	**N**
Low density residential	**Y**	Medium industrial	**N**
Medium density residential	**N**	Heavy industrial	**N**
High density residential	**N**	Power station	**N**
Informal residential	**N**	Military or police base/station/compound	**N**
Retail commercial & warehousing	**N**	Spoil heap or slimes dam	**N**
Office/consulting room	**N**	Dam or reservoir	**N**
Quarry, sand or borrow pit	**N**	Hospital / medical centre	**N**
Church	**N**	Old age home	**N**
Sewage treatment plant	**N**	Train station or shunting yard	**N**
Railway line	**N**	Major road [4 lanes or more]	**N**
Harbour	**N**	Plantation	**N**
Sport facilities	**N**	Agriculture	**Y**
Golf course	**N**	River, stream, or wetland	**Y**
Polo fields	**N**	Nature conservation area	**Y**
Filling station	**N**	Mountain, or ridge	**N**
Landfill or waste treatment site	**N**	Museum	**N**
Historical building	**N**	Protected Area	**Y**
Graveyard	**N**	Archaeological site	**N**
Airport	**N**	Other:	**N**

Key: Y = Yes P = Possibly N = No

2.4 PROJECT MOTIVATION AND NEED AND DESIRABILITY

2.4.1 PROJECT NEED

Historical context:

Historically, the St Lucia Lakes system and uMfolozi and Msunduzi Rivers shared a common mouth. However, the system and floodplain delta have a chequered history of human interference:

- In 1952 the uMfolozi and Msunduzi Rivers were artificially separated from the St Lucia Estuary and a new uMfolozi Mouth was opened to the sea, south of the St Lucia Estuary at Maphelane (Begg, 1978).
- The dredge of a concrete groyne on the St Lucia estuary north bank in the 1960s was built to stabilise the St Lucia estuary mouth. Dredging together with the concrete groyne prevented the natural

northward migration of the St Lucia estuary mouth , and this maintained a permanently open mouth to the sea.

- A Link Canal was constructed in 1975 to bring in freshwater from the uMfolozi into the St Lucia system.
- In 1984 Tropical Storm Domoina caused extreme flooding and scouring out of the mouth, also damaging the Link Canal (Independent Panel of Experts, 2022; Illenberger & Clark, 2014). The groyne was largely removed during this event.
- Dredging operations to retain the open mouth were maintained until 2002, after which a non-intervention policy was adopted. The St Lucia mouth closed on its own during drought conditions, apart from a brief opening during March 2007 following Cyclone Gamede swells.
- In an effort to restore the previous functionality of the system, a beach spillway was excavated during September 2012 to reconnect the St Lucia and uMfolozi mouths; however, the St Lucia mouth remained closed, and the uMfolozi mouth closed in June 2014, re-opened in September 2014 and closed once more in January 2015. Following the findings of a Global Environment Facility (GEF) funded project, previous dredge spoil and associated vegetation that separated the St Lucia and uMfolozi mouths were partially removed in 2015 – 2016 in an effort to reconnect the uMfolozi River to St Lucia, however the system mouth remained closed.
- The intervention (outlined above) to restore the uMfolozi-St Lucia system to a prior ecological state was met with mixed success, the main concerns being high volumes of silt from the uMfolozi being deposited into the St Lucia estuary area and backflooding of agricultural lands in the uMfolozi floodplain, owing to their being no connection to the sea; additionally an increase in height of the sand berm (between the sea and estuary) occurred over time due to dune accretion processes (iSimangaliso IMP, 2020). The siltation has also facilitated reed encroachment in the St Lucia estuary and mangroves have died off due to lack of intertidal water movements.

Motivation:

- Since 2014 (coinciding with mouth closure), backflooding and inundation of commercial and subsistence farmland in the floodplain has become a problem, affecting the commercial and small grower agricultural operations on the lower uMfolozi flats and within the Sokhulu area. Following 6 years of mouth closure and no marine connectivity, concerns about the ecological state of lake St Lucia in general, and litigation by affected farmers in 2018 (refer legal Chapter 1.5), a multi-stakeholder workshop was convened by the iSimangaliso Wetland Park Authority on 13 -14 October

2020, after which a task team was appointed to advise on short-term, medium-term and long-term objectives, part of the short term being an "assisted breach" of the system.

- Following high seasonal rains at the end of 2020 and predicted for early 2021, the St Lucia mouth was opened on 6 January 2021, and remained connected to the sea until the 3rd of June 2021. Following concerns raised by a group of scientists, an Independent Panel of Experts was appointed in the year 2022 by the DFFE to investigate the impacts of the breach and make recommendations for future management of the system.

- Amongst the findings were that there was no observed or measured change in the removal of sediment, common reeds and alien invasive species, loss of mangroves or in relief to small and large-scale farmers from back-flooding following the breach. Back-flooding in the region is caused by the blockage of the Msunduzi channel by extensive reed growth and accumulated sediment. The report recommended clearing the Msunduzi and beach channel of vegetation and sediment to allow water to flow freely from the floodplain to the mouth and dune maintenance to limit encroachment of vegetation (Independent Panel of Experts, 2022).

- Despite the mouth naturally breaching again following high seasonal rains during 14 April 2022, the farmland of the Msunduzi-Mfolozi floodplains remained back flooded (refer Figs 3 & 4), necessitating a call for clearing of the river channels to promote flow of water. A proposal to clear a channel in the lower Msunduzi River and Beach Channel was compiled by Bosch Projects (Ref.: 493/87/1/1040) on behalf of the Mfolozi Sugar Planters LTD on 25 October 2022 and submitted by the iSimangaliso Wetland Park Authority on 22 March 2023 to the DFFE as part of the motivation for a Section 30A application for emergency clearing of the blockages.

- The application was refused by the DFFE on 3 April 2023, amongst the reasons being: that it didn't constitute an emergency, that it triggered three listing notices of the NEMA EIA Regulations, various environmental concerns (e.g., impacts of sediment and vegetation removal on ecological functioning) and that there was no baseline information. The Competent Authority noted that the potential for significant estuarine and marine environmental impacts associated with the S30 Application were unknown, of which would need to be addressed.

- As such, the proposal is required to go through a Basic Assessment process, along with specialised studies, for the required environmental authorisations.

- The project rationale is that clearing of the sediment clogged Msunduzi channel will alleviate backflooding on the Msunduzi and Mfolozi flats areas. Once drained, this will allow commercial and small-grower farmers to farm their areas that have been unable to farm since backflooding inundated their lands.



Figure 4: Northward view from Maphelane side of backflooded Cotcane commercial sugar cane lands, corresponding to approximately 28°28'36"S, 32°20'47.06"E (Photo: Dr Riaan Cedras, iSimangaliso).

Table 8: Basic Assessment Q&A

1.	**Was the relevant provincial planning department involved in the application?** EDTEA Provincial and Local Municipalities in the area have been contacted and asked to comment on this project	YES	
2.	**Does the proposed land use fall within the relevant provincial planning framework?** **No, it does not fall under provincial planning framework.**		NO
3.	**If the answer to questions 1 and / or 2 was NO, please provide further motivation / Explanation** – N/A.		
	Desirability		
1.	**Does the proposed land use / development conform to the relevant structure plans, SDF and planning visions for the area?** The approval of this application will not compromise the IDP or the SDF but will serve as key enabling support to these plans. The community of St Lucia and Mtubatuba have for many years lost out on agricultural production and socioeconomic thus leading to loss of income, jobs and livelihoods.	YES	
3.	**Will the benefits of the proposed land use / development outweigh the negative impacts**	YES	

	of it? The positive benefits will outweigh negative impacts. Anticipated negative impacts are limited to the dredging phase and to a lesser extent during operational phase. With implementation of mitigation measures, significance level of negative impacts will be low.		
4.	**If the answer to any of the questions 1-3 was NO, please provide further motivation / Explanation** – N/A.		
5.	**Will the proposed land use / development impact on the sense of place?**		NO
6.			NO
7.	**Will any person's rights be affected by the proposed land use / development?** The proposed project will enhance community rights once completed, However, during dredge continuous engagement with the community is vital to ensure that no agreements are infringed, and discontentment of community members is avoided.		NO
8.	**Will the proposed land use / development compromise the "urban edge"?**		NO
9.	**If the answer to any of the question 5-8 was YES, please provide further motivation / explanation** – N/A.		
	Benefits The community of St Lucia, Mtubatuba and surrounding areas will be able to continue farming and create more job opportunities for the local community.		
1.	**Will the land use / development have any benefits for society in general?**	YES	
2.	**Explain:** The proposed dredging will have a huge benefit for society as the farmlands will not be flooded anymore.		
3.	**Will the land use / development have any benefits for the local communities where it will be located?**	YES	
4.	**Explain:** The dredging of Msunduzi will benefit the entire neighbouring communities.		

2.4.2 SOCIO-ECONOMIC VALUE OF THE ACTIVITY

Table 9: Socio-economic value of the proposed project

Description	Value	
What is the expected capital value of the activity on completion?	R 20.3 million	
What is the expected yearly income that will be generated by or as a result of the activity?	N/A	
Will the activity contribute to service infrastructure?	YES	X NO
Is the activity a public amenity?	YES	X NO

How many new employment opportunities will be created in the development and dredge phase of the activity/ies?	At least 3 for dredger operations and vegetation clearing depending on what equipment is procured.
What is the expected value of the employment opportunities during the development and dredge phase?	Depends on whether Phase 1 (veg removal) successful or whether dredging required
What percentage of this will accrue to previously disadvantaged individuals?	To be determined at procurement
How many permanent new employment opportunities will be created during the operational phase of the activity?	Monitoring and maintenance – possibly 1 to 3, depending on system response
What is the expected current value of the employment opportunities during the first 10 years?	Depends on system response, whether additional channel clearing required or not, monitoring only might be R1 million pa
What percentage of this will accrue to previously disadvantaged individuals?	To be determined at procurement

3. DESCRIPTION OF THE PROJECT

3.1 SPECIALIST REPORT FINDINGS

The following specialist reports were conducted:

Table 10: Specialist reports

Specialist Study	Conducted by:	Affiliation
Hydraulics & Geomorphology	Dr Justin Pringle[1], Dr Bennie de Waal[2] & Prof Andrew Green[1]	1 – UKZN Hydraulics & Environmental Fluid Mechanics department 2 – Geomorphological services
LiDAR	Mr Keanu Singh	GroudTruth Consulting
Vegetation	Mr Bryan Paul	Afzelia Environmental Consultants
Wetand and Aquatic study (Watercourse habitat functionality)	Ms Caleena De Carvalho	Ibis Enviro, for Afzelia Environmental Consultants
Marine	Ms Lisa Guastella	Alan Smith Consulting
Palaeontological (desktop)	Dr Alan Smith	Alan Smith Consulting
Agricultural statement	Mr Johann Lanz	Johann Lanz – soil scientist

The hydrological and geomorphological report findings are provided below, along with LiDAR results – these findings guide the project. The other specialist reports are in response to this, and summary findings from these respective reports are outlined in Chapter 5 (Description of Biophysical Environment).

3.1.1 LIDAR SURVEY AND HYDRAULICS AND GEOMORPHOLOGY REPORT

Vegetation aerial survey

The primary aim of the LIDAR Survey was to identify and quantify reed/vegetation proliferation hotspots along the uMfolozi and Msunduzi rivers. In the scope of this study, a reed/vegetation hotspot was defined as a portion of river which has been completely, or in part, blocked off to natural streamflow by the excessive growth of reeds/vegetation. An overview of the identified hotspots along the Msunduzi River is shown below in Table 11 and Figure 4

Table 11: Overview of vegetation hot spots along the Msunduzi River

Proliferation hotspot ID	Longitude	Latitude	Area (ha)
1	32.407779	-28.440844	0.08
2	32.404999	-28.449790	0.29
3	32.399363	-28.462515	0.25
4	32.396703	-28.468156	0.05
5	32.395805	-28.469555	0.18
6	32.393457	-28.471618	0.53
7	32.390669	-28.475405	0.12
8	32.388827	-28.479375	0.04
9	32.387258	-28.480826	0.21
10	32.372056	-28.483561	3.83

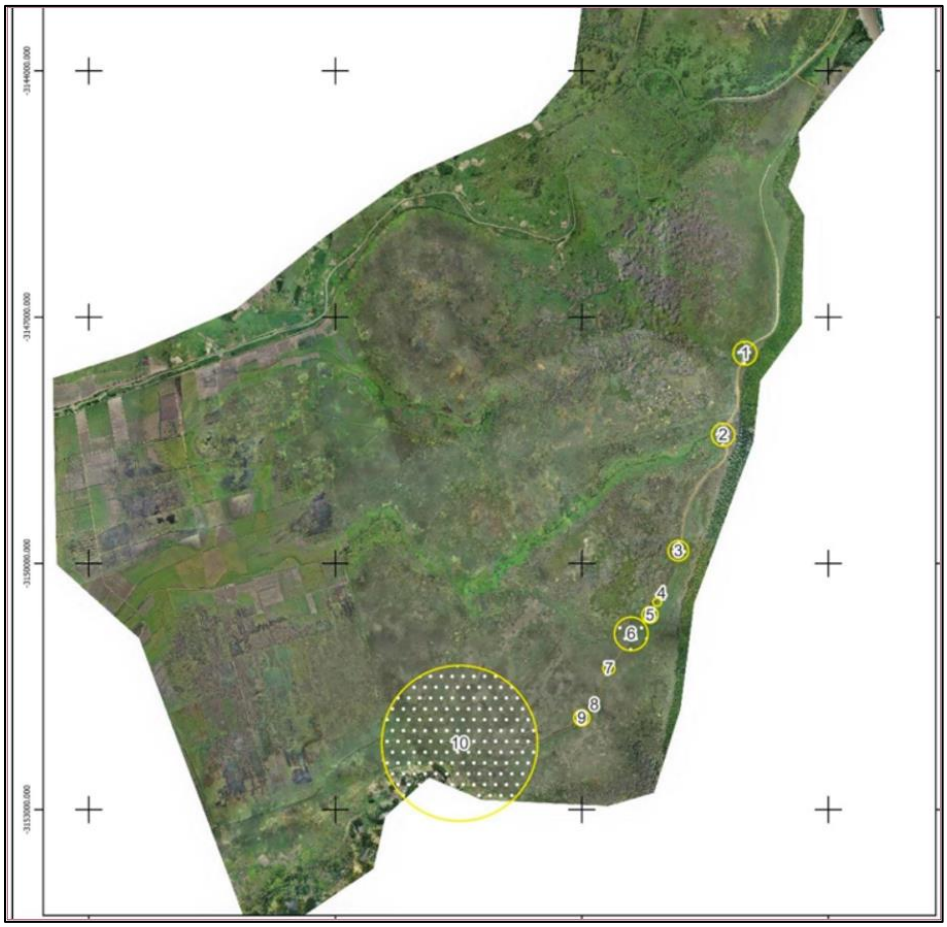


Figure 5: Map showing the LiDAR survey area with ten identified vegetation hotspots along the Msunduzi

Higher up in the uMsunduzi (Cotcane area) the channel is completely overgrown (Figure 5). The patches of vegetation act as blockages, as can be seen in Figure 6, where the LiDAR data indicates water elevation differences of ~0.1 m across the blockage. Several such blockages are present along the uMsunduzi and are seen as local drivers of the elevated water levels on the floodplain. The drainage canals are also overgrown, reducing flow conveyance towards the mouth.

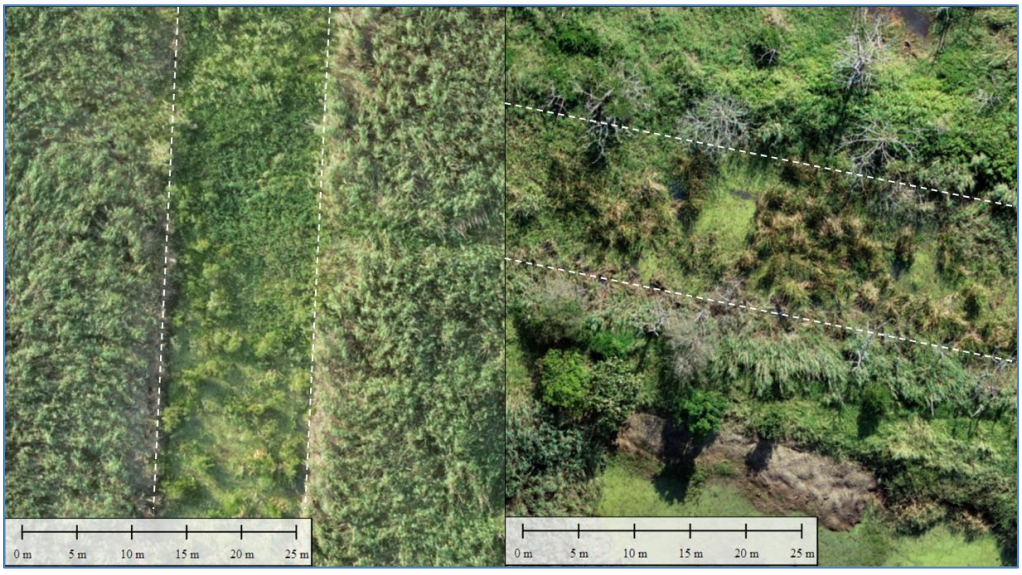


Figure 6: Vegetation blockages within the uMsunduzi (left) and Main Drain (right). Dashed lines indicate the channel banks

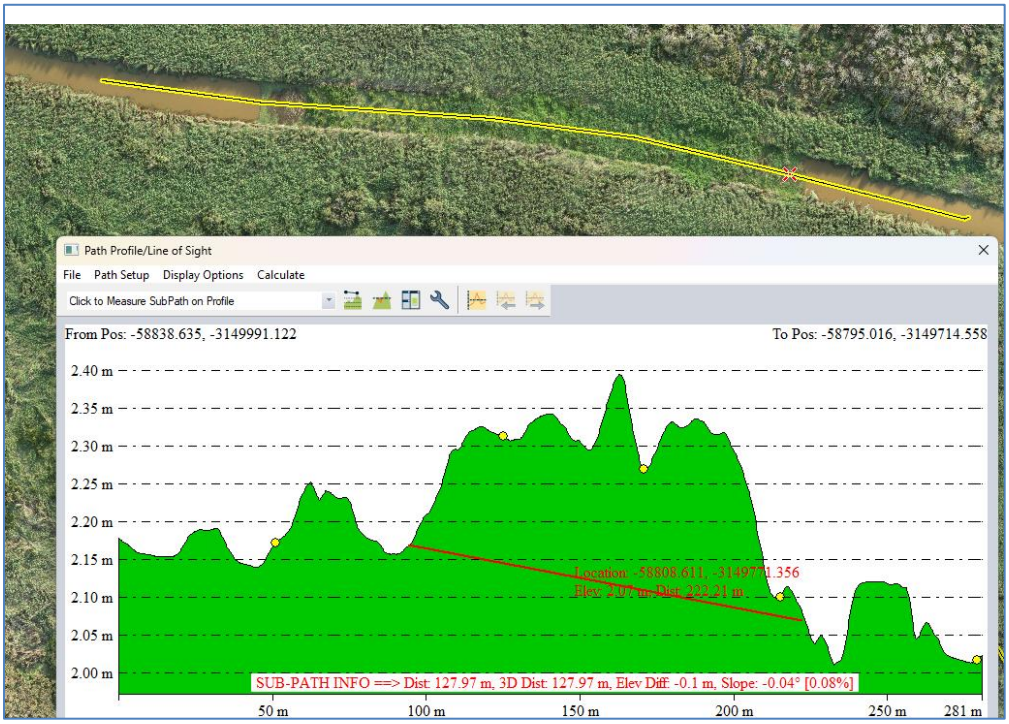


Figure 7: Longitudinal cross-section through one of the vegetation blockages along the uMsunduzi River (flow is from left to right)



Figure 8: Vegetation clogging at the Wilson's Drain confluence of the Msunduzi, corresponding to approximately 28°28'56.36"S and 32°21'49.05"E (Photo: Dr Riaan Cedras, iSImangaliso) and site 10 (Fig. 5).

Woody debris blockages along the lower uMfolozi effectively also block the flows, as can be seen in Figure 9. Several of these blockages are located along the lower uMfolozi River, locally driving avulsions upstream of the blockages.



Figure 9: Woody debris blockages along the lower uMfolozi (arrow indicates flow direction) (August 2023).

These flow pathways and channel competence changes can be seen in the hydrological time series, and the floodplain water levels monitored by UCOSP. In 2018 there was a poor relationship between the flood events of the uMfolozi (measured at Domoina Bridge) and the levels along the lower uMsunduzi drainage channels measured at Cotcane (. This relationship changes for the 2023 timeseries, where the uMsunduzi levels respond directly to the flood flows along the uMfolozi River (May 2023). The diversion works at the head of the uMfolozi Floodplain only spills water onto the floodplain and drains via the uMsunduzi at water levels above 6.3 m relative to bed level at Domoina Bridge. This implies that the smaller floods in May 2023 did not overtop the diversion works and that the avulsion onto the uMfolozi floodplain is driving the sharp rise in water level at Cotcane.

Vegetation and woody debris removal

Based on the LiDAR data presented in Figure 5, the vegetation blockages along the uMsunduzi are the local hydraulic controls preventing the drainage of the agricultural fields. The location of the proposed vegetation clearing and woody debris clearing are indicated in **Figure 10** for the uMsunduzi. These blockages along the uMsunduzi should be removed first, followed by monitoring to see if the farmlands drain. If the drainage is successful, then dredging the uMsunduzi will not be needed. If it is not successful, then a bathymetric survey along the uMsunduzi should be done to confirm the hydraulic controls in the range of 1 to 2.5 msl.

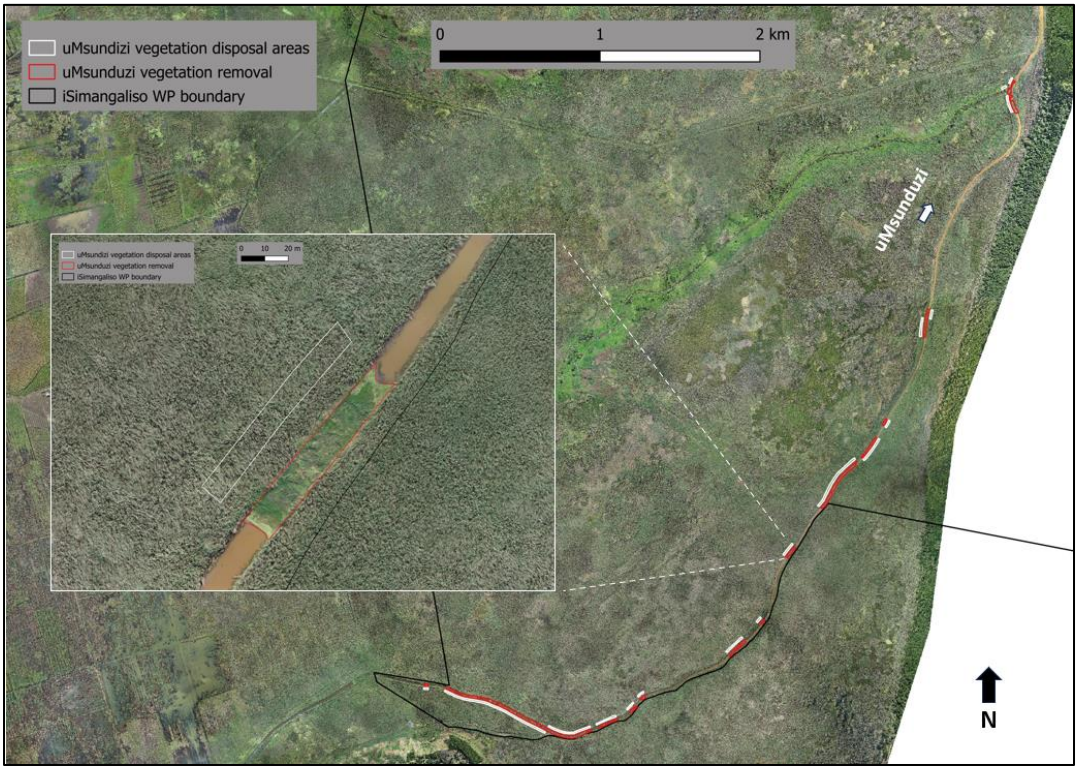


Figure 10: Location of areas where the uMsunduzi channel is overgrown and blocked by vegetation *(GroundTruth 2023)* and areas for vegetation removal (red) and proposed disposal areas (white)

Table 12: Estimated volumes of vegetation to be cleared from the uMsunduzi channel

Focus area	Area m^2	Volume m^3 @ 0.5m thick	Volume m^3 @ 1m thick	Volume m^3 @ 1.5m thick
Vegetation clearing uMsunduzi (mapped by GroundTruth)	55 800	27 900	55 800	83 700

The removed vegetation should be stacked on the floodplain as indicated in Figure 10, sufficiently away from the river channel to prevent entrainment and re-seeding (refer recommendations in De Cavalho, 2024) and allow to decompose.

The lower uMfolozi and uMsunduzi have experienced significant siltation and channel constriction over the past decade. This has changed flow pathways and lowered drainage efficiency, resulting in elevated water levels, sediment deposition and vegetation growth along the channels and on the lower floodplain.

The lower uMfolozi channel is silting up and its drainage and may benefit from vegetation clearing and the removal of woody debris as is indicated in Figure 11 (based on images for August 2023). However, a neck cutoff (also termed a chute cutoff) is busy forming and should be encouraged by not clearing the vegetation and woody debris along the meander bend. This should limit flow and sediment to enter the Link Canal along the apex of the meander bend that will be abandoned in the near future. The neck cut-off may promote natural clearing of the uMfolozi and this should be monitored.

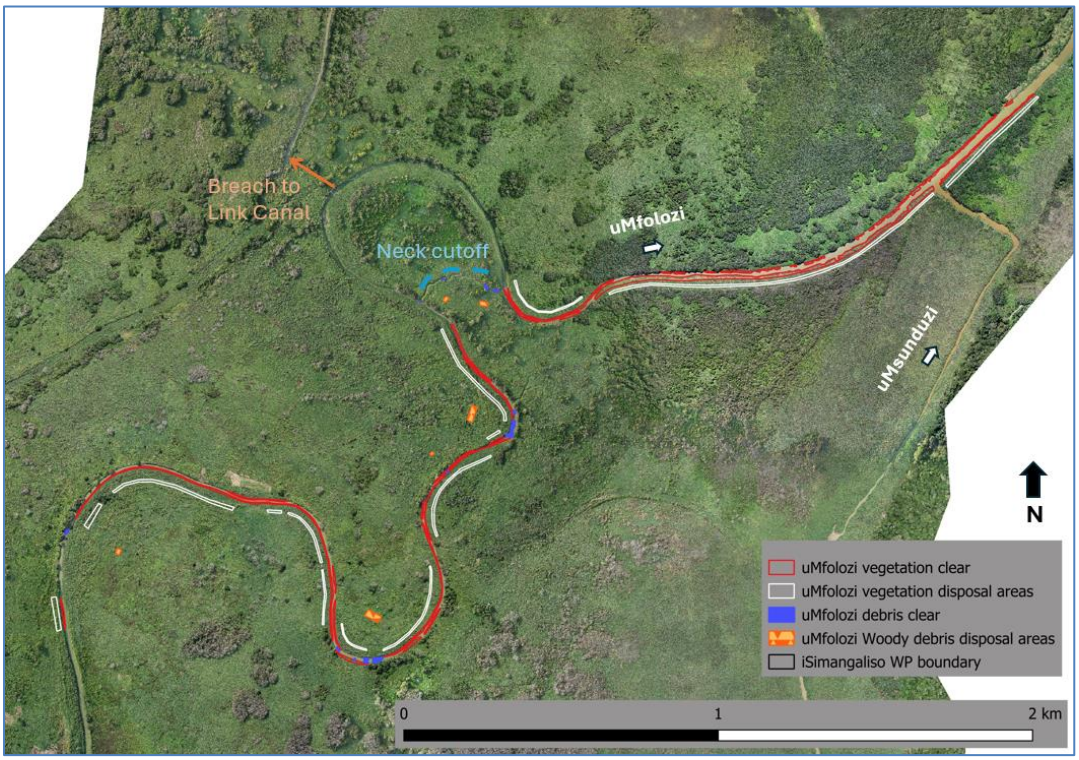


Figure 11: Location of the previously proposed vegetation clearing and woody debris clearing along the uMfolozi (August 2023)

In a recent update by Pringle et al. (2024) a satellite image from 20 April 2023 shows that the meander has cut off and the uMfolozi is showing channel expansion and reduced vegetation and woody debris blockages (Fig. 12). This change serves to illustrate the dynamic nature of river environments. Thus, Pringle et al (2024) no longer deem clearing of the lower uMfolozi is necessary at present, although still recommend the lower uMfolozi channel should be monitored for vegetation and woody debris blockages (see their monitoring recommendations). Prior to the meander cut-off along the uMfolozi, 25 000 to 49 000 m^3 of vegetation and 1 000 to 3 200 m^3 of woody debris was initially proposed be removed (Pringle, et al., 2023). While this is no longer currently required (Pringle et al., 2024), woody debris and vegetation (buffalo grass and *phragmites*) may accumulate again in the future – this requires an adaptive management approach. Regular monitoring and maintenance of the flow pathways will be needed to ensure efficient flow exchanges and limit sediment deposition. Thus, it is recommended that the uMfolozi vegetation removal is still included in the environmental authorisation application as part of an adaptive management approach, backed up by monitoring, to what is a dynamic system.



Figure 12: Satellite image of 20 April 2024 showing the enlarged chute cutoff along the uMfolozi (Image from Planet Labs). The inset image shows the overgrown uMfolozi in August 2023.

Hyrdology and dredging model scenarios

A longitudinal profile of water levels from the mouth to the inundated farmlands (based on the 2023 LiDAR DTM) indicate that the water levels along the uMsunduzi ranges from 1.2 to 1.7 mMSL, while the drainage channel (Main Drain) ranges from 1.5 mMSL to 2.9 mMSL and the flooded fields are around 2.4 mMSL (Figure 13). A similar trend can be seen for the uMsunduzi from the confluence with the uMfolozi to the Four Drain area (Figure 14). This indicates that the lower uMsunduzi River (area earmarked for the dredging) is not the main hydraulic control for the flooded farmlands, but that the overgrown drainage canals and blocked and overgrown uMsunduzi are more likely local hydraulic controls.

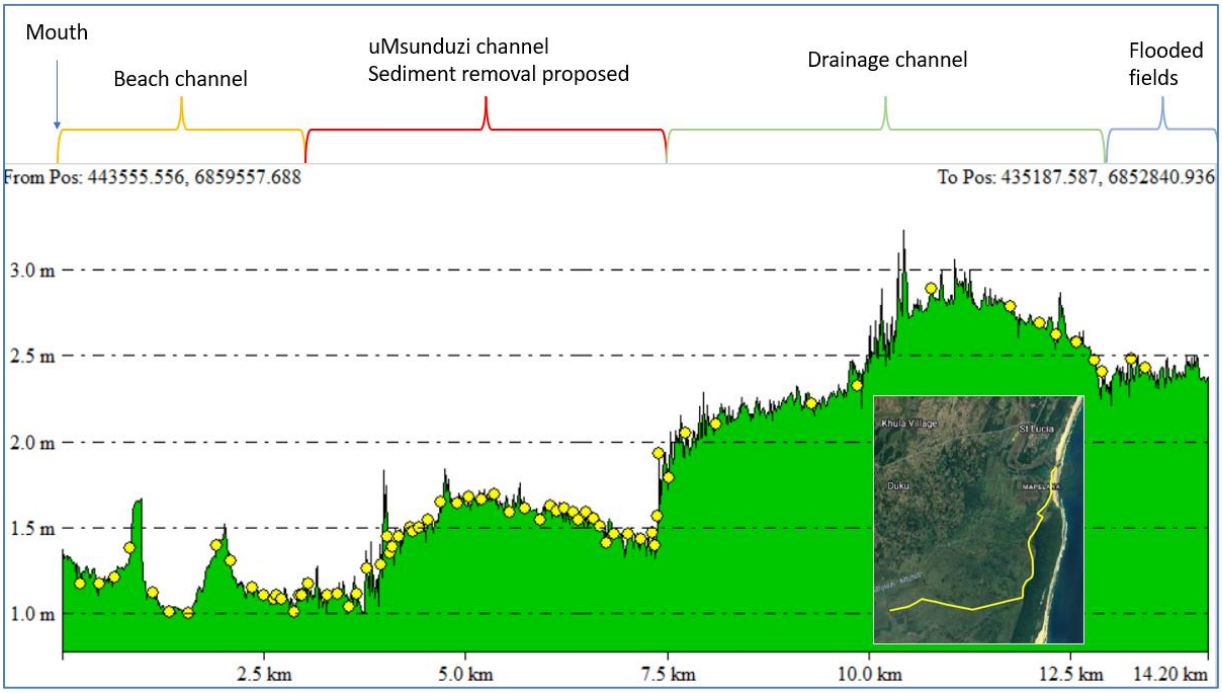


Figure 13: Longitudinal profile from the mouth along the beach channel, up the uMsunduzi and then up the Main Drain across the flooded fields (see inset map of profile path).

The organic material should be removed from the channel and composted on the higher floodplain on phragmites reeds away from trees. The woody debris could possibly be used as firewood if of a good quality, otherwise can be left to rot further away from the channel as indicated in Figure 7.

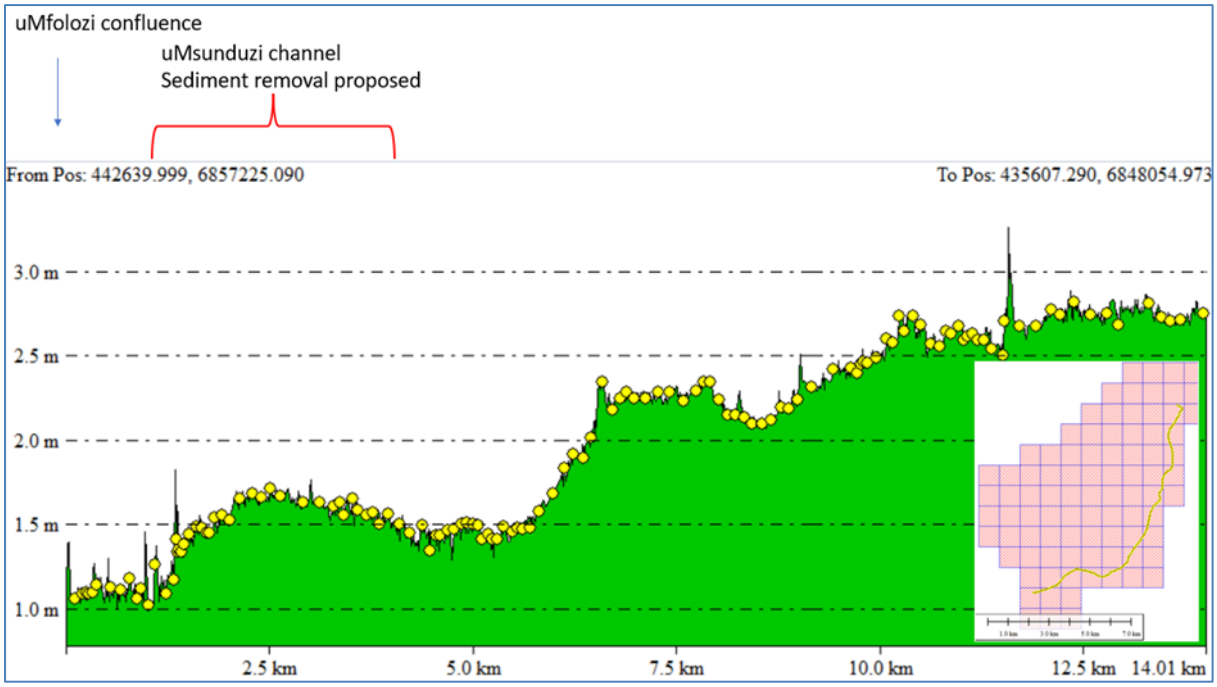


Figure 14: Longitudinal profile of the uMsunduzi River from the confluence with the uMfolozi to Four Drain

Dredging model scenarios

The model was used to explore two scenarios:

a) only vegetation clearing in both the lower uMfolozi and uMsunduzi River, and

b) vegetation clearing in both uMfolozi and uMsunduzi River and dredging a trapezoidal channel within the Msunduzi River.

The length, slope and depth of the channel were based on the field survey results from the 2014 GEF bathymetry survey, because it was not possible to navigate upstream of the blockage during the field survey.

Figure 15 shows the longitudinal profile from the Beach Channel to Four Drain along the uMsunduzi River and simulated water levels for 02/01/2023. There is a lobe of sediment within the lower 3 km of the Msunduzi River from chainage 2 000 to 5 000. The lower 14 km of the Msunduzi River is approximately flat, allowing water to easily flow upstream because there is little to no gradient to drive flow towards the mouth. Additionally, the effect of the vegetation is to slow sections of the river down. Therefore, a larger water level gradient is required to overcome the added friction, thereby resulting in water backing up and flooding upstream farmlands.

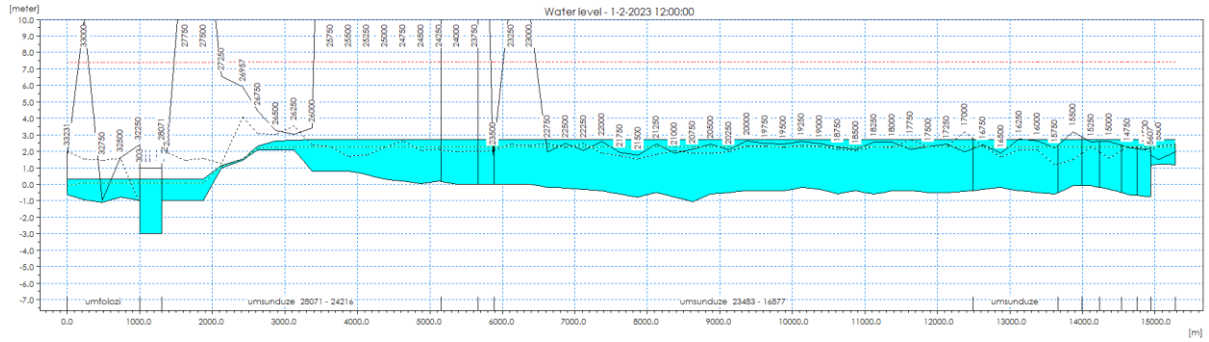


Figure 15: Longitudinal profile from the Beach Channel (left) to Four Drain (right) derived using MIKE View. The section shows a reverse slope within the lower 7 km of the uMsunduzi River, a sediment lobe within the lower 3 km, and the proposed dredging volume (approx. 40 000m3). Simulated water levels are shaded in blue.

The lower uMfolozi and Msunduzi have experienced significant siltation and channel constriction over the past decade. This has changed flow pathways and lowered drainage efficiency, resulting in elevated water levels, sediment deposition and vegetation growth along the channels and on the lower floodplain. The proposed dredging along the Msunduzi will increase the water flow efficiency on the floodplain. It will lower the water level to that of the base level (highest point along the uMsunduzi riverbed, the beach channel bed, sea level or lowest point along the beach berm when the mouth is closed). The rate of back-flooding during large flood events will not be reduced significantly by the vegetation clearing and dredging the Msunduzi, and water elevation changes associated with mouth closure will be unimpacted, resulting in back-flooding. However, the dredged channel will improve the back-flooded regions' drainage rate. During open-mouth conditions, the associated increase in sediment load will exit via the mouth. However, during closed-mouth conditions, this channel will likely silt up again.

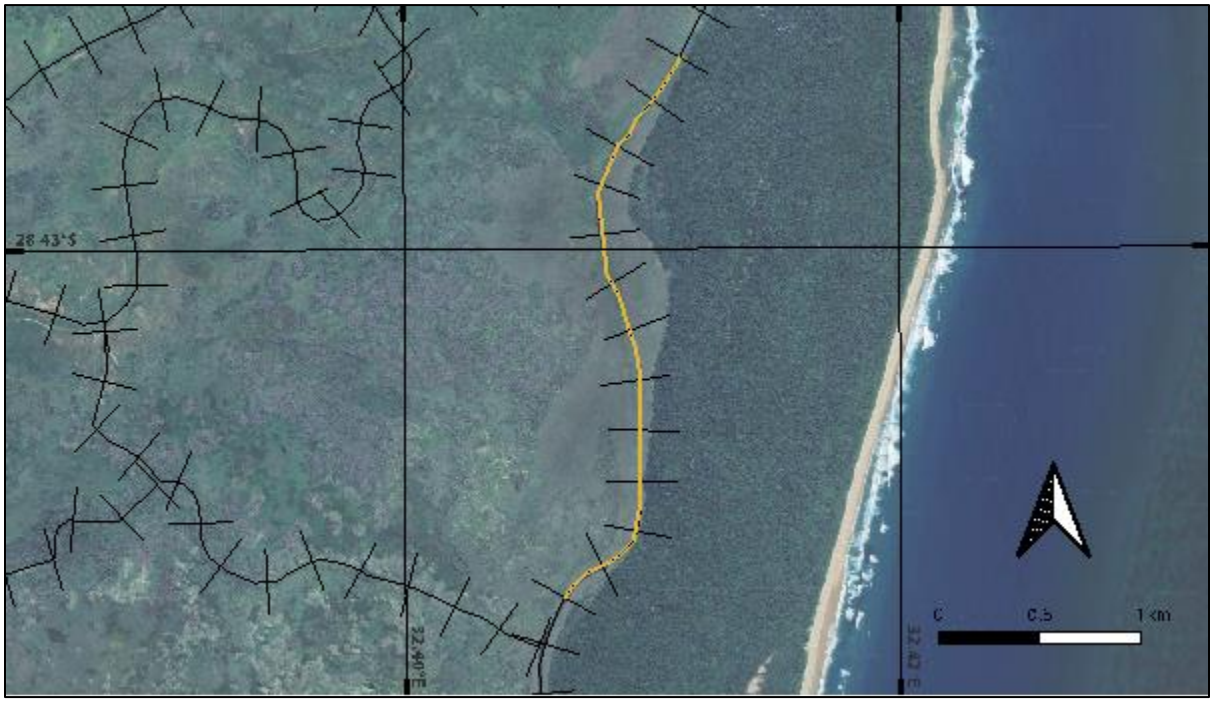


Figure 16: Map showing the location of the proposed trapezoidal channel.

Additional findings

The revised hydraulics and geomorphology report (Pringle et al., 2024) recommended that the siltation and reed growth at Honeymoon Bend be removed and that the Link Canal (constructed with the intention of bringing fresh water from the uMfolozi to the St Lucia system during low rainfall periods) near Honeymoon Bend, be cut off from the system, as this is likely a key driver of the sedimentation and vegetation growth at Honeymoon Bend. While this is an important finding and will contribute to improved functioning of the St Lucia system, due to the priority and urgency to alleviate the backflooding and expedite the approval process for Phase 1 and 2, the **Link Canal and Honeymoon Bend is not forming part of this application**, but can be applied for at a later date should iSimangaliso wish to exercise this option. It is beyond the scope of this particular project and will require its own dedicated, specialist study. This would entail closing off the Link Canal to stop the Mfolozi River flow and prevent excess sediments from entering the St Lucia Estuary, and to force flow directly towards the mouth via the beach canal and lower uMfolozi.

The uMfolozi connection means that silt deposition will continue, unless measures are taken to deal with the sediment before it enters St Lucia (Jones et al., 2020). Unless there is a significant flood to flush the system out, there is no mechanism to remove these accumulated sediments and the associated vegetation that has taken hold. Monitoring and adaptive management will be instrumental in managing the system's functioning towards the desired outcomes.

Table 13 summarises the key recommendations of the revised hydraulics and geomorphology report (Pringle et al., 2024).

Table 13: Summary of key recommendations from Pringle et al (2024) report findings.

Key Recommendation	Objective	Activities	Location	Timeframes
Clear vegetation within the uMsunduzi at selected locations	Increase conveyance within uMsunduzi	Remove vegetation blockages. Use local labour and suitable amphibious craft.	uMsunduzi between Four Drain and Main Drain	<1yr
Hydrographic survey	Confirm locations of potential sediment blockages.	Establish vertical datum for park. Survey bed elevation to establish hydraulic controls.	uMsunduzi and lower uMfolozi	1-2yrs
Monitor vegetation and possible sediment build-up.	Measure the impact of the vegetation clearing. Promote evidence-based adaptive management	Procure real-time monitoring equipment. Monitor water levels. Monitor satellite imagery for channel blockages. Field work to include fixed-point photos, and bed elevation measurements (surveying).	Equipment distributed throughout lakes and estuary system. uMsunduzi and Lower uMfolozi floodplain	To commence immediately, continuing at fixed intervals indefinitely.
Cut-off the link canal from the lower uMfolozi to Honeymoon bend.	Reduce siltation at Honeymoon bend. Reverse artificial channel modifications.	Detailed engineering design. Environmental assessment.	Link canal and Honeymoon Bend	2-5yrs
Clear vegetation and sediment at Honeymoon Bend.	Increase tidal exchange. Reduce estuary constriction.	Environmental assessment. Dredging and vegetation clearing	Honeymoon Bend	2-5yrs
Develop and apply adaptive management strategy based on data network at catchment, wetland and estuary scales.	Monitor and improve the environmental and socio-economic functioning of the system.	Maintain instrument network. Execute management plan.	Catchment.	To commence immediately, continuing at fixed intervals indefinitely.

3.2 PROPOSED INTERVENTIONS (PROJECT PROPOSAL) AND ALTERNATIVES

In terms of the EIA Regulations [2014, as amended in 2017], Sections 24(4) (b) (i) and 24(4A) of the NEMA require an EIA to include investigation and assessment of impacts associated with alternatives to the proposed project. These alternatives must be feasible and reasonable, in terms of section 24O of the NEMA, and may include modifications or changes to the activity that may minimise harm to the environment. The UNESCO Guidance and Toolkit for Impact Assessments (2022) also stipulates that alternatives to the proposed action should be considered in order to establish the most sustainable option that both protects World Heritage and achieves the objectives of the proposed action.

The activities proposed for environmental authorisation must be consistent with the principles of environmental management as codified in the National Environmental Management Act. These principles include the following:

- » Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.
- » Development must be socially, environmentally and economically sustainable.
- » Sustainable development requires the consideration of all relevant factors including […] that negative impacts on the environment and on people's environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

Environmental impact assessment addresses the latter principle of the management of environmental impacts through the **mitigation hierarchy** below . Simply put, impacts must be 'avoided, or, where they cannot be altogether avoided, be minimised and remedied.'

The DEA 2013 guideline on Need and Desirability formalises this hierarchy as follows:

- » Firstly, alternatives must be investigated to avoid negative impacts altogether
- » Secondly, after it has been found that the negative impacts cannot be avoided, alternatives must be investigated to reduce (mitigate and manage) unavoidable negative impact.
- » Thirdly, alternatives must be investigated to remediate (rehabilitate and restore)
- » Fourthly, unavoidable impact that remain after mitigation and remediation must be compensated for through investigating options to offset the negative impacts.

While throughout, **alternatives** must be investigated to optimise positive impact

The mitigation hierarchy has been considered extensively in the design process followed to date – options have been investigated which would enable avoidance of impacts, as far as possible. Where impact avoidance is not achievable, minimisation is proposed.

The following section describes the various intervention options considered for backflooding relief, proposed methodology and site access alternatives, and the preferred option.

PHASE 1: VEGETATION CLEARING AND MONITORING

- Clearing the vegetation and debris blockages within the the Msunduzi (focussing on the 10 hotspots, refer Figs 5 and 10). This will increase conveyance within the river and could naturally erode the lobe of sediment within the lower Msunduzi.
- Once the vegetation and debris are removed, undertake a hydrographic survey of the Msunduzi and lower uMfolozi rivers to better inform areas requiring dredging (if required).

- Install real-time monitoring equipment.
- Ongoing monitoring vegetation or woody debris buildup within the lower uMfolozi and Msunduzi (refer the areas to be monitored in Figure 13) and record keeping of vegetation removal, where required.

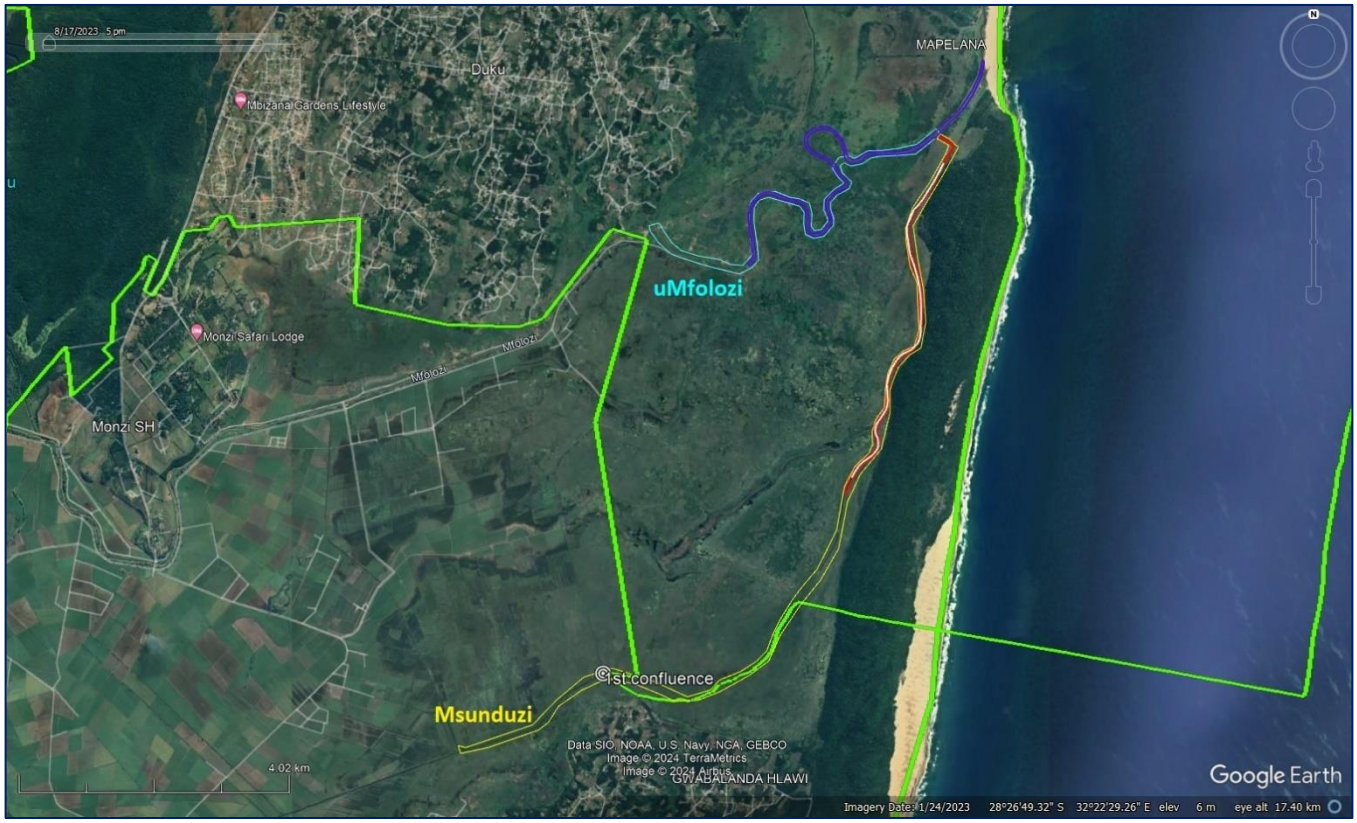


Figure 17: Vegetation monitoring areas along the Msunduzi (yellow) and uMfolozi (light blue) rivers in relation to Park boundary (green). The Mfolozi sediment lobe is indicated by the white line, red line indicates concentrated vegetation to be removed from the Msunduzi channel, although this effectively starts at the point indicated by 1st confluence (refer also Fig. 10).

Methodology: The hydraulic specialist recommended using local labour and developing an environmental stewardship approach for future management. However, for safety reasons (vulnerability to attack by hippos and crocodiles and drowning risk) and due to access difficulties, this is not recommended. the Pringle et al (2024) report does not provide details of the actual method of vegetation removal, apart from the recommendation to remove vegetation within the channel, while leaving the vegetation (this will comprise mainly common reeds *Phragmites australis* and Buffalo grass) along the banks to prevent bank erosion. It is also recommended to keep the combined mouth open during the vegetation removal phase to allow any resuspended sediments to be flushed out to sea.

The following **methods** are proposed **for the vegetation removal**:

1. **Amphibious excavator** - this can do vegetation removal and dredging (refer Phase 2 methods), but in this instance would only be utilised for the vegetation removal component. This can operate in tandem with a hopper barge to load/remove material.
2. **Excavator** (for vegetation removal) **on a floating barge**, to be accompanied by a hopper barge for removing material. The barges will need to have a low freeboard (1-2 m), so they can work in shallow water.
3. **Truxor** (or similar) amphibious craft with various vegetation removal attachments (e.g. rakes, cutters, diggers), see truxor.com. This is a small, low impact craft that can navigate shallow waterways; it may have to operate in tandem with a floating barge for disposal of material.



Figure 18: Example of Truxor amphibious craft that can be used for vegetation removal (dam-it.co.za)

While the amphibious dredger is the client preferred option, any one, or a combination of the methods, can be considered. The options will need to be assessed by the Park Authority at procurement stage, weighing up the alternatives of efficiency vs environmental impact. Considering that the area of operation is largely within the World Heritage Site, the least environmental impact option will be preferable.

Site access and site camps

Two sites have been proposed – these apply to both the Phase 1 (vegetation removal only) and Phase 2 (dredging and possibly additional vegetation removal) and are addressed in detail under Phase 2 (refer Figs 24 and 26). The preferred option is to provide access and a site camp at the Sugarloaf jetty.

Methods for vegetation disposal

The following methods are proposed for the vegetation disposal:

1. Drag the vegetation onto the river banks and dump it sufficiently away from the banks and elevated so that it doesn't get washed back into river channels, and let it naturally decompose. Suggested areas for disposing of the vegetation are outlined in Fig. 10.
2. Pile vegetation onto a floating barge and transport it to farmlands for composting, should they have a need for it. This will require permission from the farmers.
3. Pile vegetation onto a floating barge and transport it to landfill.
4. Burn the woody debris and vegetation (piled up on river banks as per item 1). This has the added complication of authorisation through NEMAQA (NEMA Air quality Act), and being located in a WHS, this is not advised.
5. Use of pesticides to break down and kill off seeds to prevent re-germination. Being located in a WHS, this is not advised.

The most suitable and preferred method is (1). The transport of vegetation on floating barges as per (2) and (3) is not practical, as it is going to be very time consuming, considering the distance between the Msunduzi operations site and Sugarloaf jetty and infrastructure for transporting the vegetation on land and would increase the number of trips to and from the site, thus increasing disturbance in the estuary.

Monitoring

Monitoring channel bathymetry will be essential to the Mouth Management Plan to establish an appropriate breaching level. Monitoring will also inform localised interventions such as removing debris and vegetation blocking flow within the channels, which we have shown to increase sediment deposition in these systems. The floodplain material is highly cohesive, and bank erosion along the dredged channels should be minimal.

PHASE 2: DREDGING OF SEDIMENTS (SHOULD PHASE 1 NOT WORK)

Results from the LIDAR Survey showed that it is not required to dredge the beach channel. Dredging of the Msunduzi channel may, , still be required, depending on the results of, and system response to, the Phase 1 vegetation clearing – whether dredging is necessary or not, and if so, where will be informed by the hydrographic survey of Phase 1, water level and vegetation monitoring.

Dredging Method:

- The lower Msunduzi should be dredged to a level of -1 mMSL to improve the drainage of the back flooded farmlands.
- A width of 10 m within the Msunduzi will result in an approximate sediment dredge volume of 40,000.00-50,000.00 m^3.
- Additional vegetation removal may still be required. We recommend removing vegetation within the channel while leaving the vegetation along the banks to prevent bank erosion. Analysis of the orthophotos shows little vegetation within the channels that require removal to dredge a channel width of 10m. This will be covered in the environmental maintenance management plan .
- It is recommended to keep the combined mouth open while dredging to allow resuspended sediment to be flushed out to sea.
- The dredge spoil should be placed in a bunded area on the Maphelane side (refer Fig. 10 and associated discussion) to prevent future risk of spoil flowing back into the Msunduzi River and clogging the system.

Dredger Options (Technology alternatives)

1. Amphibious dredger

Pringle et al (2024) recommend to use an amphibious dredger with a cutter suction head, as proposed by Bosch (2022) and shown in Figure 19. The dredger can work in very shallow water and "crawl " through any drainage channel or stream, dredging as it goes. This craft is advantageous because the cutter suction head can be removed and replaced with a rake to clear vegetation, if required. The dredger can pump the sediment via a pipeline to a maximum distance of 1.5 km.

2. Floating dredge barge with a cutter suction

Another option to be considered might be a floating barge dredger with a cutter suction, similar to that shown in Figure 20. The barge has a low freeboard of 1-2 m, so can work in shallow water and will also be able to pump the sediment via a pipeline, using booster pumps if required. To expedite the process, two (or more) barge dredgers could be used.

While the amphibious dredger is the client preferred option, it is recommended that the most suitable craft and equipment, in communication with dredging operators at the procurement stage, be identified, with due consideration for minimizing environmental impacts, but maximizing efficiency. Considering that the area of operation is largely within the World Heritage Site, the least environmental impact option will be preferable.



Figure 19: Amphibious multi-purpose dredger, showing ease of transportation to site (from **Bosch projects, 2022).**



Figure 20: Example of a floating barge

Sediment Removal Technique and Spoil Management (site alternatives)

Designated spoil sites (1, 2 & 3)

The dredge spoil should be pumped via a pipeline to areas shown in Figure 21: Potential discharge of dredge spoil 60 m away from the uMsunduzi River and avoiding any trees. Also shown in the figure are the working radius (1.5 km) of the dredger (circles). . Based on the areas presented in Table 13, the dredge spoil will cover the

demarcated areas in ~0,2 to ~0,5 m of spoil. Bunding can be used to manage the spoil and allow dewatering and the spoil should be levelled out as much as possible.

Table 14: Estimated excavation volumes per area for the different zones.

Dredge spoil area	Area (m^2)
1	42 000
2	88 000
3	57 000

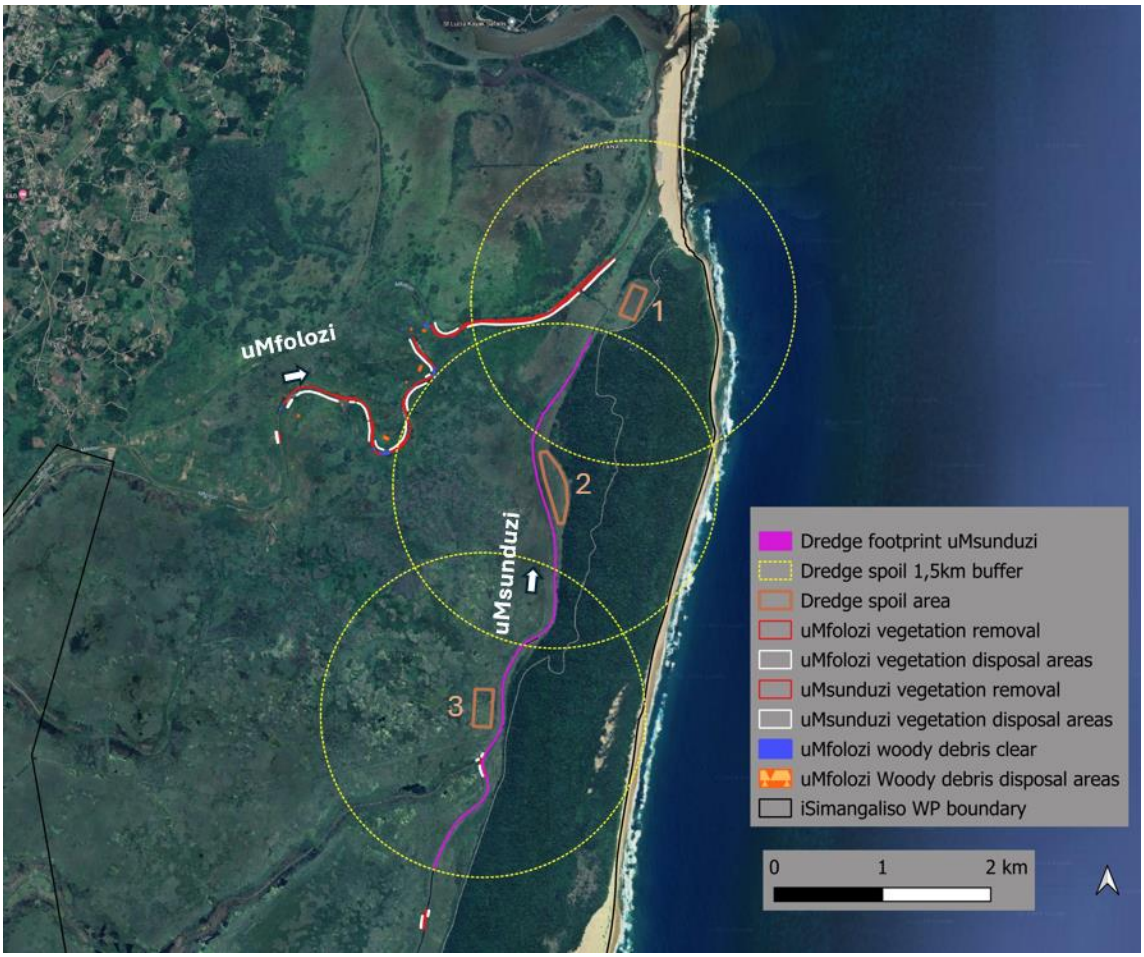


Figure 21: Potential discharge of dredge spoil 60 m away from the uMsunduzi River and avoiding any trees. Also shown in the figure are the working radius (1.5 km) of the dredger (circles).

The dredge spoil sites should be at least 60 m from the Msunduzi watercourse. The selected sites are inaccessible, but were flown by helicopter by Dr Riaan Cedras of iSimangaliso on 9 May 2024 to verify their suitability. The sites all consist of thickets of the invasive *Phragmites australis* (Figs 22 & 23). According to De Cavalho, 2024), "the species alters the structure and function of ecosystems by changing species composition (the one species dominates and can out-compete other species), nutrient cycles and hydrological regimes. Dense *Phragmites* stands decrease biodiversity and quality of wetland habitat. The establishment of such an invasive species is problematic as it is fast growing and dense", The dumping of spoil in the designated areas 1, 2 and 3 is seen as the best option, considering accessibility to the operational area and that the vegetation stands are by no means rare or sought after; in fact quite the reverse, they are encroaching and the dumping of spoil ontop might keep the vegetation in check for a while.



Figure 22: Aerial view of spoil site 1 (approximate area circled). Maphelane dunes in the background (Photo: Dr Riaan Cedras).



Figure 23: Aerial view of spoil site 2 (approximate area circled). Maphelane dunes in the background (Photo: Dr Riaan Cedras).

Spoil to farming areas

The spoil could be dumped on sugar cane lands on those farms in close proximity to the dredging activity, subject to agreement from the respective farmers, in order to provide fresh, nutrient-rich soil, which may have the added benefit of raising the land. The offer could be made by the Park Authority to the farmers and an agreement signed by both parties. However, the spoil would need to be levelled on the farm in order to make it usable by the farmers.

Site Access

The hydraulics and geomprphology report (Pringle, et al., 20240 addressed two options to access the site (refer Fig. 24). This applies to both the Phase 1 (vegetation removal only) and Phase 2 (dredging):

1. Launch the amphibious craft at the old light tackle boat slipway near the St Lucia Ski boat club (Sugar loaf) within the St Lucia Estuary. This will have the following implications:
    a. The dredger can work its way from the jetty to the lower uMsunduzi.
    b. The flow velocity conditions on the downstream side of the sediment lobe in the lower uMsunduzi range between 0.8-1.2 m/s. This may make working conditions difficult.
    c. The dredger will be working downstream of flow blockages. This is discouraged as this may make working condition dangerous. It is recommended that this method be approved by a suitably qualified professional engineer.
2. Access via Four Drain. This has the following implications:

a. Establishing the dredger and transport to the lower farmlands is relatively straightforward, requiring only one assembly.
b. The dredger can make its way down the Drain clearing as it cuts a new channel. Dredge spoil can be sprayed on either side of the banks.
c. It will be easier to control the operation from the upstream side due to slower water speed and higher water levels.

A site inspection of the Four Drain access and site camp proposal by De Cavalho (2024) showed that Option 2 is not feasible as the Four Drain access area was inaccessible due to flooding. The vulnerability of the proposed access route and site camp to flooding and the unpredictability thereof, therefore exclude this option. The Sugarloaf jetty is therefore preferred, having the additional advantage of availability of a hard surfaced parking area as a site camp and easy road access (for refuelling, maintenance, supplies, etc). An image of the site is provided in Figure 25. The area is also clogged by reed encroachment and will require a channel to be cleared of vegetation and sediments in order to gain access to the estuary and then the Msunduzi River.

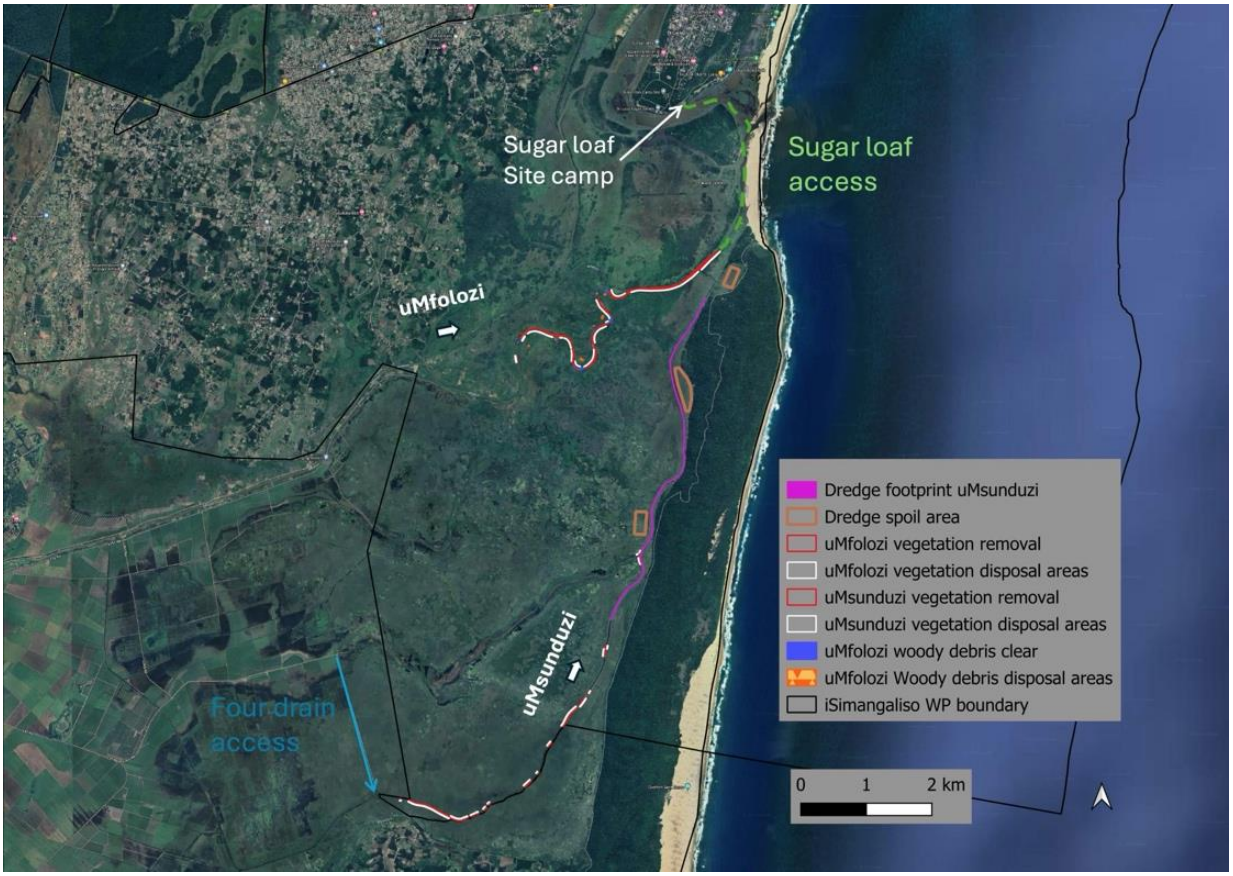


Figure 24: Access routes for the amphibious dredger/vegetation removal craft from Four Drain (blue arrow) and Sugarloaf jetty (green).



Figure 25: The old light tackle boat slipway at the Sugarloaf area of St Lucia Estuary.

There are three possible channel paths for consideration to be cleared for dredger/amphibious craft access from the sugarloaf slipway to the Msunduzi via the estuary channel - these probably correspond to hippo paths. The suggested paths, based on satellite imagery are shown in Figure 26.

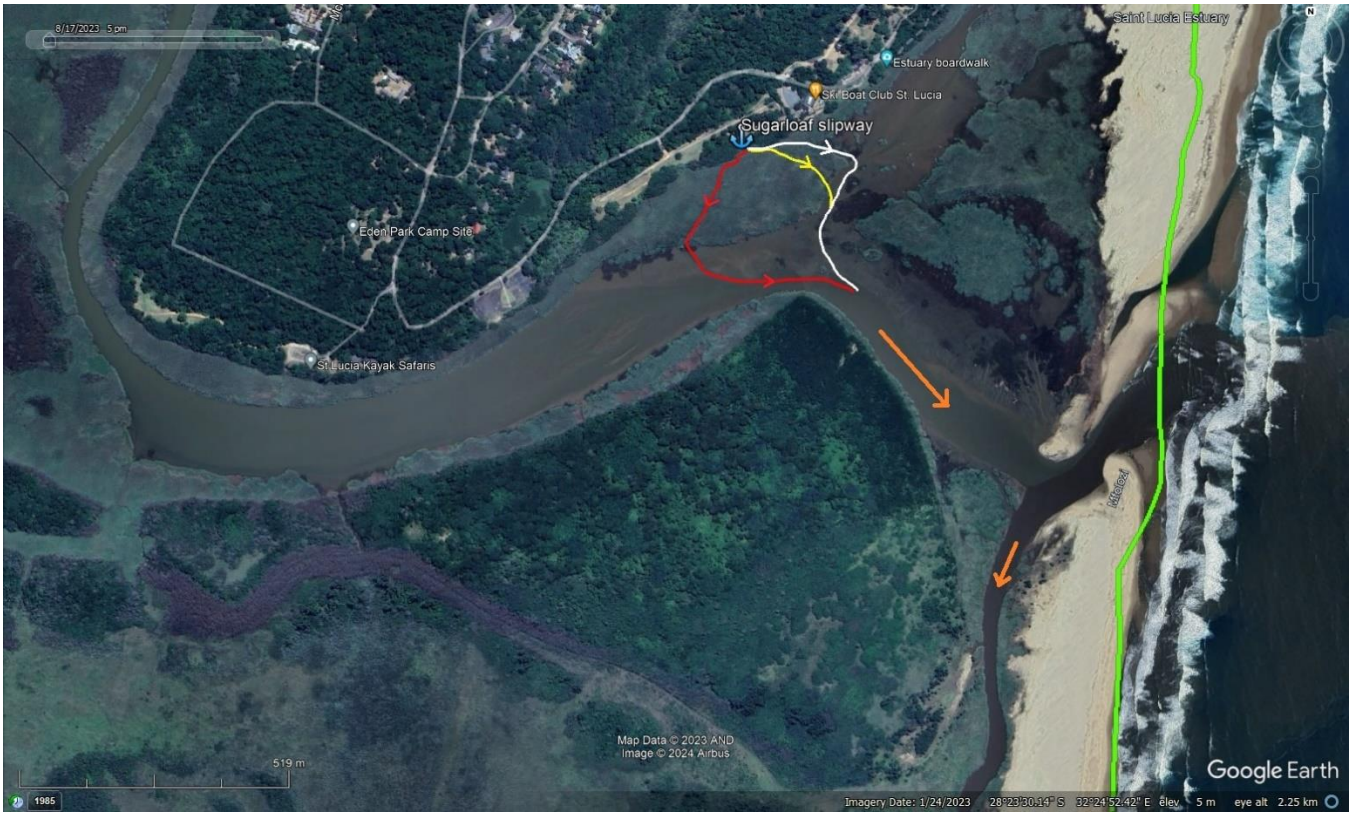


Figure 26: Google Earth image of proposed channels to provide for craft access from the Sugarloaf slipway to the St Lucia Estuary and then Msunduzi River via the beach channel (small orange arrow). White = route 1, yellow = route 2 (joins up with route 1), and red = route 3.

The estimated area of vegetation and/or sediment to be cleared, associated with each route option, is shown in Table 14. The optimal route can be decided by iSimangaliso and the contractor further to site assessment at the procurement stage - they must select whichever route looks the best option at the time. A width of 5 m is assumed for a small barge/truxor, 10 m for a larger dredger. All options will include moving sediments (Activity 19 of Listing Notice 1), a greater proportion for route 1 than 2 and 3; certainly >10 m^3. Activity 12 of Listing Notice 3 is also triggered (vegetation > 300 m^2) for this activity.

Table 15: Sugarloaf jetty phragmites vegetation clearance for barge/dredger access to Msunduzi

	Length (m) (approx)	Width (m) (veg barge)	Width (m) (dredger)	Area m^2 (veg barge)	Area m^2 (dredger)	Type
Route 1	200	5	10	1 000	2 000	Mainly phragmites, mix of veg and seds at end
Route 2	200	5	10	1 000	2 000	Phragmites
Route 3	233	5	10	1 165	2 330	Phragmites

Suggested method of vegetation and/or sediment removal:

Where vegetation only, the Truxor or an excavator, possibly on a small barge, can be used and material taken to a demarcated spoil site in the carpark and then trucked to a landfill. It is better to remove the *phragmites* to landfill in this instance, because the area is accessible to transport routes. Dumping of the material on the estuary banks is not advised due to the possibility of reseeding. Sediments can be removed by an excavator or cutter suction dredger. All sediments are to be moved to landfill.

3.3 PROJECT ALTERNATIVES

In terms of the EIA Regulations [2014, as amended in 2017], Sections 24(4) (b) (i) and 24(4A) of the NEMA require an EIA to include investigation and assessment of impacts associated with alternatives to the proposed project. These alternatives must be feasible and reasonable, in terms of section 24O of the NEMA, and may include modifications or changes to the activity that that may minimise harm to the environment.

In agreement with NEMA, the UNESCO guideline document (2022) requires an initial identification of alternatives to the proposed action. The aim is to establish the most environmentally sound option for achieving the proposed action's objectives, while protecting OUV and other heritage/conservation values. The UNESCO toolkit also stipulates that alternatives to the proposed action should be considered in order to establish the most sustainable option that both protects World Heritage and achieves the objectives of the proposed action. The option not to proceed with the proposed action ('no project', or what is termed the "no-go" option in NEMA) should always be considered.

Various project alternatives (methods, disposal and site access) were presented in Chapter 3.2, above.

Preferred alternatives

In summary, the preferred interventions are:

- Phase 1: Vegetation clearing of the Msunduzi. The preferred method of vegetation removal will be decided at procurement stage, weighing up the alternatives of efficiency vs least environmental impact. Vegetation is to be disposed of onto the river banks (refer Fig. 10), sufficiently away and elevated so that it doesn't get washed back into river channels, and left to naturally decompose.
- Monitoring of vegetation, possible sediment build-up, water levels to determine if backflooding relief, and hydrographic survey.
- Phase 2: Dredging of the sediment lobe on the Msunduzi. The preferred dredging method and equipment will be decided at procurement stage, weighing up the alternatives of efficiency vs least environmental impact. Spoil is to be pumped to designated spoil sites, 60 m away from river banks,

with the option to pump/deposit to surrounding farms, subject to willingness, agreements and ease of access.

- Preferred access for both Phase 1 and Phase 2 craft and equipment is via the St Lucia Sugarloaf jetty. The exact channel to be cleared will be decided in consultation between the Park authority, ECO and contractor, depending on which channel looks easiest to navigate and clear.

No-Go alternative

The No-Go alternative represents the option not to proceed with the proposed project and requires a comparison between the intervention options with that of not proceeding with the project. The no-go alternative is to do nothing and allow for the natural processes determine the nature of the estuary, and more specifically the Msunduzi and uMfolozi Rivers and the back flooded areas. Sediment will continue to flow into both rivers, and it is likely that *P. australis,* amongst other species (including buffalo grass *Pistia stratiotes*) will proliferate further and entirely close off the channel and restrict it to a small visible channel with a significantly reduced open water column.

Without sufficient flows from both the uMfolozi River and Msunduzi River, especially during drought conditions, may have a significant influence on freshwater contributions into the St Lucia system (Clark et al.,2014) potentially leading to another hyper-salinity period, which has been experienced previously.

Despite the ecological significance of the study, it is also important to consider the social environment and the knock-on effects of job losses and/ or reputation impacts that the no-go alternative may have on the community within the area. This is especially important for those with limited or specific skills, or those with a limited ability to find jobs elsewhere. Often this will lead to illegal activities such as bush clearing, illegal hunting, and fishing. To date, the magnitude of the jobs that have been lost as a result of back-flooding is significant, and therefore negative environmental impacts associated with not assisting with, or resolving these issues will also be significant and are highlighted in the Independent Panel of Experts Report (2022). While the no-go alternative would reap vegetation benefits for certain plant species, it would have significant negative socio-economic impact on a local economy already under significant pressures. It also would mean that land, in significant quantities are likely to be abandoned, and not managed, which could be subjected to the erection of illegal structures. Falling outside of the ISimangaliso Wetland Park Authority, this would have further negative impacts such as the proliferation of alien invasive plants species in the Park buffer area.

4. ENVIRONMENTAL LEGISLATIVE CONTEXT

Based on the information made available to Indaloenhle Environmental Consultants and the Department of Fisheries Forestry and the environment opinion, the project requires authorisation in terms of NEMA (Act No. 107 of 1998), which will be undertaken in accordance with the Environmental Impact Assessment (EIA) Regulations, 2017 (GN No. R.326), as amended. The BA process triggers Listed Activity 19 and 27 from GNR 327 (Listing Notice 1) and Listed Activity 12 from GNR 324(Listing notice 3).

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant pieces of environmental legislation that need to be considered during this study. This section outlines the applicable national legislations which needs to be taken cognisance of.

4.1 THE CONSTITUTION OF SOUTH AFRICA

Section 24 of the Constitution of South Africa [No. 108 of 1996] states that:

"…*everyone has the right – … [a] to an environment that is not harmful to their health or well-being; and … [b] to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that … [c] secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."

This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in the NEMA and given further expression.

The Constitution cannot manage environmental resources as a standalone piece of legislation; hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations is designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld on an on-going basis throughout the country.

4.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT [ACT NO. 107 OF 1998]

The National Environmental Management Act (Act 107 of 1998) (NEMA) is South Africa's overarching environmental legislation. It includes a set of principles that govern environmental management and against which all Environmental Management Programmes (EMMPr) and actions are measured. These principles include and relate to sustainable development, protection of the natural environment, waste minimisation, public consultation, the right to an environment that is not harmful to one's health or wellbeing, and a general duty of care.

The Environmental Impact Assessment (EIA) Regulations, 2014: GNR.982, R.983, and R.985 under Section 24 of the NEMA define the activities that require Environmental Authorisation and the processes to be followed to assess environmental impacts and obtain Environmental Authorisation. The nature of the

proposed project includes activities listed in the following Listing Notices – GNR 327 [Listing Notice 1] of the EIA Regulations [2014, as amended in 2017] – refer to the table below:

Table 16: NEMA Activities triggered by the project proposal

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from a water course.	Excavation, removal or dredging of sediments of more than 10 cubic meters from a watercourse. • approximate sediment dredge volume of 40,000.00-50,000.00 m3 in lower uMsunduzi to improve drainage.
27	"The clearance of an area of more than 1 hectare but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for (i) the undertaking of a linear activity or (ii) for maintenance purposes undertaken in accordance with a maintenance management plan"	• Approximately 28,000-56,000 m^3 of vegetation should be removed along the uMsunduzi, • 25,000- 49,000 m^3 the uMfolozi. • Approximately 1,000-3,200 m3 of woody debris should be removed from the lower uMfolozi. • Sugarloaf jetty clearance for access is 1000.00m^3 This activity is a linear activity for the purpose of maintenance and will be undertaken in accordance to a maintenance management plan.
Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. **{d) KwaZulu-Natal** **(ix)World Heritage Sites**	**iSimangaliso Wetland Park World Heritage Site is intending on clearing vegetation** • Approximately 28,000 - 56,000 m^3 of vegetation should be removed along the uMsunduzi, • 25,000 - 49,000 m^3 the uMfolozi. • Approximately 1,000-3,200 m^3 of woody debris should be removed from the lower uMfolozi. • Sugarloaf jetty clearance for access is approximately 1 000m^3

4.3 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT [ACT NO. 10 OF 2004]

The National Environmental Management: Biodiversity Act intends, to provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998, the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from

bioprospecting involving indigenous biological resources, the establishment and functions of a South African National Biodiversity Institute and for matters connected therewith.

This Act seeks to manage and conserve biodiversity within the framework of the National Environmental Management Act, 1998. The developer has a responsibility for limiting the loss of biodiversity and ecosystems by adhering to the following legislation and restricted activities. The following legislation may be consulted throughout the various phases of the proposed activities.

- GNR 324 of Government Gazette No. 37596 of 2014 provides the Amendment to the Threatened or Protected Species Regulations.
- GNR 1002 of Government Gazette No. 34809 of 2011, provides a national list of terrestrial ecosystems that are threatened and in need of protection.
- GNR 151 of Government Gazette No. 29657 of 2007 and GNR 1187 in Government Gazette 30568 of 2007 provides a list of critically endangered, endangered, vulnerable and protected species.
- GNR 988 of Government Gazette No. 41919 of 2018 provides amendments to the alien and invasive species list as well as the critically endangered, endangered, vulnerable and protected species.
- GNR 599 of Government Gazette No. 37886 of 2014 and GNR 864 of Government Gazette No. 40166 of 2016 provides a list of invasive and alien plant species.
- GNR 598 of Government Gazette No. 37885 of 2014 provides the Alien and Invasive Species Regulations. GNR 112 of Government Gazette No. 41445 of 2018 provides the draft alien and invasive species regulations in terms of categories, potential eradication and control techniques and the requirements for the application of permits.
- GNR 529 of Government Gazette No. 40889 of 2017 provides the most updated amendments to the Regulations on the Convention of International Trade in Endangered Species (CITES) of wild fauna and flora.

Section 76 of the NEM:BA (No. 10 of 2004) provides guidelines for monitoring, control and eradication plans for species listed as invasive in terms of Section 70 of this Act.

Based on the findings of the desktop assessment a list of approximately 100 individual plants was generated using the South African National Biodiversity Institute's (SANBI) Plants of South Africa (POSA) database. Of these species, the following families were found to be most common:

- *Asteraceae* (Daisy Family) – 10 species (1 endemic species.
- *Cyperaceae* (Sedge Family) – 11 species (1 endemic species); and

- *Fabaceae* (Pea Family) – 16 species (1 endemic species).

The project must comply with the National Environmental Management: Biodiversity Act [Act No. 10 of 2004] [NEM: BA] in providing the cooperative governance in biodiversity management and conservation.

The NEM: BA also provides for:

- The National Biodiversity Framework
- Bioregional Plans
- Biodiversity Management Plans
- Biodiversity Management Agreements
- The identification, listing and promotion of threatened or protected ecosystems; and
- Alien invasive species control and enforcement.

4.4 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT [ACT NO. 57 OF 2003]

The National Environmental Management: Protected Areas intends to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes, for the establishment of a national register of all national, provincial and local protected areas, for the management of those areas in accordance with national norms and standards, for intergovernmental co-operation and public consultation in matters concerning protected areas, and for matters in connection therewith.

In terms of the South African Protected Areas Database (SAPAD, 2023), and the provincial protected areas inventory the majority of the study area is contained within the following protected areas:

- iSimangaliso Wetland Park (World Heritage Site and RAMSAR Site); which includes the previously named Maphelane Nature Reserve and St. Lucia Game Park.

Further analysis of the protected areas dataset and the latest Important Bird and Biodiversity Areas (IBAs) dataset also confirmed the following:

- iSimangaliso Marine Protected Area (MPA) within 5 kilometres (Km). The iSimangaliso Wetland Park Authority is formally designated as the management authority for the iSimangaliso MPA in terms of section of section 38 (1)(a)(b) of NEM:PAA (Regulation ii Government notice R788 of notice 42479, 23 May 2019).
- St. Lucia Game Park within 5 km; and
- St. Lucia Park within 5 km.

4.5 WORLD HERITAGE CONVENTION ACT, 1999

South Africa has solid legislation that affords iSimangaliso the necessary legal protection, such as the World Heritage Convention Act, 1999. This Act ensures that National Government has the legal means to discharge its responsibilities under the Convention, and that World Heritage sites, along with their tourism potential, are developed in ways that meet the social and development needs of local residents and citizens. According to the Act, "State Parties need to establish an appropriate relationship between conservation, sustainability and development so that World Heritage properties can be protected through appropriate activities contributing to the social and economic development and quality of life of communities inside the park and surrounding communities".

4.6 NATIONAL WATER ACT [ACT NO. 36 OF 1998] [AS AMENDED]

The National Water Act [NWA] is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country, which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations.

The NWA states that a person may only use water if the water use is authorised by a license under the NWA or if the responsible authority has dispensed with a license requirement if it is satisfied that the purpose of the NWA will be met by the granting of a license, permit, or other authorisation under any other law. The proposed project consists of riparian vegetation clearing from 10 hot spots along the Msunduzi River, a temporary site camp and site access at the Sugarloaf jetty and a sediment lobe along the Msunduzi River that might require dredging; thus there will be alterations to the bed and banks of a watercourse. Therefore, a water use authorisation will be required as per Section 21 (c) and (i) (Table 17) of the National Water Act.

Table 17: Section 21 Water Uses.

NWA Section 21	Sec21 (c)	The installation of a pipe will impede or divert the water flow of the stream
NWA Section 21	Sec 21 (i)	The activity will alter the bed, banks, or characteristics of a water course

4.7 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT [ACT NO. 59 OF 2008] [AS AMENDED]

To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information system; to provide for compliance and enforcement, and to provide for matters connected therewith. Section 19 allows the Minister to publish a list of activities, which require a Waste Management License. The most recent list is published in Government Gazette 37083 Notice No. 921 dated 29 November 2013.

It is unlikely that any activities carried out by the development will trigger a Waste Management Activity.

The NEM: WA has been considered; however, no activities have been identified for the proposed development. Dredge waste will be disposed of at a registered landfill and not dumped illegally or to sea.

4.8 NATIONAL HERITAGE RESOURCES ACT [ACT NO. 25 OF 1999]

The National Heritage Act (No. 25 of 1999) aims to promote good management of the national estate in order to preserve the country's unique heritage for current and future generations. No significant archaeological artefacts will be disturbed during this project; therefore, no permits will be required from the provincial heritage authority, SAHRIS.

4.9 KZN NATURE CONSERVATION ORDINANCE [ORDINANCE NO. 15 OF 1974]

Protected indigenous plants in general are controlled under the relevant provincial Ordinances or Acts dealing with nature conservation. In KwaZulu-Natal, the relevant statute is the 1974 Provincial Nature Conservation Ordinance. In terms of this Ordinance, a permit must be obtained from Ezemvelo KZN Wildlife to remove or destroy any plants listed in the Ordinance.

If protected plant species are to be disturbed, the Applicant must pursue the necessary permit / licensing requirements from the Department of Forestry, Fisheries and the Environment [DFFE] and Ezemvelo KZN Wildlife [EKZNW] prior to clearing of such vegetation.

4.10 OCCUPATIONAL HEALTH AND SAFETY ACT [ACT NO. 85 OF 1993]

These regulations provide for the health and safety of persons at work, including aspects which are hazardous to health and safety. In terms of major hazardous installation, the regulations shall apply to employers, self-employed persons, and users, who have on their premises, either permanently or temporarily, a major hazard installation or a quantity of a substance which may pose a risk that could

affect the health and safety of employees and the public. During both the dredge phase of this development all the requirements of Occupational Health and Safety Act 1993 will need to be adhered to.

4.11 NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT [ACT NO. 39 OF 2004]

To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide for national norms and standards regulating air quality monitoring, management, and control by all spheres of government; for specific air quality measures; and for matters incidental thereto. It is unlikely that any activities carried out by the development will impact on the local and regional air quality.

4.12 HAZARDOUS SUBSTANCE ACT [ACT NO. 15 OF 1973] AND REGULATIONS

This Act aims to provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products, to provide for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products and to provide for matters connected therewith. A Spill Contingency Plan will be compiled for managing spills during the dredge of the proposed development.

5 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

5.1 SENSITIVITY OF THE RECEIVING ENVIRONMENT

The DFFE screening tool was consulted using the feasibility region shown in Figure 27, which covers the geographical extent of the proposed project area. Table 18 provides a summary of the development site environmental sensitivities based on the selected classification, and the environmental sensitivities of the proposed development footprint. The Agricultural, Aquatic Biodiversity, Palaeontology and Terrestrial Biodiversity themes were classified as having **Very High** Environmental Sensitivity and the Plant species category is of Medium Sensitivity (Table 19). To explain the sensitivity rankings, the Screening tool report (Appendix B) gives a detailed description of the site sensitivity ratings used.

Table 18: Summary of DFFE screening tool outputs

Theme	Very High Sensitivity	High Sensitivity	Medium Sensitivity	Low Sensitivity	EAPs Opinion
Agriculture Theme	X				Dispute Compliance statement attached. Appendix E
Animal Species Theme		X			Marine Study Attached Appendix E
Aquatic Biodiversity Theme	X				Agree Wetland and Aquatic Study attached Appendix E
Archaeological & Cultural Heritage	X				Awaiting confirmation from SAHRA
Civil Aviation Theme		X			Dispute

Defense Theme				X	Dispute
Paleontology Theme		X			Dispute Compliance Statement Appendix E
Plant Species Theme			X		Agree Attached Vegetation impact assessment Appendix E
Terrestrial Biodiversity Theme	X				Agree Attached Vegetation impact assessment. Appendix E

Findings for Terrestrial Biodiversity theme and Plant species theme

Based on the findings of the Department of Forestry, Fisheries and the Environment (DFFE) Environmental Screening Tool, the entire study area contained a "Very High" Terrestrial Ecological Theme, a "Medium" Plant Species Theme. The following is a list of the species identified using the screening tool:

- *Cassipourea gummiflua var. verticillata (VU)*
- *Freesia laxa subsp. azurea (VU)*
- *Pristimera delagoensis var. delagoensis (VU)*
- *Sensitive Species 1252 (VU)*
- *Sensitive species 191 (VU)*
- *Zostera capensis (LC)*

None of these species were identified within the study area during the assessment.

According to the KwaZulu-Natal Biodiversity Spatial Planning Terms and Processes, Version 3.3 (2016) the study area is located within an Ecological Support Area. According to the same dataset, no Critical Biodiversity Areas (CBA) Irreplaceable or Optimal are found within the study area. Any planned activities associated with this project must therefore ensure that the existing natural biodiversity pattern, ecological processes and drivers, as well as any movement corridors (daily or seasonally / episodic – e.g., migration of certain species) are not inhibited in any way and persist throughout the project life cycle.

According to the National Web-based Screening Tool Report generated for the study area, it was confirmed that there are several spatially important features associated with the site. Table 9 below provides a summary of these features identified within the screening report.

Table 19: *Summary of the features listed within the National Web-based Screening Tool Report (DFFE, 2023)*

Theme	***Sensitivity Rating***	***Feature***	***Observed***
Plant Species Theme	*Low*	*Low Sensitivity*	*Y*
	Medium	*Sensitive Species 1252 (VU)*	*N*
		Freesia laxa subsp. azurea (VU)	*N*
		Pristimera delagoensis var. delagoensis (VU)	*N*
		Cassipourea gummiflua var. verticillata (VU)	*N*
		Sensitive species 191 (VU)	*N*
		Zostera capensis (LC)	*N*

LC – Least Concern; VU – Vulnerable

In terms of the Best Practise Reporting guidelines, species listed above which have been referred to as "sensitive species with their unique identifies" have been excluded from this report. The names have been withheld as these species may be prone to illegal harvesting and must be protected.

The Red List of Ecosystems (RLE) for terrestrial realm for South Africa (remnants) was used to assess the remaining portions of ecosystems which have not been lost to anthropogenic activities such as croplands, previous management regimes the estuary and mining. The list assists with planning / decision making as the proposed activity will still have an impact on terrestrial environments, whether indirectly or directly and depending on what management objective is set for this system (natural or assisted-natural). This data source categories ecosystems based on their risk of collapse, with the following threat status:

- *Critically Endangered (CR).*
- *Endangered (EN).*
- *Vulnerable (VU); and*
- *Least Concern (LC).*

Based on this dataset, the study area does not occur within any ecosystems with a threat status of VU, EN or CR. The entire proposed dredging will take place either outside of any ecosystems recorded within this dataset, or within ecosystem with a threat status of LC. The following is a list of the affected ecosystems:

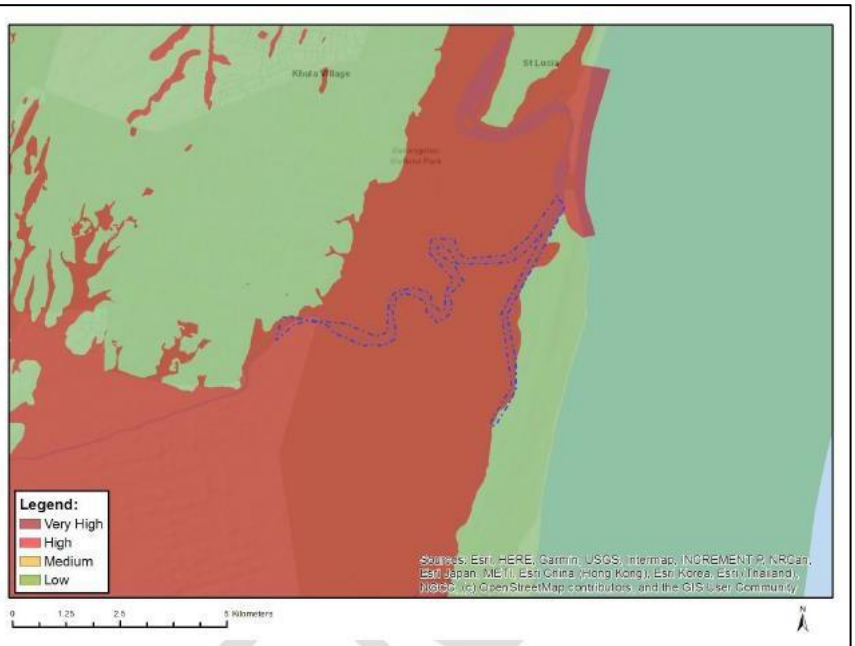
- *Mangrove Forest (FOa3) – LC.*

- *Swamp Forest (FOa2) – LC.*
- *Northern Coastal Forest (FOz7) - LC; and*
- *Subtropical Alluvial Vegetation (AZa7) – LC.*

Findings from Aquatic Biodiversity Theme

According to the Department of Fisheries, Forestry and the Environment (DFFE) Environmental Impact Assessment (EIA) National Web-based Screening Tool, the site sensitivity in terms of the presence of aquatic features, was depicted as **Very High** (Figure 28. This was largely due to the presence of the uMfolozi-uMsunduzi estuarine system wetland area (in the form of the estuary) and a Class B River.

The specialist verifies this sensitivity as determined through the desktop analyses and previous experience in this area. Although the Msunduzi is currently not a Class B River (Van Niekerk et al., 2019), as a result of various impacts, this is the recommended state and therefore has high ecological value.



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Estuary_iMfolozi/uMsunduze
Very High	Rivers_A
Very High	Rivers_AB
Very High	Rivers_B
Very High	Wetlands_(Estuary)

Figure 27: Aquatic Biodiversity Sensitivity as per DFFE screening tool.

Findings from Paleontological theme

The findings on the screening tool deemed the area as high sensitivity and a Palaeontologist was appointed to undertake Desk-top Palaeontological Impact Assessment (PIA. The findings of the specialist are detailed below ;

Delta Top Sediments

This entire uMfolozi Delta (uMfolozi-Msunduzi Floodplain) area is likely to be underlain by delta top muds and river sands and is zoned green by SAHRIS and therefore requires a desk-top Palaeontological Impact Assessment (PIA). The colour coding used in the SAHRIS Palaeosensitivity Map is shown in the Table below. These sediments are very unlikely to be fossiliferous, although a chance find cannot be ruled out.

It is possible that fossils could be transported and deposited by river flood action, however in this process they are likely to be damaged or destroyed. The position of any fossils encountered in the uMfolozi Delta cannot be predicted ahead of time due to the nature of channel sedimentation, however a "Chance Find Protocol" has been inserted to cover this eventuality in the EMMPr.

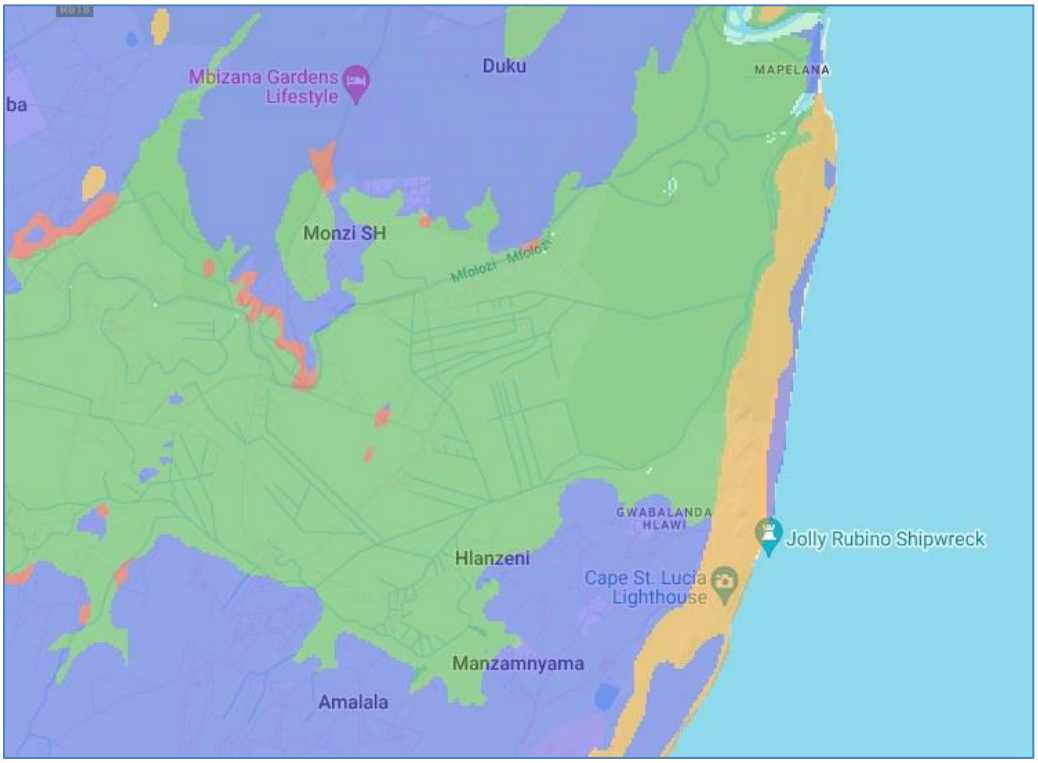


Figure 2828: Palaeosensitivity of the uMfolozi – Msunduzi Floodplain. The entire area of proposed interventions is coded green (moderate). The area of the blue (low), red (very high) and yellow (high) shading will not be impacted by this project.

Table 20: Summary of SAHRIS categories

Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study; a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	None	Letter of Exemption required

This area is coded green by SAHRIS,

The chance of fossils being found on the uMfolozi-Msunduzi floodplain **are very low,** but not zero, consequently a **"Chance Find Protocol"** has been included in the EMMPr to cover this eventuality.

Findings from Agricultural Statement

The findings of the screening tool rated the site as having a very high sensitivity and an agricultural specialist was appointed to undertake an Agricultural Compliance Statement and he concluded by saying that this site is on non-agricultural land, which cannot practically have any agricultural production potential, and a detailed agricultural assessment therefore has no value and is consequently not required.

The agricultural sensitivity of the site, as given by the screening tool. However, the agricultural sensitivity and its verification is entirely irrelevant in this case because the site's capability to practically deliver an agricultural product is not determined by its climate, terrain and soil capabilities. The site is in an area that is not and would never be utilised for agricultural production and it therefore has zero agricultural production potential, regardless of what its climate, terrain, and soil capabilities might be.

A detailed site verification report has been attached in appendix D: ANIMAL SPECIES THEME

The marine specialist was appointed and ompiled a Marine Impact Assessment report (Appendix E) that provides an insight on species on site . The proposed vegetation clearance and dredging will occr within an estuarine water body, therefore the marine life could be impacted. Therefore a Marine Study was conducted and is attached in

The Marine impact assessment findings detail that Marine/estuarine fish species caught included lobotes (Lobotes surinamensis), salmon/kob (Argyrosomus japonicus), flathead mullet (Mugil cephalus), spotted grunter (Pomadasys commersonnii) and juvenile kingfish (Caranx sp.) and apparently local communities used to harvest the flathead mullet (Craig Edgar, pers. comm). The Mfolozi mouth subsequently changed from being a predominantly open system (refer Chapter 4.1.2) to being closed from mid-2014 until the assisted breach of the combined Mfolozi/St Lucia mouths in January 2021. This mouth closure would have affected the fish assemblages. After the mouth closed and the river channels silted up, only freshwater species such as barbel (Clarias gariepinus) and tilapia (Oreochromis mossambicus) were caught (Craig Edgar, pers. comm). The tilapia is a favoured source o food for birds such as the Caspian tern, great white pelicans, goliath and grey heron, reed and white-breasted cormorants (Fox & Mfeka).

5.2 CLIMATE

5.2.1 CLIMATE DESCRIPTION

The climate of the area is best described in the iSimangaliso Wetland Park Integrated Management Plan (2022 – 2031) as follows: iSimangaliso falls within the humid subtropical climatic zone of Africa (Köppen classification Cwa), with the warm Agulhas Current offshore having a moderating influence. Summers are hot and humid, while winters are mild, with intermittent cold spells associated with the passage of cold fronts. About 75% of the rainfall along the coastal margin occurs during the spring to autumn months of October to April, with this percentage increasing to 85% inland (i.e., winters are drier inland). Most summer rainfall occurs in the form of convective thunderstorms or is associated with low pressure troughs, often linked to the eastward passage of coastal lows or cold fronts to the south. At times cumulo nimbus cells, formed offshore over the warm Agulhas Current, move over land during early evening, resulting in coastal rainfall (Hunter, 1988). Episodic floods are occasionally caused by cut-off lows forming off the east coast and tropical cyclones or tropical depressions moving southwards from Mozambique after crossing or moving down the Mozambique Channel. The most significant recent event to impact the area was Tropical Storm Domoina over 28 January to 1 February 1984, during which the uMfolozi River, which flows into the sea at Maphelane, recorded the highest flood volume in South African history (van Bladeren, 1992).

Rainfall is generally temporally and spatially highly variable in a pattern typical of subtropical regions. The most notable feature of the rainfall in iSimangaliso is the steeply declining gradient from the east to the west: Mean annual precipitation for the Maputaland Coastal Plain varies from >1 200 mm per annum (pa) along the coastal margin to approximately 500 mm pa along the Lebombo range. The close proximity of the warm Agulhas Current to the coast, especially offshore of Cape Vidal to Cape St Lucia, facilitates precipitation along the coastal strip. Additionally, there is a declining rainfall gradient from St Lucia (>1

200 mm in places) to Kosi Bay (980 mm) (Hunter, 1988). Similarly, there is a declining gradient in relative humidity (RH) from the coast to inland areas (e.g., uMkhuze). RH is high in summer, and for much of the year it exceeds 90%, although winters are dry, particularly at inland locations. Evaporation rates are high, especially during the drier winter and early spring periods; there is similarly a gradient from the coast (1 300 mm pa) to inland (1 660 mm pa).

Figure 29 shows the annual average rainfall at the South African Sugar Research Institute (SASRI) station at Riverview, on the uMfolozi flats since 1967, as well as the long-term trend and moving average. There is a general declining trend in annual rainfall, although there is interannual variability, with wet and dry periods (see Climate Variability section below). Maximum rainfall was recorded in 1987, associated with the 1987 floods, while 1984 was high as a result of Tropical Storm Domoina floods. The year 2000 was the 2nd highest year on record. Annual average rainfall for this station is 886.5 mm.

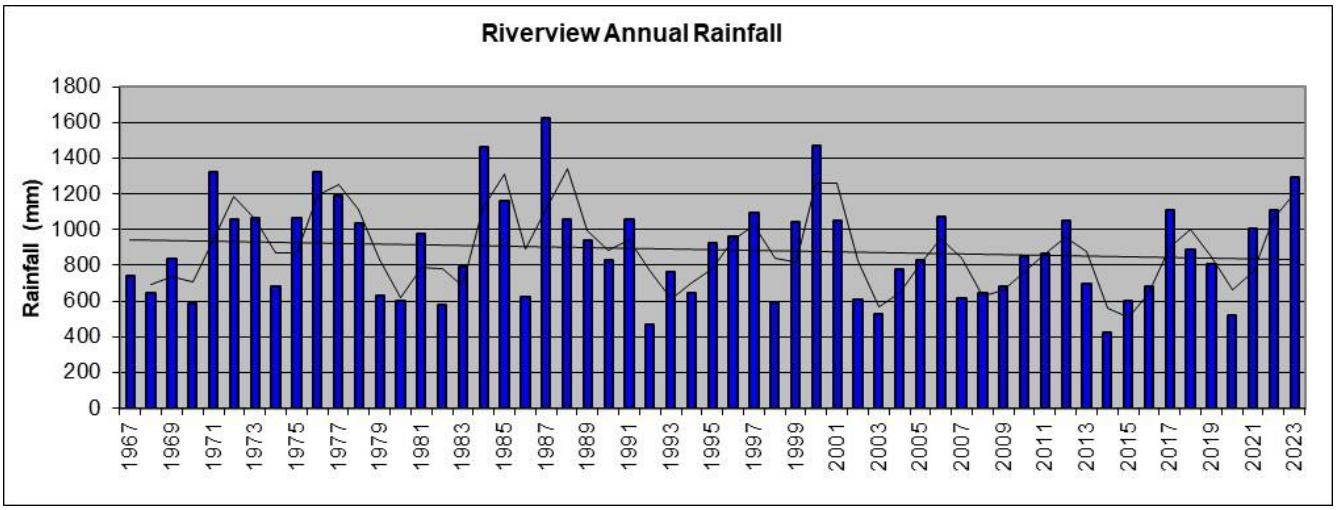


Figure 29: Annual rainfall at SASRI Riverview from 1967 to 2023 and 2-year moving average.

Figure 30 shows the long-term mean monthly rainfall at the Riverview station, indicating the predominantly summer seasonal rainfall.

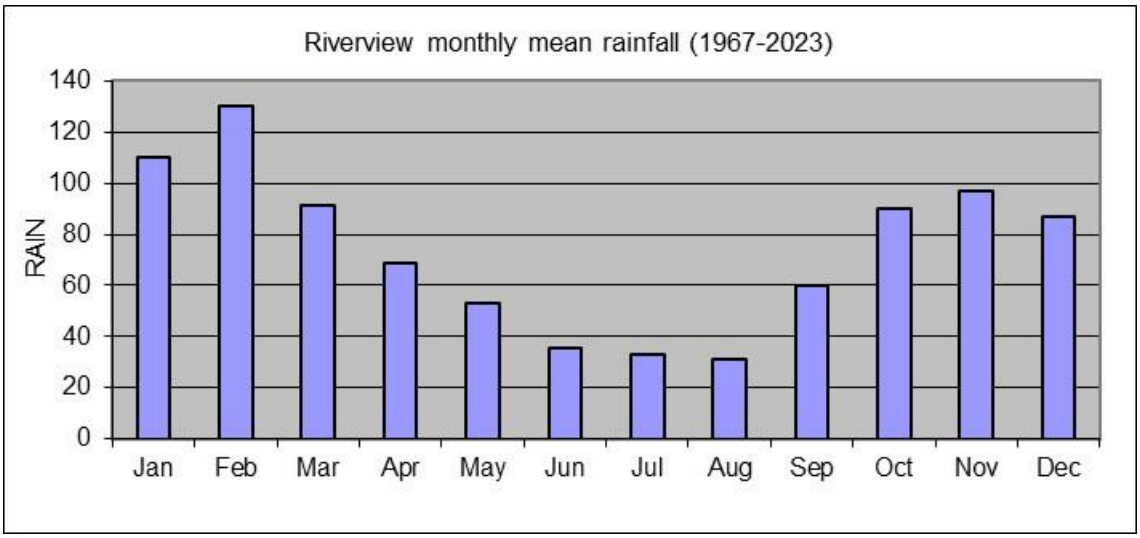


Figure 30: Long-term (1967-2023) monthly mean rainfall at the South African Sugar Research Institute (SASRI) station at Riverview.

Winds blow predominantly from the north to north-north-east (NNE) and south to south-west (refer section 5.3.3), in approximately equal proportions, associated with the South-West Indian Ocean Anticyclone and passage of coastal lows and cold fronts, respectively. There are seasonal variations, with NNE winds more dominant during summer and south-west and north-west winds more prevalent during winter. There is a diurnal onshore sea-breeze effect, especially in summer. Nocturnal offshore landbreezes, draining from inland from the north to west during winter, can cause low temperatures overnight and early morning.

5.2.2 CLIMATE VARIABILITY

Drought, floods and marine storms are the biggest natural threats. The effect of dry and wet cycles on the salinity of St Lucia Lake has already been referred to as one of the distinctive features of the lake ecosystem– these cycles are typically linked to ENSO (El Niño Southern Oscillation) as El Niño and La Niña events, although there are longer climatic cycles, e.g., Pacific decadal oscillation, that also have a controlling influence. El Niño's tend to be associated with dry conditions over Southern Africa (Dieppois, et al., 2015). Conversely, wetter than normal periods tend to be associated with La Niña events and normal rainfall with neutral ENSO (El Nino Southern Oscillation) phases, although this does not always hold true, as the 1987 floods occurred during an ENSO event. Droughts are typically broken by high rainfall events, often associated with a switch to La Niña conditions. Tropical cyclones making landfall (usually as tropical depressions) and cut-off lows remain a flood threat and, along with global warming (see above), could become more frequent in the future. High swell events, usually associated with Tropical cyclones, cut-off lows or strong cold fronts, can cause erosion of coastal margins.

5.2.3 CLIMATE CHANGE AND SEA-LEVEL RISE

Global warming: Increases in annual-average near-surface temperatures are projected to occur over large parts of South Africa, with the magnitude at the coast being less than in the interior. Heat wave conditions are found to be more likely, with dry spell durations lengthening slightly. Figure 31 shows the Climate Systems Analysis Group (CSAG), University of Cape Town, predicted temperature increases for Cape St Lucia for the future 2040-2060 period. All models predict temperature increases above 1°C. Global warming is expected to increase the frequency and intensity of El Nino events (Joubert, 2019). Results from modelling exercises suggest that the effects on water quantity and quality resulting from prolonged periods of drought can have serious consequences for natural ecosystems in iSimangaliso.

Rainfall and extreme weather: There is less certainty in rainfall projections and long-term variability and oscillations (e.g., linked to El Nino, La Nina) and the limited length of the measured rainfall record add to the challenges. Many model projections show a tendency for wetting in the summer rainfall region of South Africa (north and east); however, the magnitudes of such changes are highly uncertain (Daron, 2014). There is evidence that extreme weather events in South Africa are increasing and that there are increases in rainfall intensity (DEA, 2019). **Figure 32** shows the CSAG predicted rainfall for Cape St Lucia for the future 2040-2060 period. Most models show an increase in rainfall during the summer months, but a decrease during the winter months.

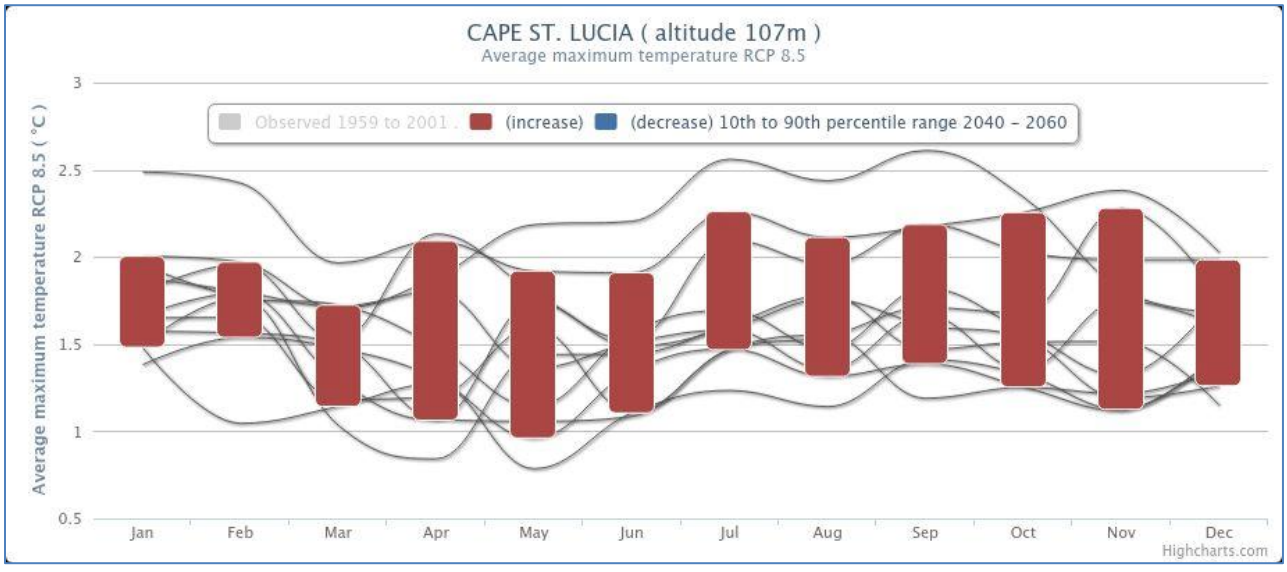


Figure 31: Predicted monthly temperature increases for Cape St Lucia for the future 2040-2060 period, based on RCP 8.5 (refer acronyms and definitions). The bar graphs are the average of various model outputs (indicated by the line graphs; thus the line graphs indicate the variability of the models).

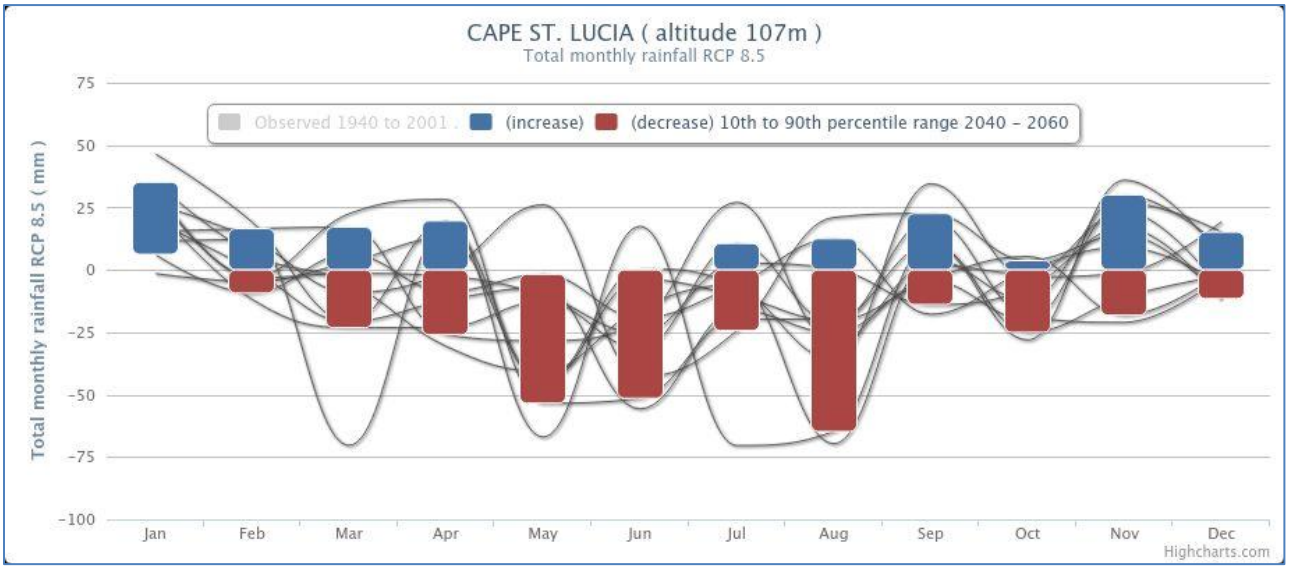


Figure 32: Predicted change in monthly rainfall for Cape St Lucia for the future 2040-2060 period, based on RCP 8.5 (refer acronyms and definitions). The bar graphs are the average of various model outputs (indicated by the line graphs).

Sea-level rise: Sea-level rise (SLR) off Durban has been measured at 2.7 mm pa by Mather, 2007 and 1.49 mm pa by NOAA (2020) and is projected to increase. Rising sea level will also result in a rise in water levels throughout the lake system, which means the lakes will expand in surface area and depth (Mather, et al., 2013). It is also predicted that the mouth of the St Lucia system may migrate inland by between ~26 to ~190 m, depending on the extent of the sea level rise (Mather, et al., 2013).

5.3 MARINE AND ESTUARINE ENVIRONMENT

Situated in the northern part of the east coast of South Africa, the St Lucia and uMfolozi-Msunduzi estuaries fall within the subtropical biogeographical region. Offshore, the strong Agulhas Current of the Indian Ocean transports warm waters poleward in a south-westerly direction (Guastella, 2014). However, inshore currents are generally north-eastward in response to the predominant SSE swell direction (Fig. 18a) – although reversals (to south-westward) in this longshore drift are possible in response to periodically sustained north-easterly winds. However, the predominant northward longshore drift direction results in the nett transport of inshore sediment along the coast in a northward direction.

(a)	(b)

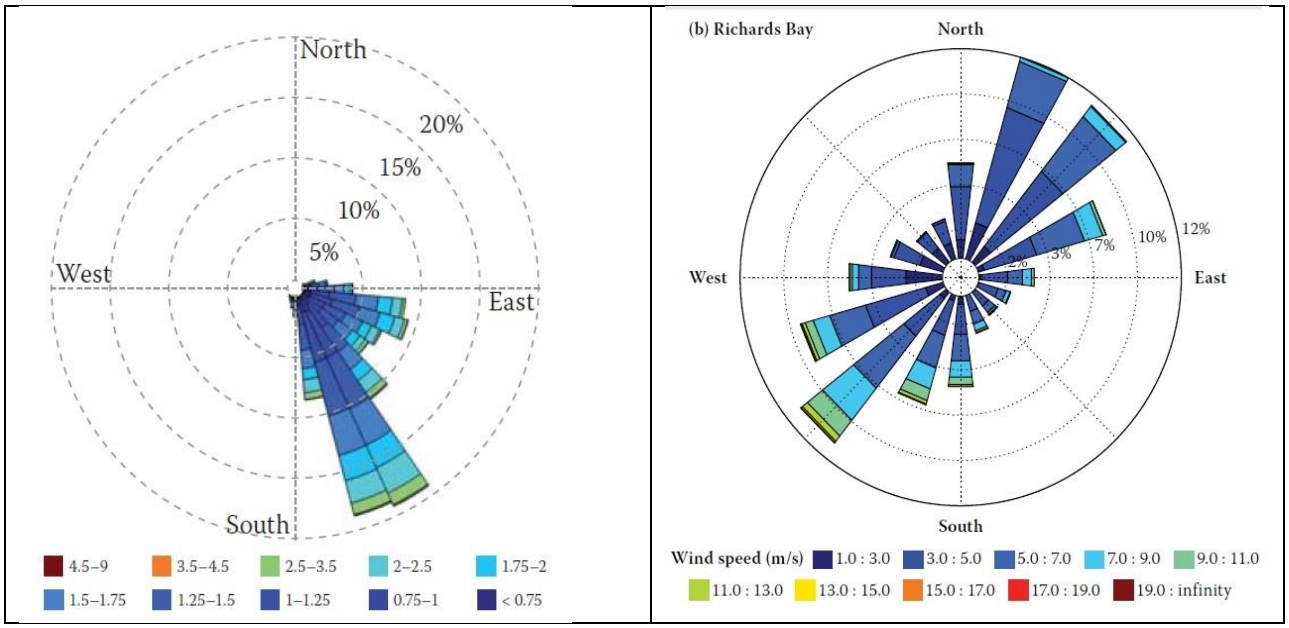


Figure 33: (a) Annual average wave rose for the nearest directional waverider buoy at Richards Bay over the period 1997-2009, wave heights in metres (adapted from Corbella & Stretch, 2012), and (b) Annual average wind rose at Richards Bay over the period 1997-2013, wind speed in m/s (adapted from Corbella et al., 2015).

The uMfolozi Estuary was classified by Whitfield (1994) as an open, medium–large subtropical system and, together with its tributary, the Msunduzi, was the only almost permanently open estuary along a 70 km stretch of coastline. The estuary mouth status, whether combined, open or closed has huge implications for water properties, sedimentology and the biota of the estuaries and St Lucia Lake system. An open estuary mouth allows for successful recruitment of marine organisms into the estuary and the inflow of sea water necessary for maintaining a salinity gradient and thereby maintains estuarine biodiversity and the nursery function. Fluctuations in salinity are regarded as a major factor governing the diversity and abundance of fish in estuaries (Whitfield et al., 2006). The uMfolozi–Msunduzi estuarine system is recognised as one of the most turbid and muddy estuaries in South Africa and is much more turbid than the St Lucia estuary which, by international standards, is regarded as a turbid system (Vivier, et al., 2010). River flows carrying high suspended loads can be lethal to both marine migrant and estuarine resident fish species (Vivier and Cyrus, 2009).

Prolonged mouth closure of the uMfoloz-Msunduzi and St Lucia mouths, in combination with an extended drought period, resulted in declines in faunal communities and changes in species compositions, with detrimental consequences for regional marine populations as it affected recruitment, the most significant being the replacement of estuarine-dependent marine fish species such as Natal stumpnose, spotted grunter and flathead mullet with freshwater species such as barbel and tilapia, the collapse of the penaeid prawns and disappearance of the swimming crab. There has also been a change from

predominantly marine to freshwater species higher up the Msunduzi system as a result of mouth closure and channel blockage.

Freshwater caridean prawns (*Macrobrachium* sp.) have been noted to breed prolifically in the uMfolozi wetlands (Bickerton, 2011), the juveniles of which find refuge in submerged macrophytes, particularly during low-flow periods.

Combining the uMfolozi and St Lucia mouths in 2017, and the Link Canal has introduced fine silt and mud from the uMfolozi system into the St Lucia estuary, which with mouth closure and no mechanism to flush it, has accumulated in the estuary. A knock-on effect of the lack of tidal exchange and freshwater inundation resulted in the die-off of mangroves, affecting their associated biota.

A combined uMfolozi-Msunduzi and St Lucia mouth which is open to the sea is the desired state from an ecological point of view to maintain estuarine function, as it facilitates marine interaction for estuarine-dependent faunal species. Once open, the mouth generally migrates in a northward direction under the influence of predominantly northward longshore drift.

Since mouth opening in January 2021 and again in April 2022, there have been sightings of some estuarine-dependent fish species and various crabs, and it is hoped that the penaeid prawns will recover. It is anticipated that continued mouth opening will lead to recovery of marine and estuarine-dependent fish assemblages that were abundant in the past, although it will take time for breeding populations to re-establish.

5.4 SOILS

The soil groups of the Makhatini Flats and adjacent Lebombo Mountain Range consist of eight soil groups (iSimangaliso Wetland Park Authority, 2020) which may be refined further into six soils classes, and are grouped by distribution, and derivation as followings:

- Sandy soils often reworked and transported, frequently found on plains and valley floors, beaches and dunes (Aerosols).
- Thin lithic soils derived from *in situ* weathering and limited to the Lebombo Mountains (Leptosols).
- Sandy clayey soils derived from fluvial deposits along river courses (Fluvisols).
- Clayey soils accumulated in geographic depressions, often waterlogged and are associated with wetlands, pans and marshes (Gleysols).
- High clay content soils with reactive to wet/dry seasons, found on low sloping topography, transported from a suitable parent rock source by hillwash and rivers (Vertisols, Luvisols, Phaeozems).

The iSimangaliso Wetland Park itself, is associated with Arenosols, Fluvisols, Gleysols, Luvisols, Vertisols and Phaeozems. These soils are one of the keys foundations for the maintenance, expansion and diversity of the different habitats found within the park (iSimangaliso Wetland Park Authority, 2020). In the case of the study area, Gleysols are / were likely to underlie the coastal lagoons areas and freshwater wetlands. Most of the soils underlying the Makhatini Flats are associated with low nutrient sandy soils or clay-rich and poorly drained soil, which are therefore by association poor for long term cultivation (iSimangaliso Wetland Park Authority, 2020).

5.5 AQUATIC ECOLOGICAL ASSESSMENT

The site falls within two quaternary catchments namely: W23D and W23C, which form part of the Greater Pongola-Mtamvuna Water Management Area (WMA). The uMfolozi serves as the main collecting river in W23D catchment whereas the Msunduzi is the main collecting river for the W23C catchment. Various non perennial river lines were identified at the desktop level which occur within the study area. Two of these non-perennial lines discharge into the Msunduzi River. The non-perennial stream closest to the uMfolozi river, within the regulated area, discharges into the St Lucia estuary. The drainage network within the study area is shown in Figure 34. The study area is distinctly representative of a floodplain with steeper slopes observed closer to the dune forests.

The Wetland Map 5 dataset, a component of the SAIIAE, confirmed that the study area falls within the estuarine ecosystem type, and specifically within the Estuarine Functional Zone (EFZ) (refer Fig. 35). In South Africa the portion of an estuary which encapsulates the water body and supporting physical and biological processes is referred to as the EFZ. It also includes any areas influenced by long term processes as well as estuarine vegetation. The purpose of the EFZ is to identify the areas in which estuarine physical and biological functions take place over long time scales (>decades). Development in the EFZ is captured as an aspect of habitat degradation or decline in overall estuary condition.

The desktop watercourse delineation exercise confirmed the boundaries of the two watercourses, namely the uMfolozi and Msunduzi. The portion of the watercourses which will be cleared of vegetation (Figure 35) and potentially dredged have been zoned as an estuary and occurs within the uMfolozi-Msunduzi EFZ. A map showing the spatial location of the desktop delineated watercourses is provided in Figure 36.

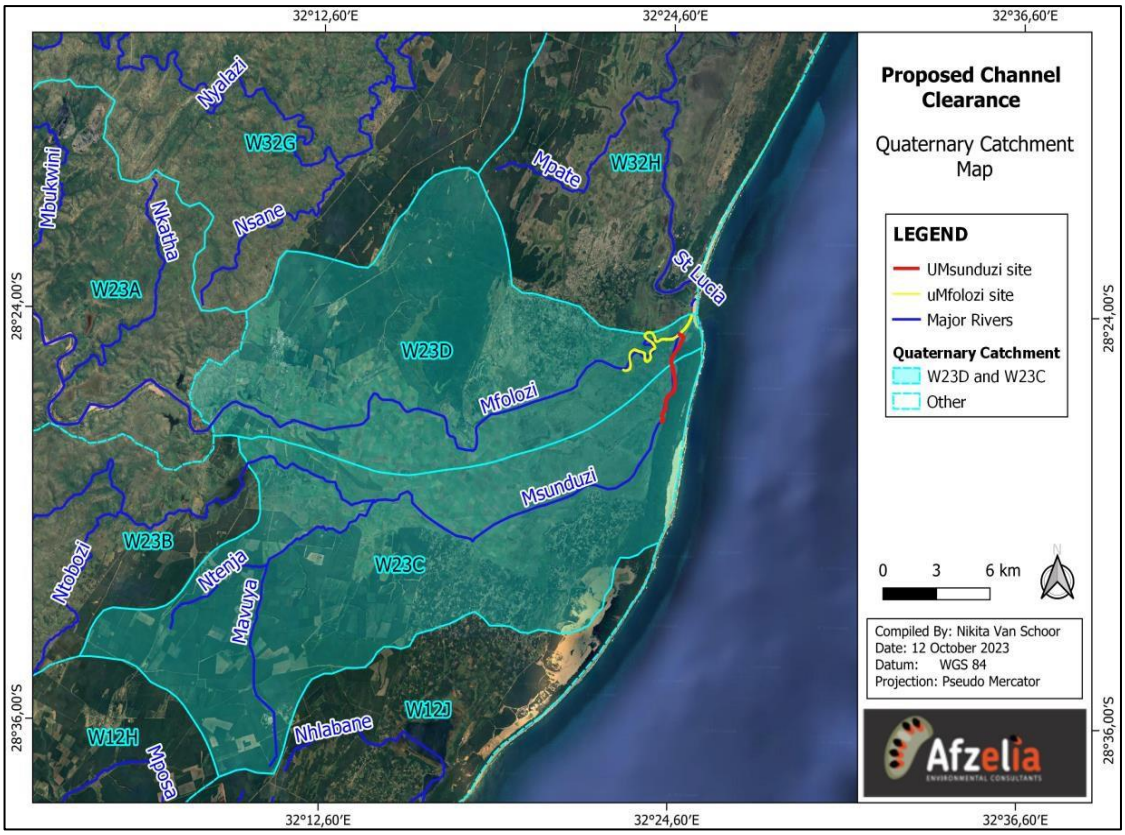


Figure 34: Quaternary catchment of the study area.

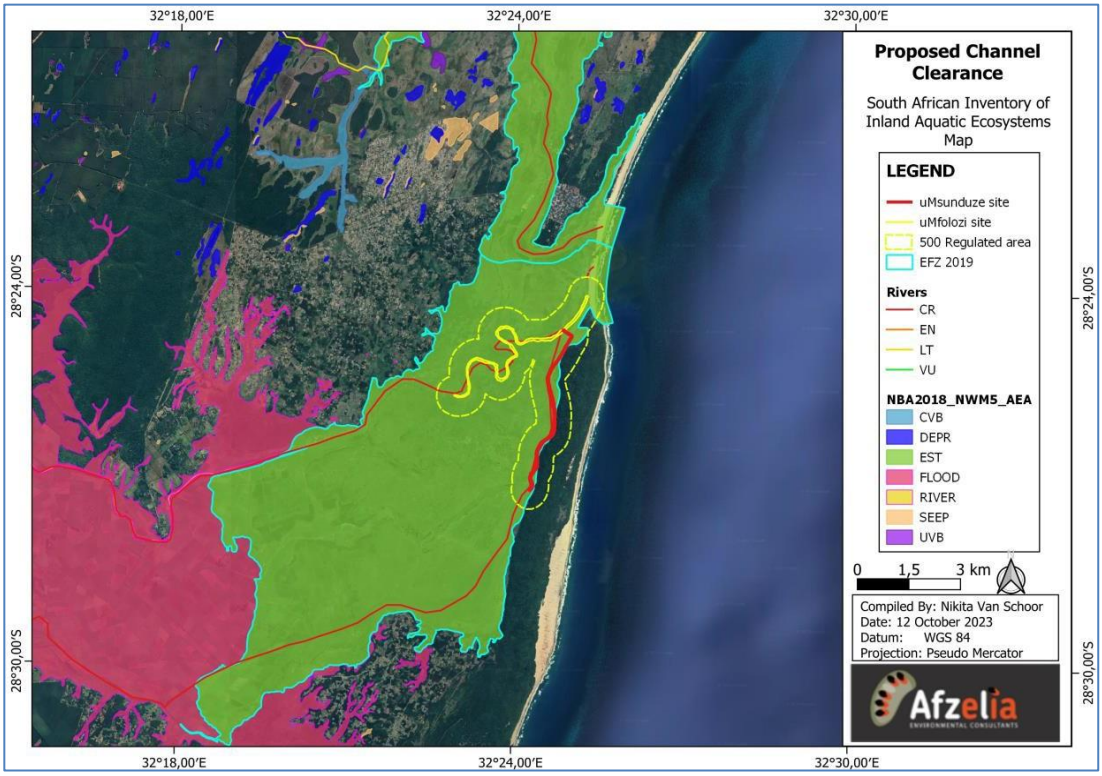


Figure 35: South African inventory of Inland Aquatic Ecosystems Map and EFZ

Ideally, the EFZ should serve as the no-go zone for any stockpiling, ablution facilities or dredging spoil. Furthermore, a national guideline for the determination of appropriate buffer zones for rivers, wetlands and estuaries, compiled by Macfarlane *et al.* (2014), was utilised to determine an appropriate buffer from the edge of the EFZ which will constitute no-go zone for the duration of the project. The recommended buffer generated by the tool was 60 m outside of the EFZ. It is highly recommended that any spoil dumping sites are located outside of the EFZ. The EFZ is extensive when considering the location of temporary ablution facilities and campsites. As such, a second no-go zone was demarcated around the watercourses in which no stockpiling, ablution facilities or campsites should be located. Additionally, sensitive habitats within the Maphelane Forest and the St Lucia System must be avoided at all times, except in instances where the channels requiring clearing are located within these areas. It should be noted that the 60 m buffer has been generated from a desktop perspective. An infield assessment will need to be conducted to determine if this buffer can be adjusted.

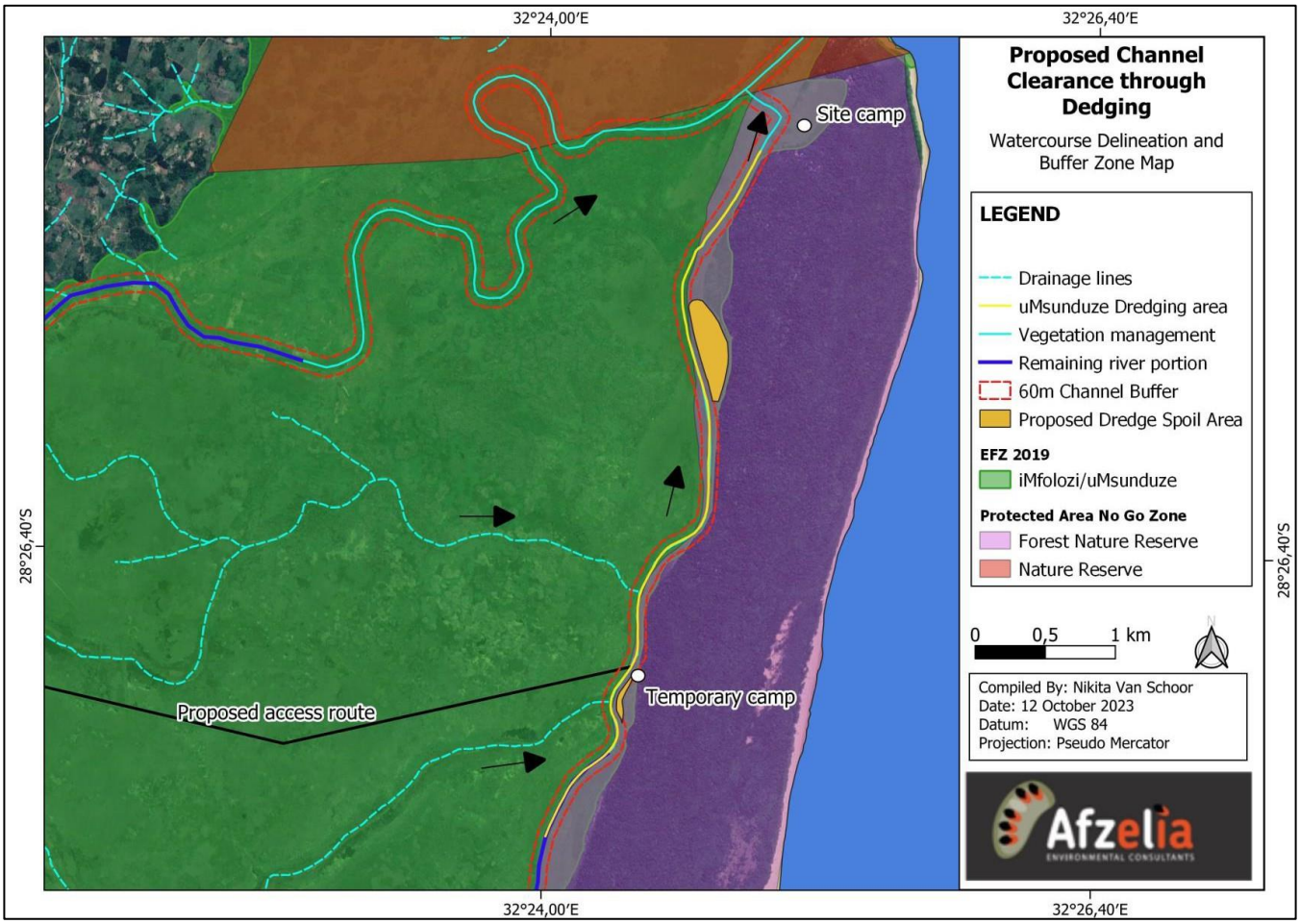


Figure 36: Watercourse delineation and classification map for the proposed dredging in a watercourse. Arrows depict direction of flow.

Anthropogenic activities generally impact water courses either directly (e.g., physical change to habitat) or indirectly (e.g., changes to water quantity and quality) (Macfarlane et al., 2014). Mitigation measures must be implemented to limit the significance of these impacts on the functionality and hydrology of the aquatic areas associated with the proposed activities. Three major activities were considered when determining potential impacts. These include:

i. Clearing vegetation within the Msunduzi and lower uMfolozi channels.
ii. Dredging of the Msunduzi channel; and
iii. Dumping of dredged spoil within the Msunduzi floodplain next to the Maphelane Dunes.

It has been recommended that the vegetation clearing of the Msunduzi followed by the uMfolozi channel occur first. Should backflooding not be relieved by the vegetation clearing, dredging of the Msunduzi channel is proposed. Habitat disturbance from the vegetation removal will be minimal, with the exception of the *Phragmites* reeds which will suffer some loss during the removal process. However, considering the extent of the *Phragmites* reed beds, the removal should not significantly impact this wetland species. Potential erosion of the channel banks may occur should the amphibian dredger be used to remove the vegetation. The most significant impact which will arise from the sediment dredging activity is the disturbance of wetland and estuarine habitat. The surrounding swamp vegetation will be initially disturbed by the excavator or amphibian dredger, which will need to traverse these habitats in order to reach the channels. The operation of the machinery within and along the channel banks may result in bank erosion and trampling of marginal or instream vegetation.

The removal of the instream sediment will disturb benthic habitats and subsequently any benthic organisms. Habitat destruction may also result from changes in the physical or chemical characteristics of the water column, changes in circulation patterns and filling in of spawning grounds which may impact the re-colonization of the area after the completion of the activity. Fish species are less likely to be impacted due to their ability to vacate an area which is experiencing disturbance. Benthic organisms are also more likely to be buried within the spoil which will be discharged in large quantities in the designated area.

Water Quality Impacts

During the dredging process, bottom sediments will be disturbed and resuspended. This will result in temporary increases in turbidity during the dredging process and for a short period after the activity. The Msunduzi channel is generally highly turbid; however excessive turbidity levels can result in severe impacts to biota. Increased turbidity will also temporarily prevent light penetration.

The spoil which is deposited within the floodplain and EFZ could potentially be redeposited into the channel during flooding events or extreme high tides. This will result in increased turbidity, smothering of submerged vegetation and habitats and the potential contamination of the water resource if the spoil has been contaminated with pesticides.

The dredging process will also result in chemical changes to the surface sediments at the site. Oxygen depletion as a result of the chemical and biological oxygen demand of the dredged material may cause the mortality of biotic organism within the vicinity of the site.

The physical disturbance of the bottom topography may disrupt the existing hydrological regime. Tidal currents may penetrate deeper into the uMfolozi and Msunduzi channels resulting in salinity changes and subsequently the death of certain species which are not tolerant to salinity fluctuations. Certain vegetation types may also be impacted by changing salinities. The severity of these water quality impacts will largely depend on the hydrological freshwater or marine inputs which will allow the flushing of the channels and carrying away of any suspended sediments.

5.6 HYDROLOGY

Historically the uMfolozi River and Lake St. Lucia were linked, but artificially separated around 1952, to prevent the inflow of suspended sediment into the main St Lucia system. More recently, the link between the uMfolozi River and Lake St Lucia was re-established in 2012, and now the lake St Lucia and the uMfolozi River mouth are managed as one system.

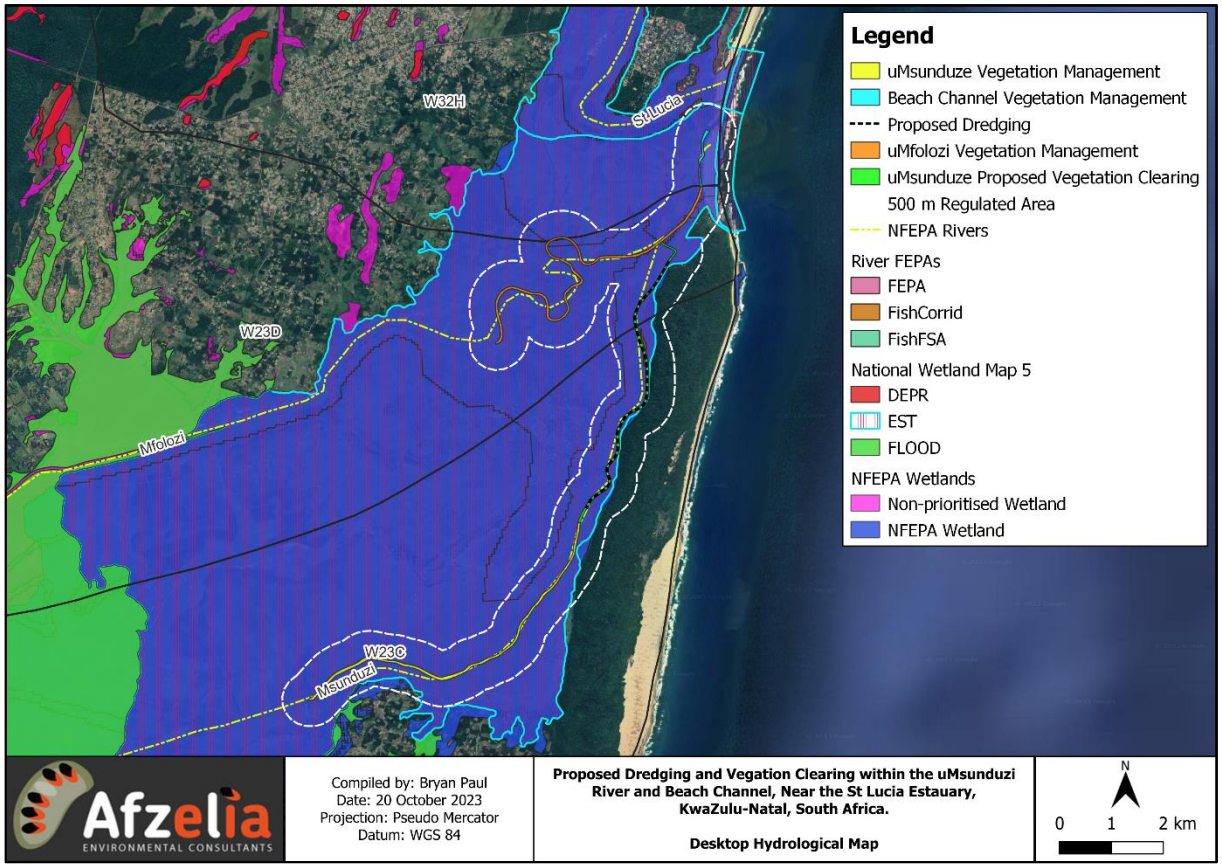


Figure 37: Illustration of the existing hydrological features associated with the study area.

Table 21: Summary of the desktop hydrological features located within the 500 m regulated area.

• Dataset	• Findings
National Wetland 5 Map	- The site intercepts a large estuary system; and - a floodplain wetland is found within the 500 m regulated area.
NFEPA Wetlands	- Majority of the site will fall within a NFEPA Wetland.
NFEPA Rivers	- Two (2) NFEPA rivers are found within the 500 m regulated area (Msunduzi River and Mfolozi River River).
River FEPAs	- No river FEPAs identified.
Quaternary Catchment	- Found within quaternary catchments W32H, W23D and W23C.

This section describes the baseline hydrology and hydraulic functioning of the St Lucia System, defined herein as the St Lucia Lakes, the Narrows, the St Lucia Estuary, the uMfolozi and Msunduzi Rivers. We define hydraulic functioning as that which refers to the movement of water through the system.

Figure 38 below shows the topography of the St Lucia catchment, ranging from approximately 1 680 mMSL in the west to 0 mMSL at the east coast.

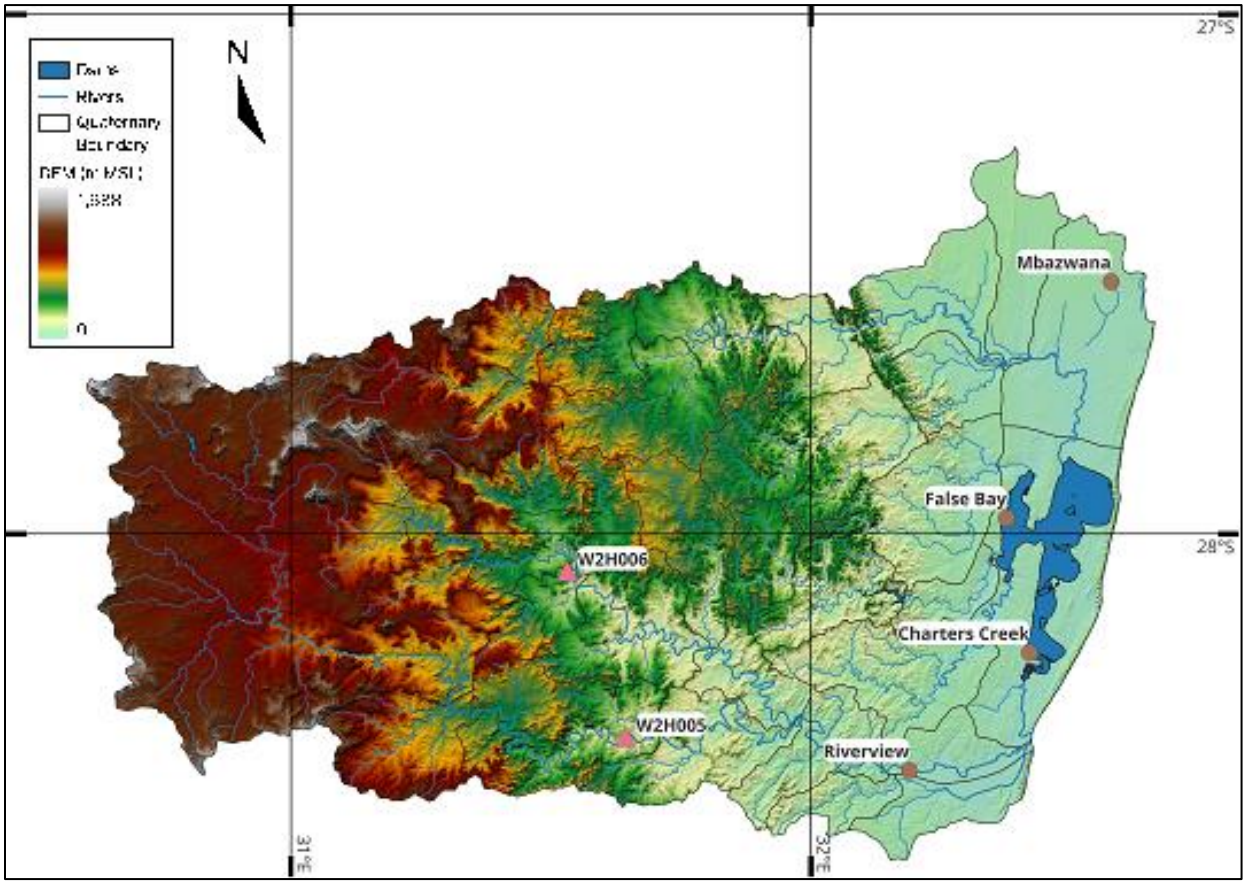


Figure 38: Topography of the St Lucia catchment (Pringle, et al., 2023).

5.7 VEGETATION

According to the National Landcover Dataset (DEA, 2020) a total of nine (9) landcover classes may be found with the greater surrounds of the site. Analysis of Figure 39 below confirms that of the nine recorded, only six (6) classes fall within the project footprint and will be directly affected.

- Contiguous Forest.
- Coastal Dunes and Beach Sand.
- Natural Estuaries & Lagoons.
- Herbaceous Wetlands.
- Subsistence Annual Crops.
- Cultivated Commercial Sugarcane Non-Pivot (all other)

The site verification confirmed that majority of the national landcover dataset remain accurate. However, more recent evidence suggests that subsistence farming has ceased along portions of the Msunduzi channel be dredged. Based on the observations made during the fieldwork, this is likely to be linked to

backflooding, and the lack of safe access to these areas. Subsistence farming along the uMfolozi River persists however and include a variety of different crops.

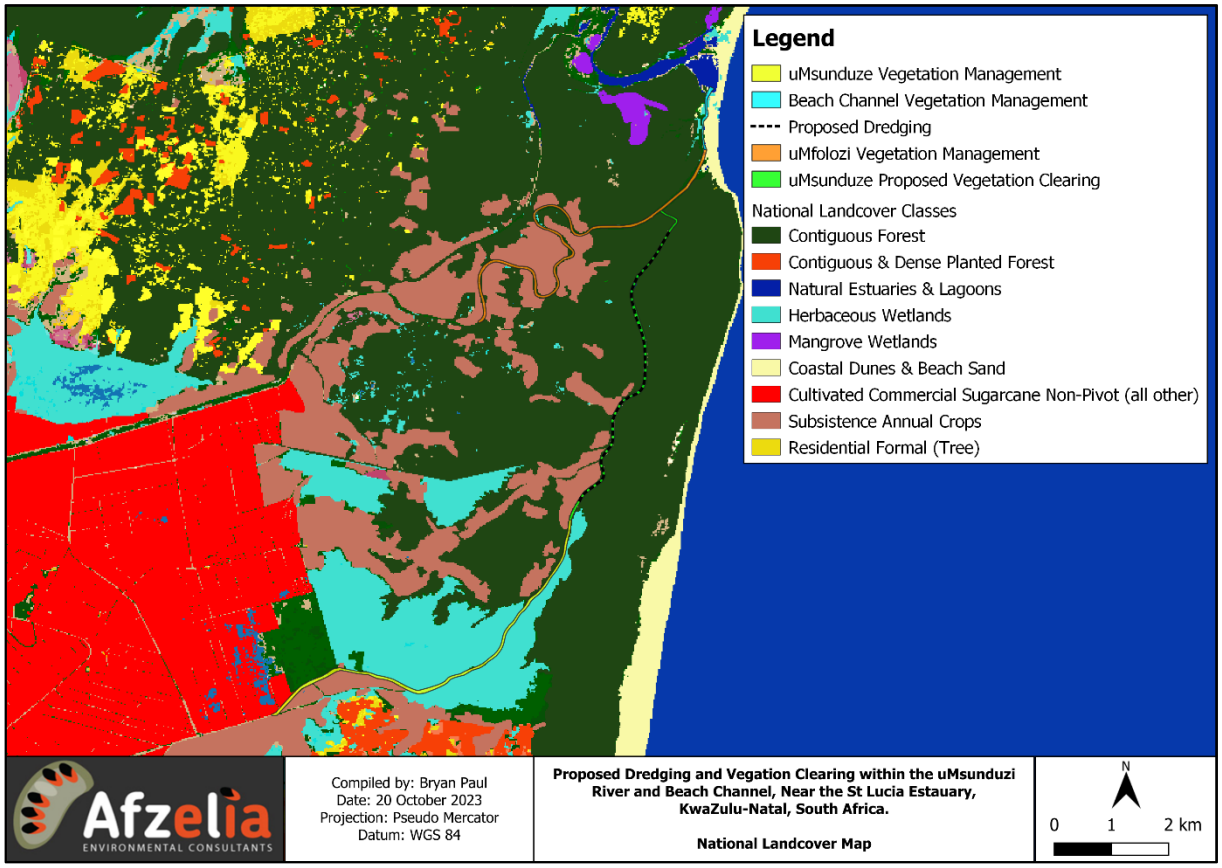


Figure 39: Illustration of the existing hydrological features associated with the study area.

As illustrated in Figure 40, the entire site is located within an Ecological Support Area. According to this dataset, no Critical Biodiversity Areas (CBA) are found within the study area. Any planned activities associated with this project must therefore ensure that the existing natural biodiversity pattern, ecological processes and drivers, as well as any movement corridors (daily or seasonally / episodic – e.g., migration of certain species) are not inhibited in any way and persist throughout the project life cycle.

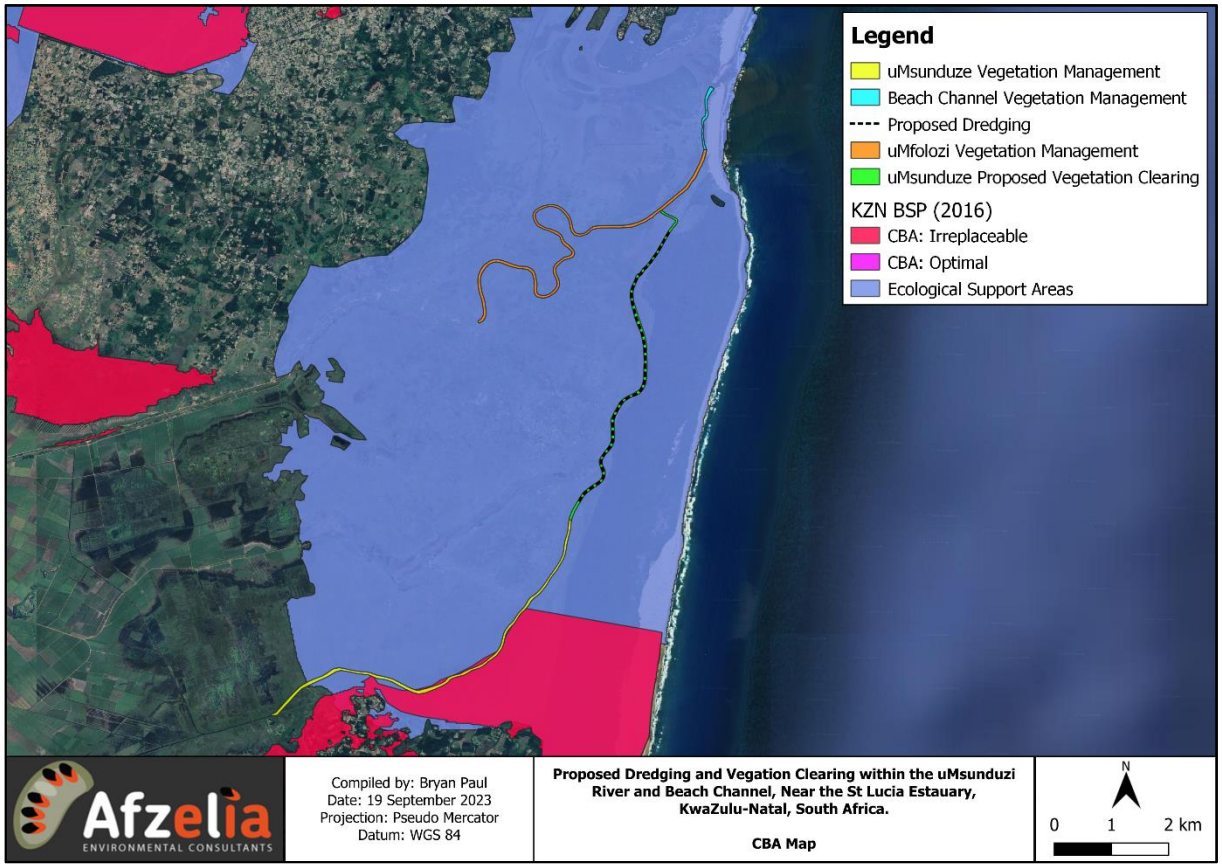


Figure 40: Illustration of the applicable areas of conservational importance found within the study area.

During the desktop assessment, a plant species list was generated for the proposed site and nearby surrounds. This list was generated using the South African National Biodiversity Institute's (SANBI) Plants of South Africa (POSA) database of all plants collected and recorded from specific locations throughout South Africa and contained 100 individual species recorded within the greater surrounds. Figure 41 below provides a visual illustration of the area which was assessed using the POSA species database, and which explores areas with mixed habitat types.

According to the database search, no plant SCC have been recorded within the study area However, the following list is a summary of the most common plant families found during the POSA database search.

- Asteraceae (Daisy Family) – 10 species (1 endemic species).
- Cyperaceae (Sedge Family) – 11 species (1 endemic species); and
- Fabaceae (Pea Family) – 16 species (1 endemic species).

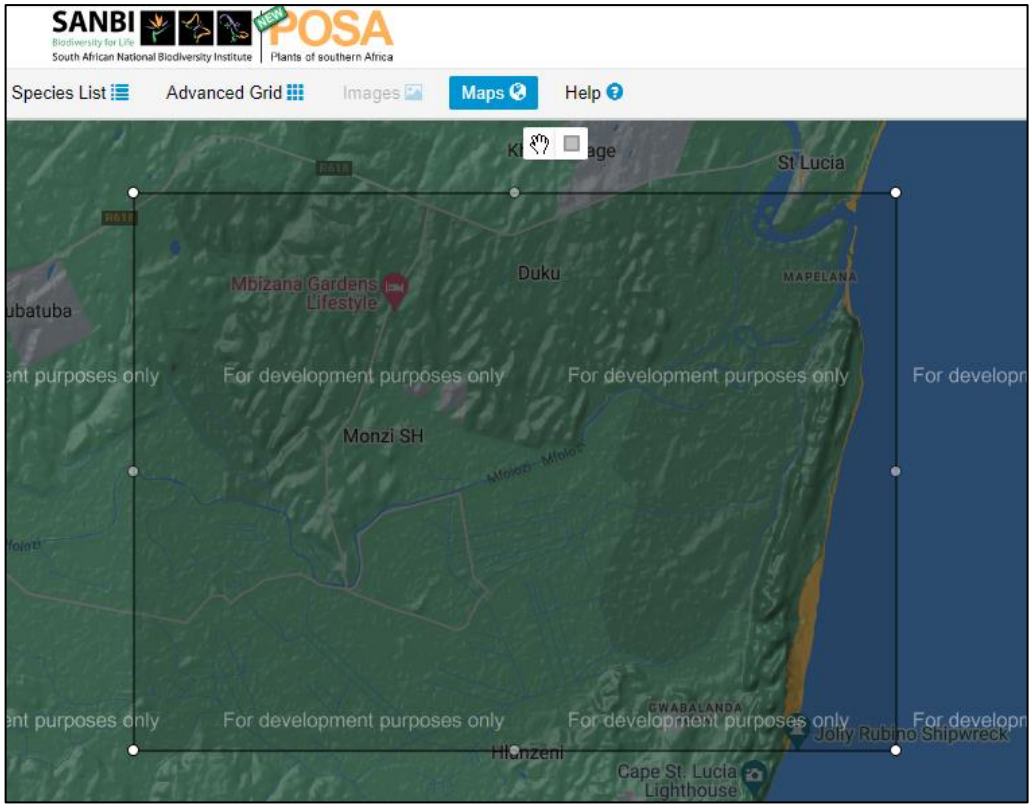


Figure 41: Illustration of the areas included in the POSA species search for the study area.

The plant communities observed within the study area were largely composed of freshwater riparian and wetland species. Dense stands of *Phragmites australis* dominated the portions assessed, with many of the woody plant communities being set much further back from the main, accessible channel. The most notable were separate patches of *Hibiscus tiliaceus* or *Barringtonia racemosa.*

Typically, plant communities observed within the study area consisted of indigenous species. However, some alien species were observed during the survey, but were not considered dominant or found in sufficient quantities to outcompete indigenous species.

The following is a list of the species observed:

- *Casuarina equisetifolia* - observed near the beach channel and dunes.
- *Tamarix ramosissima* - observed near the beach channel and dunes.
- *Schinus terebinthifolius* - Observed along both river systems, often alongside other woody plant communities.
- *Chromolaena odorata* - observations were largely confined to the areas affected by backflooding.
- *Ricinus communis* - observations were largely confined to the areas affected by backflooding.

- *Pistia stratiotes* – infrequent observation made of this species with both rivers. Likely to become problematic within the near future, as some of the clumps were already in more protected areas away from the main channel.



Figure 42: Plant communities observed within the study area (Left – Stands of P. australis which dominate both river channels; example of a small patch of Hibiscus tiliaceus observed within the uMfolozi River. A species usually associated with estuaries).



Figure 43: Photographic evidence of the alien invasive plant species observed within the study area (Left – Clump of Pistia stratiotes protected behind a stand of Phragmites shoots in the Msunduzi River; Right - Schinus terebinthifolius enclosed by Hibiscus tiliaceus in the Msunduzi River).

Table 22: Summary of the Site Ecological Importance (SEI) assessment

Habitat	Conservation Importance (CI)	Functional Integrity (FI)	Biodiversity Importance (BI)	Receptor Resilience (RR)	Site Ecological Importance (SEI)
Water column	High	High	High	High	Medium
Hibiscus tiliaceus – Barringtonia Racemosa Fringe Community	High	High	High	Medium	High
Farmland / Flooded or Functional Subsistence Cropland	Low	Low	Low	Very High	Very Low
Phragmites australis Dominated Reed Community	High	High	High	High	Medium

5.8 GEORMOPHOLOGY

Much of the geomorphology description from the specialist report by Pringle, et al., 2023 and 2024, is included in the Project Context (Chapter 2.4.1) and Project Description (Chapter 3) sections of this report. Several avulsion points and a meander chute cutoff have been observed for the lower uMfolozi River (Figure 23). This indicates that the channel is in a phase of change, possibly due to the large floods in 2023, the constriction of the channel downstream and changes in channel gradient. The main flow pathways in Figure 23 are:

A - this shows the largest and most recent avulsion along the lower uMfolozi. It has incised to a depth that can route a significant portion of low flows and larger flows onto the lower uMfolozi floodplain. The relatively steep gradient towards the Msunduzi will favour ongoing capture of the flow and the incision of a new channel. This will be accelerated once the Msunduzi base level is lowered through dredging.

Higher up in the Msunduzi (Cotcane area) the channel is completely overgrown (Figure 24). The drainage canals are also overgrown, reducing flow conveyance towards the mouth. Woody debris blockages along the lower uMfolozi effectively block the flows as can be seen in Figure 25. Several of these blockages are located along the lower uMfolozi River, driving avulsions upstream of the blockages. These flow pathways and channel competence changes can be seen in the hydrological timeseries, and the floodplain water levels monitored by UCOSP. In 2018 there is a poor relationship between the flood events of the uMfolozi (measured at Domoina Bridge) and the levels along the lower Msunduzi drainage channels measured at Cotcane (Figure 44). This relationship changes for the 2023 timeseries, where the uMsunduzi levels respond directly to the flood flows along the uMfolozi River (May 2023). The diversion

works at the head of the uMfolozi Floodplain only spills water onto the floodplain and drains via the Msunduzi at water levels above 6.3 m relative to bed level at Domoina Bridge. This implies that the smaller floods in May 2023 did not overtop the diversion works and that the avulsion onto the uMfolozi floodplain is driving the sharp rise in water level at Cotcane.

A longitudinal profile from the mouth to the inundated farmlands (based on the 2023 LiDAR DTM) indicate that the water levels along the uMsunduzi ranges from 1.2 to 1.7 mMSL, while the drainage channel ranges from 1.5 mMSL to 2.9 mMSL and the flooded fields are around 2.4 mMSL (Figure 33). A similar trend can be seen for the Msunduzi from the confluence with the uMfolozi to the Four Drain area (Figure 34). This indicates that the lower uMsunduzi River (area earmarked for the dredging) is not the hydraulic control for the flooded farmlands, but that the overgrown drainage canals are the likely hydraulic control.

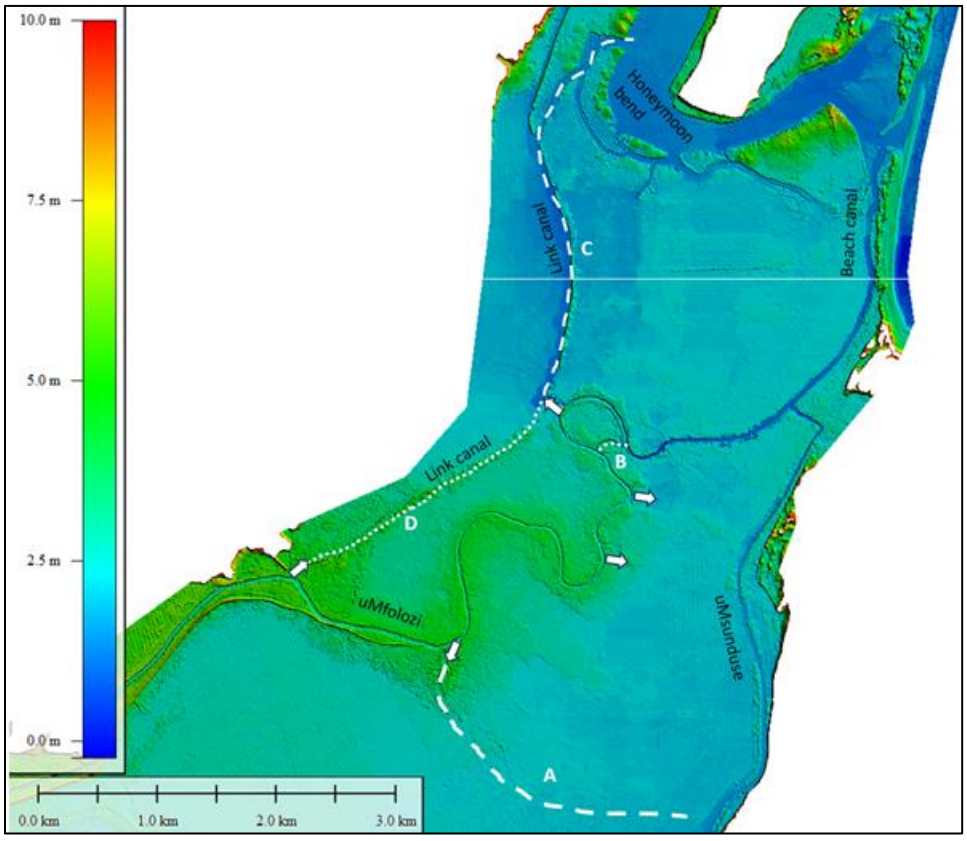


Figure 44: Digital Terrian Map of the elevated uMfolozi River and various avulsion points (white arrows) and main flow paths (0dotted lines numbered A to D) (from Pringle, et al., 2023).

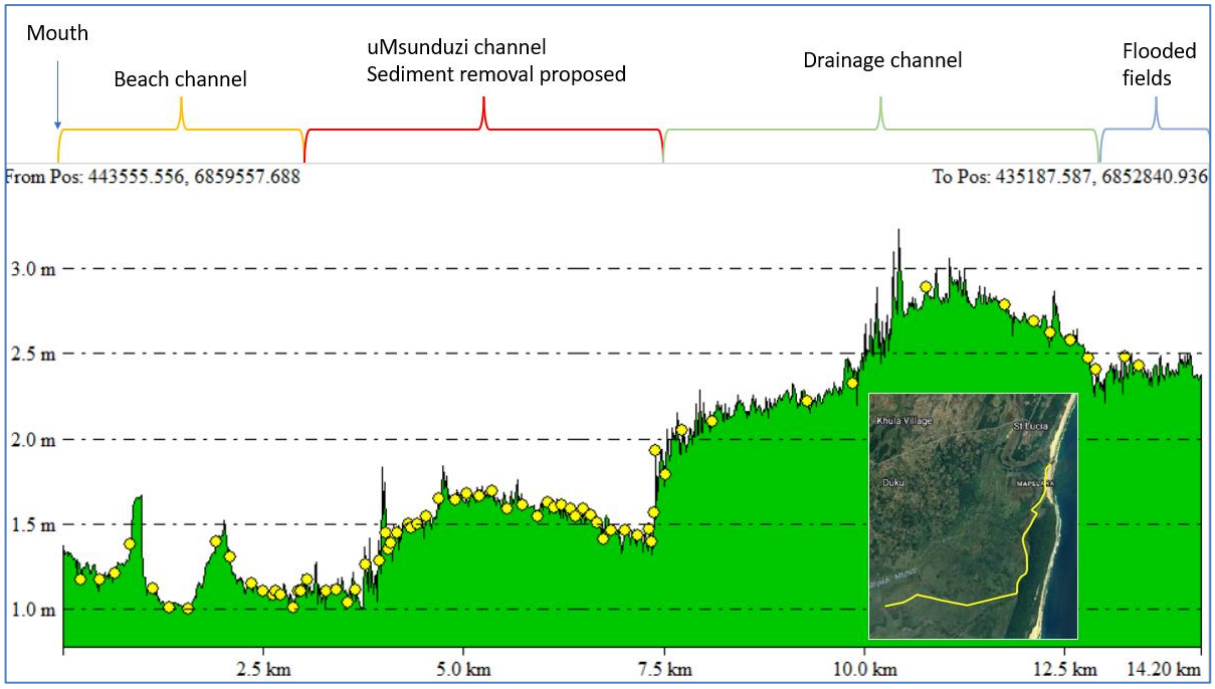


Figure 45: Longitudinal profile from the mouth along the beach channel, up the uMsunduzi and then up the Main Drain across the flooded fields (see inset map of profile path).

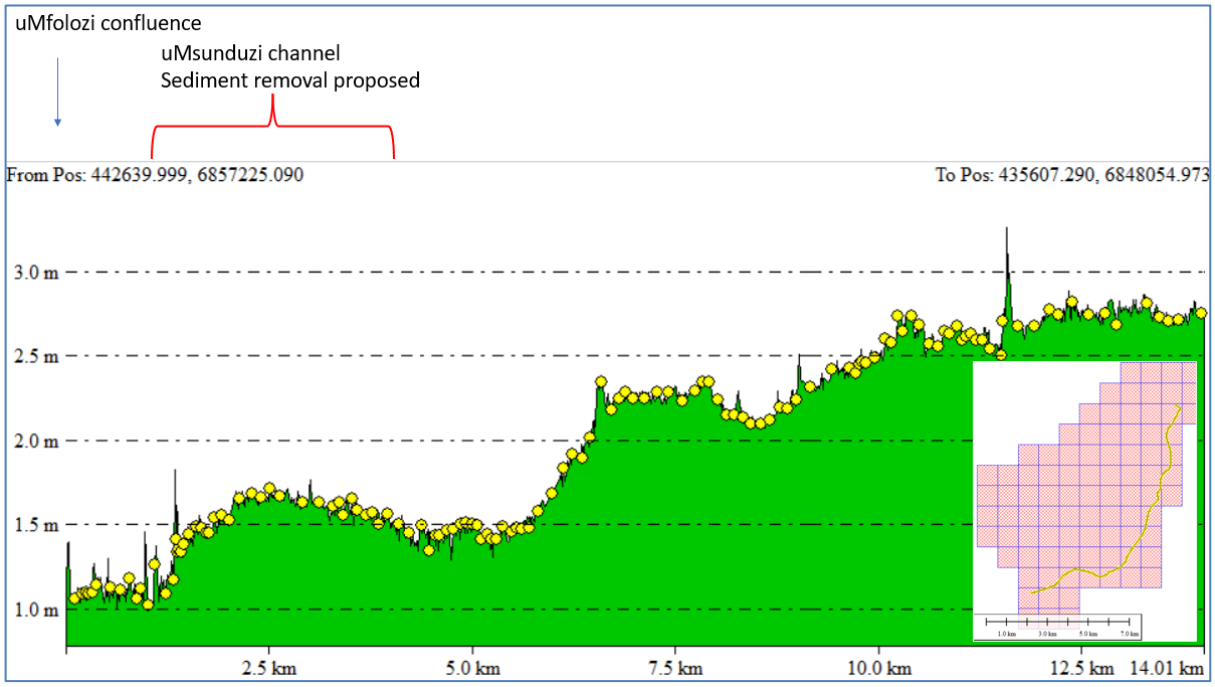


Figure 46: Longitudinal profile of the uMsunduzi River from the confluence with the uMfolozi to Four Drain

5.9 WATERCOURSE HABITAT FUNCTIONALITY

A watercourse habitat functionality and impact assessment, which also served as a site verification study for the aquatic assessment, was undertaken by De Carvalho (2024). This study forms part of the Water Use License (WUL) and Environmental Impact Assessment (EIA) application. The Wetland Habitat Functionality and Impact Assessment was carried out in accordance with the National Environmental Management Act, 1998 (Act No. 107 of 1998) and National Water Act, 1998 (Act No. 36 of 1998). Vegetation clearing and dredging activities should be considered separately whereby vegetation clearing will pose a lower risk on the watercourses than dredging which should be considered the last resort to aid in back-flooding.

The proposed portion of the watercourses which will be dredged and cleared of vegetation occur within the EFZ. This area has been demarcated as having high ecological sensitivity and very high importance, although this system is currently not in a favourable ecological state (Category D).

5.10 SOCIAL AND ECONOMIC ENVIRONMENT

An estimated 1 120 sugarcane farm labourers and their families are directly affected representing 4 480 livelihoods. The local small-scale and subsistence farming community is also heavily affected. A diverse selection of fruits and vegetables provides food security in the form of substance and household income.

The loss in production of sugarcane, fruits, and vegetables are forcing some local people into a desperate situation, with elevated levels of crime evident in the area. Neighbouring farmers are affected and elevated levels of crime also affects tourism, which in turn affects all the local businesses. The profitability of the Umfolozi Sugar Mill is also at risk, which in turn places the entire local economy at risk. The livelihoods of everyone are at stake.

There is a desperate need of disaster relief in the form of short-term immediate interventions, as well as long term preventative measures to be put in place. Sugarcane grower losses need to account not only for the complete devastation of the crop on hand, but the complete re-establishment of the area under sugarcane.

Crop Damage

It is impossible to harvest the sugarcane crop, and the yield and quality of the crop is destroyed. The 2023/24 season's crop is already affected, adding to the seasons that have passed (Table 23). Water is not receding, and the greatest extend of the affected area will have no crop for many years to come.

Table 23: Estimated Crop Damage

Year	Yield Loss (t)	Value (R/t)	Total (R.)
2020/21	125 000	R 643,22	R 80 402 500
2021/22	125 000	R 694,47	R 86 808 750
2022/23	144 000	R 703,13	R 101 250 720
2023/24	320 000	R 849,74	R 271 916 800
			R 540 378 770

Furthermore, an estimated area of 2500 ha will need to be replanted.

Estimated Replanting:

Area Replant (ha)	Cost (R/ha)	Total
2 500	R 36 425	R 91 062 500

Table 24: Crop damage and replanting cost

Estimated Total Grower Direct Loss:

Crop Damage	R 540 378 770
Replanting Cost	R 91 062 500
Total	**R 631 441 270**

Multiplier Effect

The multiplier effect of the sugar industry in the local Umfolozi economy as determined by the Bureau for Food and Agricultural Policy is 3.2. This is because the income generated by one industry leads to more spending in other local businesses, which creates more income, and so on. Therefore, the knock-on effect to the local economy: **R 2 020 612 064 (R2.021 billion)**

6 PUBLIC PARTICIPATION PROCESS

This chapter outlines the Public Participation Process being undertaken as per Regulation 41 of the EIA Regulations, 2014 (as amended) 2017 .

Public participation is a critical informant of environmental assessment. Comprehensive, integrated and thorough application of public participation facilitates and ensures informed decision-making by the competent authority. Guidelines on public participation in terms of the NEMA EIA Regulations, published by the Department of Environmental Affairs in 2017.

Public participation is a process that is designed to enable all interested and affected parties [I&APs] to make known their opinion and / or concerns which enables the practitioner to evaluate all aspects of the proposed development, with the objective of improving the project by maximising its benefits while minimising its adverse effects. I&APs include all interested stakeholders, technical specialists, and the various relevant organs of state who work together to produce better decisions.

The primary aims of the public participation process are:

- to inform I&APs and key stakeholders of the proposed application and environmental studies
- to initiate meaningful and timeous participation of I&APs
- to identify issues and concerns of key stakeholders and I&APs with regards to the application for the development [i.e., focus on important issues]
- to promote transparency and an understanding of the project and its potential environmental [social and biophysical] impacts [both positive and negative]
- to provide information used for decision-making.

- to provide a structure for liaison and communication with I&APs and key stakeholders
- to ensure inclusivity [the needs, interests and values of I&APs must be considered in the decision-making process]
- to focus on issues relevant to the project, and issues considered important by I&APs and key stakeholders, and
- to provide responses to I&AP queries.

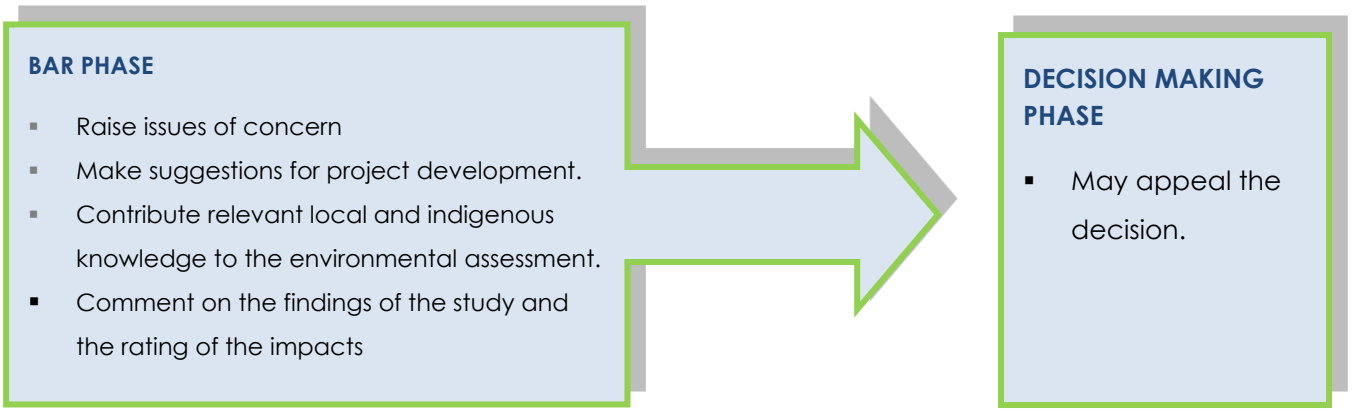


Figure 47: Responsibilities of I&APs in different PPP stages

The figure below depicts the approach taken by Indaloenhle Environmental Consultants, where one-way information flow is avoided and information exchange is promoted, thereby enabling a higher level of engagement.

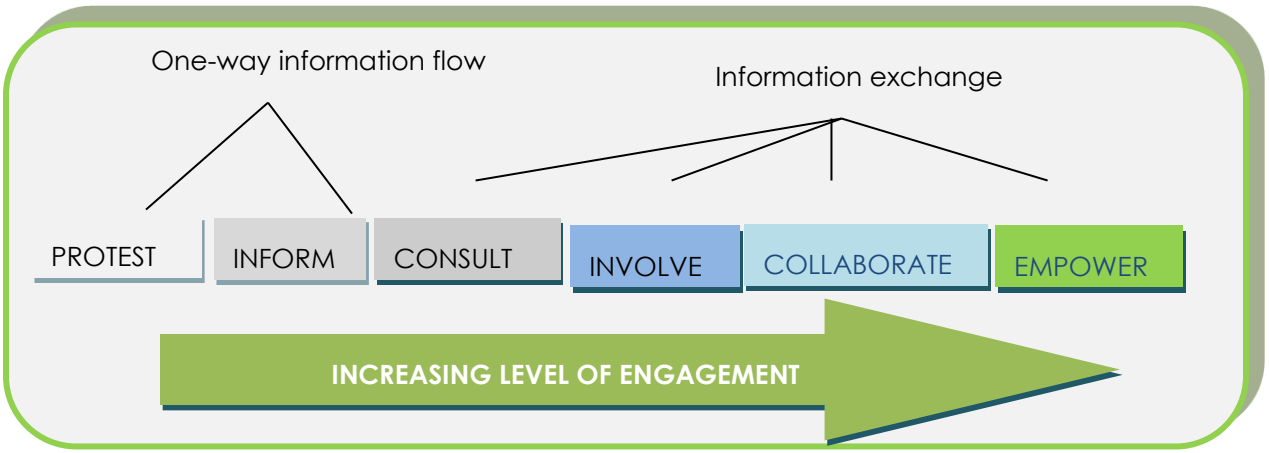


Figure 48: The stakeholder engagement spectrum (DEAT, 2002)

To achieve a higher level of engagement, several key activities have taken place. These included the following:

- The identification of stakeholders is a key deliverable at the onset, and it is noted that there are different categories of stakeholders that must be engaged, from the different levels and categories of government to the communities of wards of residential dwellings which surround the proposed development.
- The development of a living and dynamic database that captures details of stakeholders from all sectors.
- The convening of focused meetings with stakeholders during the BA process; this included engaging with community members. The continued engagement of public leaders to whom the public generally turn for information, keeping such individuals well informed about process and progress.
- The fielding of queries from I&APs and others, and providing appropriate information
- The convening of specific stakeholder groupings / forums as the need arises.
- The preparation of reports based on information gathered throughout the BA via the PPP and feeding that into the relevant decision-makers.
- The PPP includes distribution of pamphlets or Background Information Documents [BIDs] and other information packs; and
- Where appropriate site visits may be organised, as well as targeted coverage by the media.

A detailed Public Participation report is attached in **Appendix F.**

6.1 AUTHORITY CONSULTATION

A pre-application meeting was held with representatives from the Department of Forestry, Fisheries and the Environment (DFFE) on the 30th of November 2023. The purpose of the Pre-Application Meeting was to introduce the proposed project to Department of Forestry, Fisheries and the Environment, present and confirm the relevant Listed Activities and Specialist Studies pertinent to the proposed development and that, each body, as per its guidelines and regulations can make known the recommendations pertaining the proposed project.

Key discussion items are detailed below:

- The proposed project scope and how we are intending on undertaking the basic assessment process.
- The proposed development triggers Activity 19 and 27 of Listing Notice 1 and Listing Notice 3 Activity 12
- Specialist studies that were already undertaken included Wetland and Aquatic Assessment, Marine Assessment, Vegetation Assessment , Hydraulic and Geomorphology Assessment
- The screening tool was discussed in detail , the specialist that will undertake compliance statement studies were identified
- The proposed work will be done in phase approach depending on the outcome of phase 1.
- Submission of Basic Assessment Report will be done concurrently will lodging of application.

6.2. CONSULTATION WITH OTHER RELEVANT STAKEHOLDERS

Consultation with other relevant key stakeholders was undertaken through written email correspondence to actively engage these stakeholders throughout the process and to provide background information about the project during the Basic Assessment (BA) process. Relevant key stakeholders were consulted and notified through Background. Information Document (BID). All relevant stakeholders are allowed an opportunity to comment on the dBAR.

I&APs were identified throughout the BA process primarily from responses received from the notices mentioned above. The contact details of all identified I&APs are recorded on the Interested and Affected Parties database, which is included in **Appendix F1**. This database will be updated on an on-going basis throughout the BA process.

The identified stakeholders of this project include:

Table 25: Key Stakeholders contacted as part of the Public Participation Process(for detalils on actual comments , please refer to comments and response report on Appendix F8 Table 21 : Key Stakeholders

contacted as part of the Public Participation Process(for detalils on actual comments , please refer to comments and response report on Appendix F8

COMPETENT AUTHORITY		
Sindisiwa Dlomo – sdlomo@dffe.gov.za DFFE		**Comment recivied on Draft BAR**
GOVERNMENT STAKEHOLDERS		
uMkhanyakude District Municipality	Mandisa Sibisi MSibisi@dffe.gov.za	Email from Zimbili Hlabisi Thank you for your email, kindly include our Local Government Support (LGS) official from DFFE Mandisa Sibisi msibisi@dffe.gov.za and mandysbisi21@gmail.com.
uMtubatuba local Municipality	andile.planning@mtubatuba.gov.za	No comment
Department of Water and Sanitation	SteenkampA2@dws.gov.za>	Pre application meeting, 13 Dec 2024.
SAHRA	nkhumalo@sahra.org.za	Draft BAR submitted awaiting confirmation of site sensitivities
Department of Agriculture & Rural Development	Nontuthuzelo.Ntshabele@dalrrd.gov.za	Comments on Draft BAR received
UNESCO	e.mwaka@unesco.org	Submitted Draft BAR- No comment
DFFE - **Protected Areas Multilateral Programmes**	ftshamano@dffe.gov.za	Comment Received
DFFE – Oceans and Coast	**OCEIA@dffe.gov.za**	Comment Received
DFFE - **Biodiversity Mainstreaming and EIA**	tkgaphola1@dffe.gov.za	Will receiveamended BAR

6.3. SITE NOTIFICATIONS

The EIA Regulations [2017] require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity is proposed to occur. In addition, at points of

access or high through traffic. The purpose of this is to notify the public of the project and to invite the public to register as Interested and Affected Parties and inform them of the PP Process. Indaloenhle Environmental Consultants erected several public notices, written in English, at publicly accessible spaces on the 29th November 2023 [refer to Fig. 37 and Appendix F2].

A



B



C



D



E



F



Figure 49: Public Notices at St Lucia: A Shoprite, B St Lucia Ski-boat club, C Public amenities at ski-boat ramp at Ingwe Beach, D, St Lucia SPAR shop, and E & F Siyabonga centre (29 Nov 2023).

6.4. ADVERTISING

In compliance with Section 41(2) of the Environmental Impact Assessment (EIA) regulations promulgated under the National Environmental Management Act, notification of the commencement of the BA process for the project was advertised in the following newspapers: In IsiZulu (iSolezwe) 17 January 2024, and English (Zululand Observer, 22 January 2024, and Sunday Times, 21 January 2024). I&APs have been requested to register their interest in the project and become involved in the BA process. The primary aim of the advertisement is to ensure that the widest group of I&APs possible is informed and invited to provide input, through questions and comments on the project. A Background Information Document (BID) was made available to I&APs.

Notice of Environmental Authorisation and WULA for the proposed dredging of the Msunduzi River and Beach Channel, uMkhanyakude District Municipality.

Notice is hereby given in terms of regulation 41 (2a) as published in the Government Gazette No 326 Environmental Impact Assessment (EIA) regulations, 2017, of the National Environmental Management Act (NEMA) (as amended) for intent to undertake a Basic Assessment (BA) for the proposed development.

The project requires authorisation in terms of NEMA (Act No. 107 of 1998), which will be undertaken in accordance with the Environmental Impact Assessment (EIA) Regulations, 2017 (GN No. R.326. The BA process triggers Listed Activity 19 and 27 from GNR 327 (Listing Notice 1) and Listed Activity 12 from GNR 324(Listing notice 3).

Project Detail: The St Lucia estuary and lake system is a World Heritage Site and Ramsar Wetland of International Importance, under the management of the iSimangaliso Wetland Park Authority. The estuary mouth system is complex and comprises of three catchments, the, Mfolozi River Catchment (which includes the Msunduzi River) and Mkhuze River Catchment. Back-flooding of the Msunduzi River, which leads to the inundation of commercial and small-scale farmland with water on the Mfolozi floodplain, has been problematic for a while, affecting both the commercial and small-scale farmer's production in the Mfolozi floodplain.

To ensure the natural functioning of the St. Lucia Estuary system and in line with the Panel of Experts report (2022), the proposal is to dredge the sediment-clogged portion and remove vegetation at Msunduzi River and the Beach Channel of the St Lucia Estuary. The iSimangaliso Wetland Park Authority, as the Management Authority for the iSimangaliso World Heritage Site, appointed Indaloenhle Environmental Consultants (Pty) Ltd to undertake the legally required application processes for Environmental Authorisation and Water Use license application for the proposed activity.

Project Location: The affected area is described as the lower Msunduzi River channel blockage and the linking Beach Channel to the St Lucia Estuary and mouth, uMkhanyakude District Municipality. Central geographic co-ordinates are provided in Table 1.

Geographic coordinates	Latitude	Longitude
St Lucia estuary mouth (approx.).	28°23'24.51"S	32°25'25.48"E
Lower Msunduzi River blockage (central, approx.)	28°24'43.76"S	32°25'00.00"E
Flooded farmlands (central, approx.)	28°28'37.73"S	32°20'38.89"E

Should you be interested and or affected by the proposed development, you are hereby invited to register as an Interested and Affected Party (I&AP) .Please note that only registered I&APs will be notified of further opportunities for involvement in this process.

For further information, registration as Interested and Affected Parties and submission of comments, please contact:

Miss Mbalenhle Mtshali , Indaloenhle Environmental Consultants

www.indaloenhle.co.za

62 Old Main Road, Kloof 3610

Isaziso sokugunyazwa kwezeMvelo kanye ne-WULA mayelana nokumbiwa okuhlongozwayo komfula uMsunduzi kanye ne-Beach Channel, kuMasipala wesiFunda uMkhanyakude.

Isaziso sinikeziwe ngokomthethonqubo 41 (2a) njengoba ushicilelwe kuGazethi Kahulumeni No. 326 lmithethonqubo Yokuhlolwa KoMthelela Emvelweni (EIA), 2017, yoMthetho Kazwelonke Wokuphathwa Kwemvelo (NEMA) (njengoba uchitshiyelwe) ngenhloso yokwenza Ukuhlola Okuyisisekelo. (BA) ngentuthuko ehlongozwayo.

Iphrojekthi idinga ukugunyazwa ngokwemibandela ye-NEMA (uMthetho No. 107 ka-1998), ezokwenziwa ngokuhambisana neMithethonqubo Yokuhlolwa Komthelela Wezemvelo (EIA), 2017 (GN No. R.326. Inqubo ye-BA iqala uMsebenzi Osohlwini we-19 kanye 27 evela ku-GNR 327 (Isaziso Sohlu 1) kanye Nomsebenzi Osohlwini 12 ovela ku-GNR 324(Isaziso sohlu 3).

Imininingwane Yephrojekthi:TIchweba lase-St Lucia kanye nesistimu yechibi iNdawo Yamagugu Omhlaba kanye ne-Ramsar Wetland Ebaluleke Ngamazwe Ngamazwe, ngaphansi kokuphathwa kweSimangaliso Wetland Park Authority. Uhlelo lomlomo wechweba luyinkimbinkimbi futhi luhlanganisa imithombo emithathu, uMfula uMfolozi (ohlanganisa umfula uMsunduzi) kanye noMfula uMkhuze. Ukugcwala emuva komfula uMsunduzi, okuholela ekuthelelekeni kwamapulazi okuhweba namapulazi amancane namanzi ethafeni lezikhukhula iMfolozi, sekunezinkinga isikhathi eside, okuphazamise ukukhiqizwa kwabalimi abathengisayo nabancane endaweni yezikhukhula yaseMfolozi.

Ukuqinisekisa ukusebenza kwemvelo kohlelo lwe-St. Lucia Estuary futhi ngokuhambisana nombiko we-Panel of Experts (2022), isiphakamiso siwukuba kudilizwe ingxenye evalekile futhi kususwe uhlaza emfuleni uMsunduzi kanye naseBeach Channel ye-St Lucia Estuary. . ISimangaliso Wetland Park Authority, njengeSigungu Esilawulayo seNdawo Yamagugu Yomhlaba ye-iSimangaliso, yaqoka i-Indaloenhle Environmental Consultants (Pty) Ltd ukuthi yenze izinqubo ezidingekayo ezisemthethweni zokufaka isicelo sokugunyazwa kweNdawo kanye nesicelo sokusetshenziswa kwamanzi kulo msebenzi ohlongozwayo.

Indawo Yephrojekthi:Indawo ethintekile ichazwa njengendawo ephansi yokuvaleka kweshaneli yomfula uMsunduzi kanye neBeach Channel exhumanisa i-St Lucia Estuary kanye nomlomo, uMasipala Wesifunda uMkhanyakude. Izixhumanisi zendawo ezimaphakathi zinikeziwe kuThebula 1.

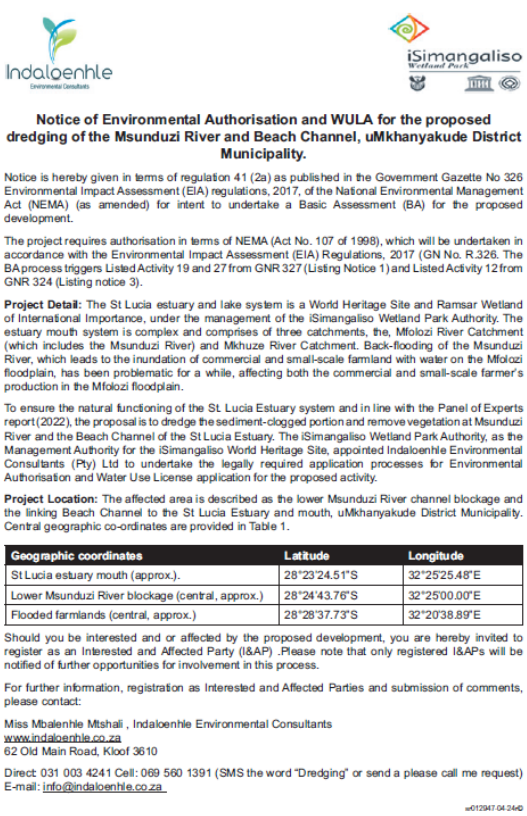
Izixhumanisi zendawo	I-Latitude	Ubude
Umlomo wesiza sase-St Lucia (cishe.).	28°23'24.51"S	32°25'25.48"E
Ukuvaleka komfula uMsunduzi osezansi (maphakathi, cishe.)	28°24'43.76"S	32°25'00.00"E
Amapulazi agcwele izikhukhula (maphakathi, cishe.)	28°28'37.73"S	32°20'38.89"E

Uma kwenzeka unentshisekelo futhi noma uthintwa yintuthuko ehlongozwayo, uyamenywa ukuba ubhalise njengeQembu Elithakaselayo nelithintekile (I&AP) kungakedluli umhlaka 16 Febhruwari 2024. Sicela wazi ukuthi ama-I&AP abhalisiwe kuphela azokwaziswa ngamanye amathuba okuzibandakanya le nqubo.

Ukuze uthole ulwazi olwengeziwe, ukubhaliswa Njengabathintekayo Abanentshisekelo Nabathintekayo kanye nokuhanjiswa kwamazwana, sicela uthinte:

Miss Mbalenhle Mtshali, Indaloenhle Environmental Consultants
www.indaloenhle.co.za
62 Old Main Road, Kloof 3610

Qondanisa: 031 003 4241 Cell: 069 560 1391
(SMS the word "Dredging" or send a please call me request) E-mail:info@indaloenhle.co.za



Notice of Environmental Authorisation and WULA for the proposed dredging of the Msunduzi River and Beach Channel, uMkhanyakude District Municipality.

Notice is hereby given in terms of regulation 41 (2a) as published in the Government Gazette No 326 Environmental Impact Assessment (EIA) regulations, 2017, of the National Environmental Management Act (NEMA) (as amended) for intent to undertake a Basic Assessment (BA) for the proposed development.

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Project Detail: The St Lucia estuary and lake system is a World Heritage Site and Ramsar Wetland of International Importance, under the management of the iSimangaliso Wetland Park Authority. The estuary mouth system is complex and comprises of three catchments, the, Mfolozi River Catchment (which includes the Msunduzi River) and Mkhuze River Catchment. Back-flooding of the Msunduzi River, which leads to the inundation of commercial and small-scale farmland with water on the Mfolozi floodplain, has been problematic for a while, affecting both the commercial and small-scale farmer's production in the Mfolozi floodplain.

To ensure the natural functioning of the St Lucia Estuary system and in line with the Panel of Experts report (2022), the proposal is to dredge the sediment-clogged portion and remove vegetation at Msunduzi River and the Beach Channel of the St Lucia Estuary. The iSimangaliso Wetland Park Authority, as the Management Authority for the iSimangaliso World Heritage Site, appointed Indaloenhle Environmental Consultants (Pty) Ltd to undertake the legally required application processes for Environmental Authorisation and Water Use License application for the proposed activity.

Project Location: The affected area is described as the lower Msunduzi River channel blockage and the linking Beach Channel to the St Lucia Estuary and mouth, uMkhanyakude District Municipality. Central geographic co-ordinates are provided in Table 1.

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Should you be interested and or affected by the proposed development, you are hereby invited to register as an Interested and Affected Party (I&AP) .Please note that only registered I&APs will be notified of further opportunities for involvement in this process.

For further information, registration as Interested and Affected Parties and submission of comments, please contact:

Miss Mbalenhle Mtshali , Indaloenhle Environmental Consultants
www.indaloenhle.co.za
62 Old Main Road, Kloof 3610

Direct: 031 003 4241 Cell: 069 560 1391 (SMS the word "Dredging" or send a please call me request)
E-mail: info@indaloenhle.co.za

6.5. STAKEHOLDER MEETING

Representation of the project was made through the iSimangaliso Wetland Park St Lucia Mouth Stakeholder Meeting on 29 November 2023 and the BID was distributed; all records (Attendance register, comments) of the public meeting will be contained within this Basic Assessment Report (Appendix F).

Table 26: St Lucia Mouth Stakeholder meeting attendance register

iSimangaliso Wetland Park

Attendance Register

Date: 29 November 2023

Meeting: St Lucia mouth Stakeholders

NO:	Name and Surname	Organization	Contact no:	Email Address	Signature
1	TUMEKA NTLOKO	DFFE	0827698812	tntloko@dffe.gov.za	
2	NOMTHANDAZO NTSHOBELA	DALRRD	0835652390	nomthandazo.ntshobela@dalrrd.gov.za	
3	Nandipha Bleuu	DFFE	0662830218	n'bhengu@dffe.gov.za	
4	S'phamandla Ntombela	Imbubu Nature Tourism Ambassador	0678736209	info@imbubunaturetours.co.za	
5	Bongani Mantengu	Nkundusi	0761487455		
6	Vala Ndlovu	Nkundusi	0722687225		

NO:	Name and Surname	Organization	Contact no:	Email Address	Signature
7	Petros Mlaba	Sokhulu	072 0366 581		
8	Z. J Mfekayi	Sokhulu	0630388915		
9	F Khumalo	Sokhulu	0739346155		
10	N MBUYAZI	Sokhulu	0788307049	mbuyazinjabulo@gmail.com	
11	S. Gumede	Dukuduku	0732772477	sphamandlasphiwexaba@gmail.com	
12	Peet Grobelaar	Maphelane Ski Boat Club/MSIKHAKHENI	0825684284	peet@landlaw.co.za	
13	Mogalepula Pitso	DCOG-NDMC	0720628448	Mogalepula@ndmc.gov.za	
14	Sinve Bekwa	DCOG-NDMC	0790846851	Sinve@ndmc.gov.za	
15	Ryan Cedras	iSimangaliso	0786411441	ryan@isimangaliso.com	
16	Justin Pringle	Ezemvelo	0791201572	pringlej@ukzn.ac.za	
17	Nokwethemba Zulu	iSimangaliso	072 883 9628	nokwethemba@isimangaliso.com	
18	C Fox	EKZNW	0355901476	Caroline.Fox@ekznwildlife.com	
19	Mbali Mdlalose	Ezemvelo	0724239544	mbali@ezemvelo.co.za	
20	LISA GUASTELLA	"	0828604043	lisa.guastella@durban.ac.za	
21	CRAIG EDGAR	UMFOLOZI FARMERS UNION	0829785251	CRAIGEDGAR19@ICLOUD.COM	
22	Lumka Salukazana	UKDM	073 036 0047	Salukazanalu@ukdm.gov.za	
23	Walter v Ransburg	DEA&RD	0726489127		
24	Lungile Ntuli	iSimangaliso	0828588051	lungile@isimangaliso.com	
25					

6.6. COMMENTS AND RESPONSE REPORT

This Comments and Responses Report (CRR) is in line with the requirements of Regulation 44 of the National Environmental Management Act's (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014 (as amended). The CRR captures the comments and issues raised by Interested and Affected Parties (I&APs) and authorities during 30 days commenting period in the public participation.

Issues and concerns raised in the public participation process during the BA process will be compiledon comment and response report . Please see Appendix F8

6.7. KEY ISSUES RAISED BY THE PUBLIC [SUMMARISED]

Community members are eager to have the project start immediately to minimize flooding in their farms. Please see appendix F8

6.8. PUBLIC REVIEW OF THE DRAFT BAR

All registered I&APs were notified of the availability of the report through written and verbal communication. The dBAR was made available for authority and public review for a total of 30 days from

the 16 February 2024 to 18 March 2024. The final stage in the BA process entails the capturing of responses and comments from I&APs on the dBAR to refine the BAR and ensure that all issues of significance are addressed. This report incorporates all comments by Interested and Affected Parties and findings of specialist studies prior to submission to Department of Forestry, Fisheries and the Environment (DFFE) for review and decision-making.

6.9. PUBLIC PARTICIPATION PROCESS SUMMARY

Table 27: Summary of Public Participation Process thus far

Activity	Description	Reference
Identifying stakeholders	Stakeholders were identified and a database of all I&APs were compiled.	Appendix F
Publishing newspaper adverts	Advertisements regarding inter alia the proposed project scope of works, location, and date for draft Basic Assessment Report review as well as details of EAP was placed in iSolezwe, Zululand Observer and Sunday Times and the Proof of advertisement will be appended to this report.	Appendix F
Erection of site notices	A number of site notices were erected on the perimeter of the site on (30 November 2023).	Appendix F
Preparation of an on-going Issues Trail	Comments, issues of concern and suggestions received from stakeholders thus far have been captured in a Comment and Response Report.	Appendix F
Release of Draft Reports	This Draft Basic Assessment Report [dBAR] has been advertised and made available for a period of 30 days for public review and comment. The dBAR is available for review from the 16 February 2024 to 18 March 2024.	Appendix F
Public Meetings / Open Days	A Public Meeting was arranged with the community through community leaders and BID was distributed and all records of the public meeting will be contained within the final Basic Assessment Report	Appendix F

Release of final Reports	The final Basic Assessment Report will incorporate all comments by IAPs and findings of the specialist studies, before being submitted to Department of Forestry, Fisheries and the Environment for review and decision-making.	

7. IMPACTS AND RESIDUAL RISKS ASSESSMENT

7.1. INTRODUCTION

Impact assessment must consider the nature, scale, and duration of effects on the environment, whether such effects are positive [beneficial] or negative [detrimental]. It is also imperative that each issue / impact is also assessed according to the project stages from planning, through dredge and operation phase. Where necessary, the proposal for mitigation or optimisation of an impact is noted.

The environmental impact assessment is focused on the following phases of the project namely: **Pre-Construction, Construction**, **Operational Phases and Decommissioning Phase**. The impacts associated with decommissioning phase applicable to this project and the responsible methods of post-dredge clean-up are provided in the EMMPr.

7.2. METHODOLOGY

The potential environmental impacts associated with the project are evaluated according to the nature, extent, duration, intensity, probability, and significance of the impacts, whereby:

1. ***Nature [N]***

This is a brief written statement of the environmental aspect being impacted upon by a particular action or activity. Herewith impacts are classified as either direct, indirect, or cumulative.

- Direct impacts: impacts usually caused from activities carried out on site that can only be monitored to be carried out within certain confines but cannot at all be avoided, i.e., clearing of vegetation /reserve in an area populated with vegetation.
- Indirect impacts: secondary impacts resulting from direct impacts, i.e., erosion resulting from destabilised soils due to clearing of vegetation.
- Cumulative impacts: impacts which could result during the life cycle of the project as a result of one or two impacts that are usually unnoticed as single elements of such.

2. Extent [E]

Extent refers to the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact.

- Site [1] – Within the dredge site.
- Local [2] – Within a radius of 2 km of the dredge site.
- Regional [3] – the scale applies to impacts on a provincial level and parts of neighbouring provinces.
- National [4] – the scale applies to impacts that will affect the whole South Africa.

3. Duration [D]

Duration indicates what the lifetime of the impact will be.

- Short-term [1] – less than 5 years.
- Medium-term [2] – between 5 and 15 years.
- Long-term [3] – between 15 and 30 years.
- Permanent [4] – over 30 years and resulting in a permanent and lasting change that will always be there.

4. Intensity [I]

Intensity describes whether an impact is destructive or benign.

- Very High [4] - Natural, cultural, and social functions and processes are altered to extent that they permanently cease.
- High [3] - Natural, cultural, and social functions and processes are altered to extent that they temporarily cease.
- Moderate [2] - Affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way.
- Low [1] - Impact affects the environment in such a way that natural, cultural, and social functions and processes are not affected.

5. Probability [P]

Probability describes the likelihood of an impact occurring.

- Improbable [1] - Likelihood of the impact materialising is very low.
- Possible [2] - The impact may occur.
- Highly Probable [3] - Most likely that the impact will occur.

- Definite [4] - Impact will certainly occur.

6. Cumulative [C]

In relation to an activity, means the impact of an activity that may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

7. Significance [S]

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

7.3. RATING OF POTENTIAL IMPACTS

The potential impacts identified are explained per phase of the project and mitigation measures are provided.

Table 28: Significance ratings

Significance of the Impact	Description of Significance	Rating
Very Low	The impact is unimportant and does not require mitigation. As such, the impact is regarded as acceptable for the proposed development.	<5
Low	The impact is very minor and may require limited mitigation. It may be regarded as acceptable, considering the proposed mitigation.	5≥10
Medium	The Impact is clearly effective, but moderate, and can be mitigated/avoided by implementation of the proposed mitigation measures.	10≥20
Moderate	The impact is clearly effective; failure to mitigate could lead to the entire project being unacceptable.	20≥30
High	There are slim chances of mitigation measures.	30≥40
Very High	The impact. Is relatively high and there are no possible mitigation measures of this impact. As such, social, cultural, and economic activities of the community are disrupted.	>40

7.3.1. THE MITIGATION HIERARCHY

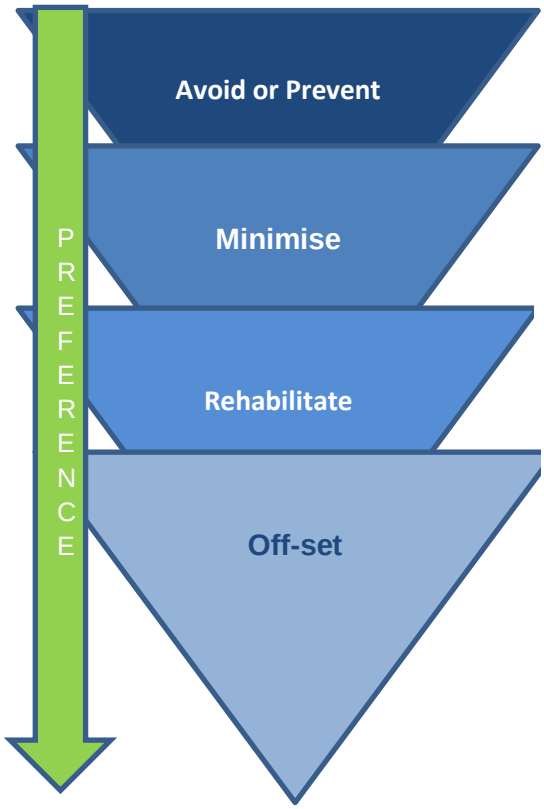
The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will be included in an EMMPr.

An important aspect of impact assessment is the identification and application of methods which mitigate against the impacts. To aid selection of mitigation measures, the mitigation hierarchy is used. The mitigation hierarchy is a tool that guides users toward limiting as far as possible the negative impacts on biodiversity from development projects.

It emphasises best practice of avoiding and minimising any negative impacts, and then restoring [rehabilitating] sites no longer used by a project, before lastly considering off-setting residual impacts. The mitigation hierarchy is crucial for all development projects aiming to achieve no overall negative impact on biodiversity or on balance a net gain [also referred to a No Net Loss and the Net Positive Approach]. It is based on a series of essential, sequential steps that must be taken throughout the project's life cycle to limit any negative impacts on biodiversity.

A recent cross-sector guide for implementing the mitigation hierarchy provides practical guidance, innovative approaches and examples to mitigation hierarchy support operationalizing the mitigation hierarchy effectively. The publication is aimed at environmental professionals working in, or with, extractive industries and financial institutions, who are responsible for overseeing the application of the mitigation hierarchy to biodiversity conservation, while balancing conservation needs with development priorities.

The sequential steps of the mitigation hierarchy are annotated on the diagram below.



*Refers to considering options in project location, sitting, scale, layout, technology. and phasing **to avoid impacts** on biodiversity, associated ecosystem services, and people. This is the best option but is not always possible. Where environmental and social factors give rise to unacceptable negative impacts the activity should not take place. In such cases*

Refers to considering alternatives in the project location, siting, scale, layout, technology and phasing that would minimise impacts on biodiversity and ecosystem. services. In cases where there are environmental and social constraints every effort

Refers to rehabilitation of areas where impacts are unavoidable, and measures are. provided to return impacted areas to near-natural state or an agreed land use. Although rehabilitation may fall short of replicating the diversity and complexity of a natural system.

*Refers to measures over and above rehabilitation to compensate for the residual. negative effects on biodiversity, after every effort has been made to minimise and then rehabilitate impacts. **Offsets** can provide a mechanism to compensate for significant residual impacts.*

Figure 50: The mitigation hierarchy

7.3.2. IMPACT ASSESSMENT

This section presents the impact assessment according to the methodology in the preceding sections, in a tabular form.

PROJECT PHASE	ENVIRONMENTAL IMPACT	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION								RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION							
		Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation of enhancement	Without mitigation	With mitigation		Spatial Extent	Duration	Intensity	Probability	Reversibility	Mitigation of enhancement	Without mitigation	With mitigation
	Construction Phase																	
VEGETATION REMOVAL	Faunal mortalities from vegetation removal (habitat loss)	Local	Short	**High**	Definite	Low	Low	-ve	**High**	Repatriation of fauna found attached to vegetated matter)	Local	Short	Moderate	Definite	Very Low	Very Low	-ve	Medium
	Mobilisation of sediments during vegetation removal increases turbidity, affects light penetration, and causes faunal disturbance	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium	Removal on outgoing tide	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium
	Water quality impacts – stirring up of	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium	No mitigation suggested								

VEGETATION REMOVAL	accumulated bottom sediments may release nutrients, such as phosphorus, nitrogen and ammonia, and hydrogen sulphide into the water column, Oxygen depletion due to chemical and biological oxygen demand of the dredged material may cause mortality of biota within the site vicinity.																	
	Noise disturbance, ambient and in water column, human disturbance– affects aquatic and avi-fauna. On a positive note, noise could scare away dangerous creatures and	Local	Short	Moderate	Definite	Very Low	Very Low	-ve	Medium	No mitigation suggested								

VEGETATION REMOVAL	therefore reduce risk to vegetation clearing staff.																	
	Loss of plant communities (largely P*hragmites australis*) through active removal, could affect river prawn populations.	Local	Short	**High**	Probable	Low	Low	-ve	High	Time plant removal during late autumn/winter to avoid river prawn disturbance	Local	Short	Moderate	Probable	Moderate	Moderate	-ve	Medium
	Trampling or vehicle damage to sensitive vegetation and faunal habitats during operations	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium	EMMPr to address to reduce	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium
	Waste discharges during vegetation removal operations (e.g., fuel leaks (from boats or vehicles), litter)	Local	Short	Moderate	Possible	Very Low	Insignificant	-ve	Medium	EMMPr to address to reduce	Local	Short	Low	Possible	Very Low	Insignificant	-ve	Medium
	Dumping of vegetation from channels onto the floodplain leads to redistribution back to	Local	Short-Medium	Moderate	Possible	Very Low	Insignificant	-ve	Medium	All vegetation removed from site	Regional	Short	Low	Definite	Very Low	Insignificant	+ve/-ve	High

	channels & alterations to natural flow paths, increase in nutrients.																	
	Erosion of channel margins and estuary banks due to vegetation removal	Local	Short	Moderate	Possible	Very Low	Insignificant	-ve	Medium	Retain vegetation along the banks to prevent bank erosion, ECO monitoring to manage/advise	Local	Short	Low	Possible	Very Low	Insignificant	-ve	Medium
	Risk to employees of attack by hippos and crocodiles.	Local	Short	Moderate	Possible	Very Low	Insignificant	-ve	Medium	Staff to be made aware of the dangers; in this case, noise might be a positive impact/mitigation.	Local	Short	Low	Possible	Very Low	Insignificant	-ve/+ve	Medium
VEGETATION REMOVAL	Faunal mortalities from suction and/or disturbance by dredging equipment	Local	Short	**High**	Definite	Low	Low	-ve	High	No mitigation suggested								
	Fine sediment plumes and increased turbidity affects light penetration and causes faunal disturbance.	Local	Short	**High**	Probable	Low	Low	-ve	Medium	Turbidity curtain, dredge on outgoing tide	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium
	Water quality impacts – stirring up of accumulated bottom	Local	Short	**High**	Probable	Low	Low	-ve	Medium	No mitigation suggested								

DREDGING	sediments may release nutrients, such as phosphorus, nitrogen and ammonia, and hydrogen sulphide into the water column, Oxygen depletion due to chemical and biological oxygen demand of the dredged material may cause mortality of biota within the site vicinity.																	
	Noise disturbance, ambient and in water column and substratum, human disturbance – affects aquatic and avi-fauna.	Local	Short	Moderate	Definite	Very Low	Very Low	-ve	Medium	No mitigation suggested								
	Trampling or vehicle damage to sensitive vegetation and faunal habitats during	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium	EMMPr to address to reduce	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium

	dredging operations.																	
	Waste discharges during dredger operations (e.g., oil leaks, litter)	Local	Short	Moderate	Possible	Very Low	Insignificant	-ve	Medium	EMMPr to address to reduce	Local	Short	Low	Possible	Very Low	Insignificant	-ve	Medium
DREDGING	Dumping of dredged spoil within the floodplain leads to habitat loss where the spoil is disposed of and alterations to natural flow paths.	Local	Short-Medium	Moderate	Probable	Low	Low	-ve	Medium	Spoil is disposed of offsite	Regional	Short	Low	Definite	Very Low	Very Low	+ve/-ve	High
	Nutrients and pesticides may leach from the spoil dumpsite and contaminate the rivers and downstream area.	Regional	Short-Medium	Moderate	Possible	Medium	Low	-ve	Medium	Spoil is disposed of offsite	Regional	Short	Low	Definite	Very Low	Very Low	+ve/-ve	High
	Erosion of channel margins and estuary banks due to dredging.	Local	Short	Moderate	Possible	Very Low	Insignificant	-ve	Medium	Retain vegetation along the banks to prevent bank erosion, ECO monitoring to advise/manage	Local	Short	Low	Possible	Very Low	Insignificant	-ve	Medium

	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
						Abiotic Habitat (Drivers)			Biota (Responses)											
			Name/s	PES	Ecological Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
VEGETATION REMOVAL	Physical removal of vegetation within the uMsunduze River	Loss of instream habitats, marginal vegetation and disturbance to fauna	uMsunduze River/estuary	E	High	2	1	2	4	2	**8**	1	2	**11**	**4**	**44**	0.4	**17,6**	**L**	High
		Alien invasive species infestation	uMsunduze River/estuary	E	High	3	1	1	3	1	**6**	2	2	**10**	**4**	**40**	0.2	**8**	**L**	High
		Vegetation removal may stir up bottom sediments releasing stored nutrients into the water column. This may result in oxygen depletion and impact instream biota.	uMsunduze River/estuary	E	High	1	3	1	1	4	**8**	1	1	**10**	**4**	**40**	0.4	**16**	**L**	High
		Vegation removal may disturbed bottom sediments resulting in increased turbidities which can cause faunal disturbance	uMsunduze River/estuary	E	High	1	3	1	1	3	**6**	1	1	**8**	**4**	**32**	0.6	**19,2**	**L**	High
		Improved water flow within the river which may assist in mobalising built up sediments	uMsunduze River/estuary	E	High	-4	-3	-4	-1	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-28,8**	**+**	Medium
	Temporary ablution facilities for workers	Increased risk of water contamination and resultant water qualtiy issues	uMsunduze River	E	High	1	3	1	1	2	**6**	1	1	**8**	**4**	**32**	0.2	**6,4**	**L**	High

	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance max = 100	Risk Rating	Confidence level
						Abiotic Habitat (Drivers			Biota (Responses											
			Name/s	PES	Ecological Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
DREDGING	Dredging of vegetation and sediments within the uMsunduze River	Loss of instream habitats, marginal vegetation and disturbance to fauna	uMsunduze River/estuary	E	High	2	1	2	3	3	**6**	1	2	**9**	**4**	**36**	0.6	**21,6**	**L**	High
		Alien invasive species infestation	uMsunduze River/estuary	E	High	1	1	1	3	1	**6**	1	2	**9**	**4**	**36**	0.4	**14,4**	**L**	High
		The release of nutrients (phosphorous, nitrogen and ammonia) and other toxic chemicals stored within the sediment into the water column. This introduces pollutants into the environment and may result in oxygen depletion which would impact instream biota.	uMsunduze River/estuary	E	High	1	4	1	3	5	**10**	1	2	**13**	**4**	**52**	0.6	**31,2**	**M**	Medium
		Dredging will disturb bottom sediments resulting in increased turbidities which can cause faunal disturbance. Other impacts may include soil compaction and the loss of benthic organisms	uMsunduze River/estuary	E	High	2	3	2	2	5	**10**	1	2	**13**	**4**	**52**	0.8	**41,6**	**M**	High
	Creating access for the operational machinery	Watercourse habitat trampling, increased risk of erosion and sedimentation of the rivers	uMsunduze River/estuary	E	High	2	3	1	2	2	**6**	2	1	**9**	**4**	**36**	0.4	**14,4**	**L**	High
	Temporary ablution facilities for workers	Increased risk of water contaimantion and resultant water qualtiy issues	uMsunduze River/estuary	E	High	1	3	1	1	2	**6**	1	1	**8**	**4**	**32**	0.2	**6,2**	**L**	High
	Dumping of dredged spoil within the floodplain	Habitat loss within the floodplain where the spoil is disposed and alterations to natural flow paths	uMsunduze River/estuary	E	High	3	2	3	4	4	**8**	1	2	**11**	**4**	**44**	0.8	**35,2**	**M**	High

	Lowering of water levels on lower floodplain and faster drainage after flooding.	Regional	Medium -Long	Moderate	Possible	**High**	Medium	+ve	Low	No mitigation suggested								
POST-VEGETATION REMOVAL	Reduced backflooding to farmlands due to improved drainage allows for planting and harvesting of crops	Local	Short-Medium	Moderate	Probable	Low	Very Low	+ve	Low	No mitigation suggested								
	Changes in water flow and sediments to a major delta distributary	Regional	Long	Moderate	Definite	**High**	**High**	?	Low	No mitigation suggested								
	Reduction in inundated habitat and wetland processes	Regional	Medium -Long	Moderate	Possible	High	Medium	-ve/ +ve	Low	No mitigation suggested								
	Changed aquatic habitat in upper reaches of Mfolozi-Msunduzi flats due to improved water exchange;	Regional	Medium -Long	Moderate	Possible	**High**	Medium	+ve	Low	No mitigation suggested								

POST-VEGETATION REMOVAL	leads to recovery of estuarine-dependent biota																	
	Changes in zooplankton, benthos and fish species and abundance following vegetation removal	Regional	Short-Long	Moderate	Possible	**High**	Medium	?	Low	No mitigation suggested								
	Improved estuarine function, leading to potential cessation of mangrove die-off and positive expansion of the mangrove forest and swamp forest zones	Regional	Medium-Long	Moderate	Possible	**High**	Medium	+ve	Low	No mitigation suggested								
	Increased water flow through the Msunduzi and Mfolozi channels results in increased water flow to the estuary mouth, which may assist in maintaining an open	Regional	Medium-Long	Moderate	Possible	**High**	Medium	+ve	Low	No mitigation suggested								

	mouth, improving estuarine function																
	Increased silt to ocean when mouth open	Regional	Short-Long	Moderate	Probable	**High**	**High**	-ve/+ve	Medium	Improved catchment management upstream reduces to prevent undue amounts of silt being washed down rivers	Regional	Short-Long	Moderate	Possible	**High**	Medium	+ve/-ve	Medium
	Increased silt to estuary when mouth closed	Regional	Short-Long	Moderate	Probable	**High**	**High**	-ve	Medium	Improved catchment management upstream reduces silt load; artificially open the estuary mouth	Regional	Short-Long	Moderate	Possible	**High**	Medium	+ve/-ve	Medium
POST-VEGETATION REMOVAL	Potential for vegetation to recolonise and accumulate within the channels again, leading to backflooding	Regional	Medium-Long	Moderate	Possible	**High**	Medium	-ve	Low	Channels monitored for regrowth of vegetation and flood debris; clear ASAP	Regional	Medium-Long	Low	Probable	Medium	Medium	-ve/+ve	Low
	Backflooding during large flood events will not be significantly reduced	Regional	Short-Long	**High**	Possible	**Very High**	**High**	-ve	Medium	Regular monitoring and maintenance of vegetation in the channels may facilitate more speedy drainage of the floodplain post-flood; improved	Regional	Short-Long	Moderate	Possible	**High**	Medium	-ve	Low

									catchment management upstream reduces silt load									
	Lowering of water levels on lower floodplain and faster drainage after flooding	Regional	Long	Moderate	Possible	High	Medium	+ve	Low	No mitigation suggested								
	Projected relief of backflooding to farmlands allows for planting and harvesting of crops	Local	Short-medium	Moderate	Possible	Low	Very Low	+ve	Low	No mitigation suggested								
POST-DREDGING	Changes in water flow and sediments to a major delta distributary	Regional	Long	Moderate	Definite	**High**	**High**	?	Low	No mitigation suggested								
	Reduction in inundated habitat and wetland processes	Regional	Medium-Long	Moderate	Possible	**High**	Medium	-ve/+ve	Low	No mitigation suggested								
	Changed aquatic habitat in upper reaches of Mfolozi-Msunduzi flats due to increased water	Regional	Medium-Long	Moderate	Possible	**High**	Medium	+ve	Low	No mitigation suggested								

POST-DREDGING	exchange; leads to recovery of estuarine-dependent biota																	
	Changes in zooplankton, benthos and fish species and abundance following dredging	Regional	Short-Long	Moderate	Possible	**High**	Medium	?	Low									
	Improved estuarine function leads to potential cessation of mangrove die-off and positive expansion of the mangrove forest and swamp forest zones	Regional	Medium-Long	Moderate	Possible	**High**	Medium	+ve	Low									
	Increased water flow through the Msunduzi channel results in increased water flow to the estuary mouth, which may assist in maintaining an open mouth,	Regional	Medium-Long	Moderate	Possible	**High**	Medium	+ve	Low	No mitigation suggested								

	improving estuarine function																
	Increased silt to ocean when mouth open	Regional	Short-Long	Moderate	Probable	**High**	**High**	-ve/+ve	Medium	Improved catchment management upstream to prevent undue amounts of silt being washed down rivers.	Regional	Short-Long	Moderate	Possible	**High**	Medium	+ve/-ve	Medium
	Increased silt to estuary when mouth closed.	Regional	Short-Long	Moderate	Probable	**High**	**High**	-ve	Medium	Improved catchment management upstream reduces silt load; artificially open the estuary mouth	Regional	Short-Long	Moderate	Possible	**High**	Medium	+ve/-ve	Medium
POST-DREDGING	Potential for dredge spoil runoff refilling the dredged channels.	Local	Short-Medium	Moderate	Possible	Low	Very Low	-ve	Low	Ensure dredge spoil dump site is sufficiently away from potential run-off into dredged channels	Local	Medium	Moderate	Possible	Low	Very Low	-ve	Low
	Potential for sediments to eventually accumulate within the channels again, leading to backflooding.	Regional	Medium-Long	Moderate	Possible	**High**	Medium	-ve	Low	Channels to be monitored for vegetation growth and sediment accumulation, maintenance dredging might be required	Regional	Medium-Long	Low	Probable	Medium	Medium	-ve/+ve	Low
	Backflooding during large flood events	Regional	Short-Long	**High**	Possible	**Very High**	**High**	-ve	Medium	Regular monitoring and maintenance of	Regional	Short-Long	Moderate	Possible	**High**	Medium	-ve	Low

POST-VEGETATION REMOVAL

will not be significantly reduced.									channels may facilitate more speedy drainage of the floodplain post-flood; Improved catchment management upstream reduces silt load									

Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
					Abiotic Habitat (Drivers)			Biota (Responses)											
		Name/s	PES	Ecological Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
Disposal of the removed vegetation	Inappropriate disposal may lead to Phragmites reestablishing, increasing its distribution and outcompeting more diverse vegetation types.	uMsunduze River/estuary	E	High	3	1	1	4	1	**8**	1	3	**12**	**4**	**48**	0.6	**28,8**	**L**	High
	Removed Debris may also wash back into the channels during flooding causing blockages	uMsunduze River/estuary	E	High	3	1	1	1	2	**6**	1	2	**9**	**4**	**36**	0.6	**21,6**	**L**	Medium
Physical removal of the instream vegetation at the identified hotspots	Improved water flow within the river which may assist in mobalising built up sediments	uMsunduze River/estuary	E	High	-4	-3	-4	-1	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-28,8**	**+**	Medium
	Increased water exchanged with the upper reaches of the uMfolozi and uMsunduze resulting in improved esturiane functioning and the recovery of estuarine dependent biota	uMsunduze River/estuary	E	High	-4	-3	-3	-3	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-28,8**	**+**	Medium

POST-DREDGING

Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance max = 100	Risk Rating	Confidence level
					Abiotic Habitat (Drivers			Biota (Responses											
		Name/s	PES	Ecological Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
Disposal of the dredged spoil within the floodplain	Potential for sediment runoff and refilling of the dredged channels	uMsunduze River/estuary	E	High	4	3	3	2	3	**8**	1	2	**11**	**4**	**44**	0.8	**35,2**	**M**	High
	Potential for the spread of alien invasive plant species	uMsunduze River/estuary	E	High	2	1	1	3	1	**6**	2	3	**11**	**4**	**44**	0.4	**17,6**	**L**	High
Dredging of the uMfolozi and uMsunduze	Improved water flow within the river	uMsunduze River/estuary	E	High	-4	-3	-4	-1	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-27**	**+**	Medium
	Increased water exchanged with the upper reaches of the uMfolozi and uMsunduze resulting in improved esturiane functioning and the recovery of estuarine dependent biota	uMsunduze River/estuary	E	High	-4	-3	-3	-3	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-27**	**+**	Medium
	A reduction in inundated habitat and wetland processes associated with improved drainage	uMsunduze River/estuary	E	High	3	1	3	4	2	**8**	2	3	**13**	**4**	**52**	0.6	**31,2**	**M**	Medium

Positive	**Negative**
Improve drainage of back-flooded regions	Drying of inundated wetland areas
Improve socio-economic benefits related to formal and informal farming.	Temporary scarring during operation time, for example the dredge spoil disturbing habitat in the short term.
The higher sediment loads will be concentrated near the mouth allowing for them to be scoured during breaching events.	Increased flow can result in higher sediment transport rates, which can imply that sediment will deposit in regions where the water velocity slows down.
Improve system connectivity upstream of the Lower uMsunduzi	Potential side effects that haven't been considered.

Aspect	Nature of impact	With/Without Mitigation	Magnitude (M)	Duration (D)	Probability (P)	Extent (E)	Significance (S) S=(M+D+E) x P	Proposed Mitigation
OVERALL DREDGE PHASE IMPACTS								
Removal of vegetation and dredging sediments within the Msunduzi River	***Direct Impact:*** Loss of instream habitats, marginal vegetation and disturbance to fauna	**Without Mitigation**	3	3	3	2	**24**	The following measures must be carried out to mitigate the disturbance of vegetation and dredging of sediments. i. The activity must be planned in advance with a well-method statement. ii. The operator of the equipment must be suitably experienced. iii. The activity must not take place during extreme weather conditions such as heavy rains and flooding events. iv. The activity must not take place if notifiable water quality impacts are observed (e v. The activity must not occur during dawn (04h00 to 06h00am) and dusk (17h00 to 19h00) to avoid vulnerable species which are likely to be more active during this period. vi. The activity should preferably occur when the benthic organism populations are lowest. An estuarine specialist should be consulted on this matter. vii. The dredger should be sprayed down before arrival on site to ensure any contaminants are removed. This will also prevent the accidental introduction of
		With mitigation	1	2	2	2	**10**	

								alien invasive species. viii. The dredger must be checked for any oil leaks before entering the site. ix. The turbidity of the channels must be measured before dredging activities begin. x. The stability of the channels must be monitored post dredging. Turbidity levels must return to background levels within 24 hours after the activity. Elevated levels may be symptomatic of sedimentation and erosion of the watercourse banks. xi. A comprehensive monitoring and rehabilitation programme should be initiated, which should be maintained during dredging, when impacts are anticipated to be most significant.A biomonitoring plan must be conducted before dredging and quarterly for 1 year post dredging. Indices which should be measured include water quality, invertebrates, and fish
	Cumulative Impact: Potential for cumulative impact on Dredging will disturb bottom sediments	**Without Mitigation**	3	2	2	3	**16**	The following measures must be carried out to mitigate the disturbance of watercourse area: • Work within the watercourse area must be strictly limited to the "dredge footprint" only.

	resulting in increased turbidities which can cause faunal disturbance. Other impacts may include soil compaction and the loss of benthic organisms.	**With Mitigation**	2	1	2	1	**8**	• The watercourse area must be rehabilitated as soon as the dredging has been completed.
	Direct Impact: Increase in sediment inputs and turbidity in the watercourse.	**Without Mitigation**	2	1	2	2	**10**	The following measures must be carried out to mitigate against erosion, siltation and turbidity. • The areas not within the direct project footprint must be demarcated as 'no-go' areas. The recommended buffer of 10m must be established prior to construction. • When erosion, is observed within the watercourse areas, effort must be made to prevent further erosion in that area. A turbidity curtain could be used if monitoring indicates turbidity to be high. • All areas upstream and downstream of the dredge footprint must be demarcated as a 'no-go' zone for the duration of the Dredge process.
		With mitigation	1	1	2	2	**8**	
	Direct Impact: Erosion in the watercourse and loss of material leading to sedimentation and deposition of material downstream of the affected watercourse.	**Without Mitigation**	2	2	2	2	**12**	
		With mitigation	1	1	1	1	**3**	

		With mitigation	2	1	2	1	**8**	No site staff are permitted to enter these areas. The recommended buffer of 10m must be implemented.
		With mitigation	1	2	1	1	**4**	
		With mitigation	2	1	1	3	**6**	

		With mitigation	2	3	1	2	**7**	
Employment opportunities	***Indirect Impact:*** This is a positive impact for the community through the potential creation of local employment.	**Without Mitigation**	1	1	1	1	**3**	This is a positive impact.
		With mitigation	1	1	1	1	**3**	
		With mitigation	2	2	2	1	**10**	
	Direct Impact: Excessive noise pollution on site.	**Without Mitigation**	3	2	2	1	**12**	• The dredge phase of the project will see the increase in vehicles moving through the area which will result in the increase of noise and disturbance to fauna. •
		With mitigation	2	2	2	1	**10**	

	Direct Impact: Hydrocarbon spills can occur through careless management of fuel operated machinery such as pumps and generators.	**Without Mitigation**	1	2	3	1	**12**	• All fuel storage areas must be located on hard surfaced areas and bunded to 110% capacity of the containers stored therein. • Drip trays must be used under all fuel operated machinery at all times, e.g., if refuelling taking place.
		With mitigation	1	2	1	1	**4**	
Generation, storage and disposal of waste during construction.	***Direct Impact:*** Improper storage of waste on site resulting in littering and impact on environment on site affecting surrounding community.	**Without Mitigation**	1	2	3	2	**15**	The dredge phase of the project will see an increase in workers on site and therefore an increase in waste in the area. • Littering will not be permitted in the study area; • Designated waste storage areas with appropriate waste receptacles must be set up within the dredge site camp; • Waste management will be controlled through the implementation of the EMMPr. This impact can be managed and mitigated.
		With mitigation	1	2	1	1	**4**	
	Direct Impact: Incorrect disposal of waste leading to pollution at the dump site or at sites where waste may be illegally disposed of.	**Without Mitigation**	1	2	3	2	**15**	• Waste will be removed from site and disposed of at a registered waste disposal site. • Safe disposal slips for the disposal of all waste must be obtained and kept on site as proof of safe disposal. • A registered waste removal contractor must remove sewage waste from site or sewage waste must be disposed of at a permitted Wastewater Treatment Site. • Safe disposal slips for the disposal of effluent waste must be obtained and kept on site as proof of safe disposal.
		With mitigation	1	2	1	1	**4**	
Dredge staff working on site	***Direct Impact:*** Dredge staff making use of the surrounding areas for ablutions, resulting in	**Without Mitigation**	2	2	3	2	**18**	The increase in dredge personnel during the dredge phase will require an appropriate number of toilet facilities for the site. The dredger should have its own onboard toilet.

	contamination of the environment.	**With mitigation**	1	2	1	1	**4**	• Appropriate and sufficient toilet facilities (1 toilet per 15 employees) must be provided by the contractor. • All toilet facilities must be checked on a daily basis. • All toilet facilities must be emptied and cleaned on a weekly basis. • All toilet facilities on site utilised by the dredge personnel must be checked on a daily basis and emptied on a weekly basis by the contactor.
Dredge work impacting properties outside the dredge footprint.	***Direct Impact:*** Damage to adjacent properties during operations.	**Without Mitigation**	2	3	2	2	**14**	The following mitigation measures must be adhered to: • All services must be identified prior to dredge through notifying surrounding stakeholders prior to any potential traffic congestion. • The contractor must create alternative access routes to the dredge area, where required. • Surrounding landowners and stakeholders must be notified prior to disruptive activities during construction. • Any infrastructure that gets removed must be replaced and any damage caused from dredge must be repaired.
		With mitigation	2	1	1	2	**5**	

Table 26. : Anticipated Environmental Impacts of Phase 1: Vegetation removal from the Msunduzi and Mfolozi channels, on the marine and estuarine environment: Dredge phase

No	Nature of Impact: Vegetation removal phase	Extent	Duration	Intensity	Probability	Consequence	Significance	Status	Confidence
1	Faunal mortalities from vegetation removal (habitat loss) **With mitigation** (repatriation of fauna found attached to vegetated matter)	Local Local	Short Short	**High** Moderate	Definite Definite	Low Very Low	Low Very Low	-ve -ve	High Medium
2	Mobilisation of sediments during vegetation removal increases turbidity, affects light penetration and causes faunal disturbance. **With mitigation** (removal on outgoing tide)	Local Local	Short Short	Moderate Moderate	Probable Probable	Very Low Very Low	Very Low Very Low	-ve -ve	Medium Medium
3	Water quality impacts – stirring up of accumulated bottom sediments may release nutrients, such as phosphorus, nitrogen and ammonia, and hydrogen sulphide into the water column, Oxygen depletion due to chemical and biological oxygen demand of the dredged material may cause mortality of biota within the site vicinity. **No mitigation suggested**	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium
4	Noise disturbance, ambient and in water column, human disturbance– affects aquatic and avi-fauna. On a positive note, noise could scare away dangerous creatures and therefore reduce risk to vegetation clearing staff. **No mitigation**	Local	Short	Moderate	Definite	Very Low	Very Low	-ve	Medium
5	Loss of plant communities (largely P*hragmites australis*) through active removal, could affect river prawn populations. **No mitigation for plant remova**l **With mitigation:** preferentially time plant removal during late autumn/winter to avoid river prawn disturbance	Local	Short	**High**	Probable	Low	Low	-ve	High
6	Trampling or vehicle damage to sensitive vegetation and faunal habitats during operations **With mitigation** (EMMPr to address to reduce)	Local Local	Short Short	Moderate Moderate	Probable Probable	Very Low Very Low	Very Low Very Low	-ve -ve	Medium Medium
7	Waste discharges during vegetation removal operations (e.g., fuel leaks (from boats or vehicles), litter)	Local	Short	Moderate	Possible	Very Low	Insignificant	-ve	Medium

	With mitigation (EMMPr to address to reduce)	Local	Short	Low	Possible	Very Low	Insignificant	-ve	Medium
8	Dumping of vegetation from channels onto the floodplain leads to redistribution back to channels & alterations to natural flow paths, increase in nutrients. **With mitigation –** all vegetation removed from site	Local Regional	Short-Medium Short	Moderate Low	Possible Definite	Very Low Very Low	Insignificant Insignificant	-ve +ve/-ve	Medium High
9	Erosion of channel margins and estuary banks due to vegetation removal **With mitigation** - retain vegetation along the banks to prevent bank erosion, ECO monitoring to manage/advise	Local Local	Short Short	Moderate Low	Possible Possible	Very Low Very Low	Insignificant Insignificant	-ve -ve	Medium Medium
10	Risk to employees of attack by hippos and crocodiles. **With mitigation** – staff to be made aware of the dangers; in this case, noise might be a positive impact/mitigation.	Local Local	Short Short	Moderate Low	Possible Possible	Very Low Very Low	Insignificant Insignificant	-ve -ve/+ve	Medium Medium

Table 27.: Anticipated Environmental Impacts of Phase 2: Dredging the Mfolozi sediment lobe, on the marine and estuarine environment: Dredge phase.

No	Nature of Impact: Dredging phase	Extent	Duration	Intensity	Probability	Consequence	Significance	Status	Confidence
1	Faunal mortalities from suction and/or disturbance by dredging equipment **No mitigation**	Local	Short	**High**	Definite	Low	Low	-ve	High
2	Fine sediment plumes and increased turbidity affects light penetration and causes faunal disturbance. **With mitigation** (turbidity curtain, dredge on outgoing tide)	Local Local	Short Short	**High** Moderate	Probable Probable	Low Very Low	Low Very Low	-ve -ve	Medium Medium
3	Water quality impacts – stirring up of accumulated bottom sediments may release nutrients, such as phosphorus, nitrogen and ammonia, and hydrogen sulphide into the water column, Oxygen depletion due to chemical and biological oxygen demand of the dredged material may cause mortality of biota within the site vicinity. **No mitigation suggested**	Local	Short	**High**	Probable	Low	Low	-ve	Medium
4	Noise disturbance, ambient and in water column and substratum, human disturbance – affects aquatic and avi-fauna.	Local	Short	Moderate	Definite	Very Low	Very Low	-ve	Medium

	No mitigation								
5	Trampling or vehicle damage to sensitive vegetation and faunal habitats during dredging operations	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium
	With mitigation (EMMPr to address to reduce)	Local	Short	Moderate	Probable	Very Low	Very Low	-ve	Medium
6	Waste discharges during dredger operations (e.g., oil leaks, litter)	Local	Short	Moderate	Possible	Very Low	Insignificant	-ve	Medium
	With mitigation (EMMPr to address to reduce)	Local	Short	Low	Possible	Very Low	Insignificant	-ve	Medium
7	Dumping of dredged spoil within the floodplain leads to habitat loss where the spoil is disposed of and alterations to natural flow paths.	Local	Short-Medium	Moderate	Probable	Low	Low	-ve	Medium
	With mitigation – spoil is disposed of offsite	Regional	Short	Low	Definite	Very Low	Very Low	+ve/-ve	High
8	Nutrients and pesticides may leach from the spoil dumpsite and contaminate the rivers and downstream area.	Regional	Short-Medium	Moderate	Possible	Medium	Low	-ve	Medium
	With mitigation – spoil is disposed of offsite	Regional	Short	Low	Definite	Very Low	Very Low	+ve/-ve	High
9	Erosion of channel margins and estuary banks due to dredging	Local	Short	Moderate	Possible	Very Low	Insignificant	-ve	Medium
	With mitigation retain vegetation along the banks to prevent bank erosion, ECO monitoring to advise/manage	Local	Short	Low	Possible	Very Low	Insignificant	-ve	Medium

Table 28 : Dredge phase: Impacts related to Phase 1 vegetation removal within hotspot areas

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
						Abiotic Habitat (Drivers)			Biota (Responses)											
			Name/s	PES	Ecological Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
CONSTRUCTION	Physical removal of vegetation within the uMsunduze River	Loss of instream habitats, marginal vegetation and disturbance to fauna	uMsunduze River/estuary	E	High	2	1	2	4	2	**8**	1	2	**11**	**4**	**44**	0.4	**17,6**	**L**	High
		Alien invasive species infestation	uMsunduze River/estuary	E	High	3	1	1	3	1	**6**	2	2	**10**	**4**	**40**	0.2	**8**	**L**	High
		Vegetation removal may stir up bottom sediments releasing stored nutrients into the water column. This may result in oxygen depletion and impact instream biota.	uMsunduze River/estuary	E	High	1	3	1	1	4	**8**	1	1	**10**	**4**	**40**	0.4	**16**	**L**	High
		Vegation removal may disturbed bottom sediments resulting in increased turbidities which can cause faunal disturbance	uMsunduze River/estuary	E	High	1	3	1	1	3	**6**	1	1	**8**	**4**	**32**	0.6	**19,2**	**L**	High
		Improved water flow within the river which may assist in mobalising built up sediments	uMsunduze River/estuary	E	High	-4	-3	-4	-1	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-28,8**	**+**	Medium
	Temporary ablution faciltiies for workers	Increased risk of water contamination and resultant water qualtiy issues	uMsunduze River	E	High	1	3	1	1	2	**6**	1	1	**8**	**4**	**32**	0.2	**6,4**	**L**	High

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
						Abiotic Habitat (Drivers)			Biota (Responses)											
			Name/s	PES	Ecological Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
OPERATIONAL	Disposal of the removed vegetation	Inappropriate disposal may lead to Phragmites reestablishing, increasing its distribution and outcompeting more diverse vegetation types.	uMsunduze River/estuary	E	High	3	1	1	4	1	**8**	1	3	**12**	**4**	**48**	0.6	**28,8**	**L**	High
		Removed Debris may also wash back into the channels during flooding causing blockages	uMsunduze River/estuary	E	High	3	1	1	1	2	**6**	1	2	**9**	**4**	**36**	0.6	**21,6**	**L**	Medium
	Physical removal of the instream vegetation at the identified hotspots	Improved water flow within the river which may assist in mobalising built up sediments	uMsunduze River/estuary	E	High	-4	-3	-4	-1	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-28,8**	**+**	Medium
		Increased water exchanged with the upper reaches of the uMfolozi and uMsunduze resulting in improved esturiane functioning and the recovery of estuarine dependent biota	uMsunduze River/estuary	E	High	-4	-3	-3	-3	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-28,8**	**+**	Medium

Table 29 : Dredge phase: Impacts related Phase 2 Dredging

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance max = 100	Risk Rating	Confidence level
			Name/s	PES	Ecological Importance	Abiotic Habitat (Drivers			Biota (Responses											
						Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
CONSTRUCTION	Dredging of vegetation and sediments within the uMsunduze River	Loss of instream habitats, marginal vegetation and disturbance to fauna	uMsunduze River/estuary	E	High	2	1	2	3	3	**6**	1	2	**9**	**4**	**36**	0.6	**21,6**	**L**	High
		Alien invasive species infestation	uMsunduze River/estuary	E	High	1	1	1	3	1	**6**	1	2	**9**	**4**	**36**	0.4	**14,4**	**L**	High
		The release of nutrients (phosphorous, nitrogen and ammonia) and other toxic chemicals stored within the sediment into the water column. This introduces pollutants into the environment and may result in oxygen depletion which would impact instream biota.	uMsunduze River/estuary	E	High	1	4	1	3	5	**10**	1	2	**13**	**4**	**52**	0.6	**31,2**	**M**	Medium
		Dredging will disturb bottom sediments resulting in increased turbidities which can cause faunal disturbance. Other impacts may include soil compaction and the loss of benthic organisms	uMsunduze River/estuary	E	High	2	3	2	2	5	**10**	1	2	**13**	**4**	**52**	0.8	**41,6**	**M**	High
	Creating access for the operational machinery	Watercourse habitat trampling, increased risk of erosion and sedimentation of the rivers	uMsunduze River/estuary	E	High	2	3	1	2	2	**6**	2	1	**9**	**4**	**36**	0.4	**14,4**	**L**	High
	Temporary ablution faciltiies for workers	Increased risk of water contaimantion and resultant water qualtiy issues	uMsunduze River/estuary	E	High	1	3	1	1	2	**6**	1	1	**8**	**4**	**32**	0.2	**6,2**	**L**	High
	Dumping of dredged spoil within the floodplain	Habitat loss within the floodplain where the spoil is disposed and alterations to natural flow paths	uMsunduze River/estuary	E	High	3	2	3	4	4	**8**	1	2	**11**	**4**	**44**	0.8	**35,2**	**M**	High

Phase	Activity	Impact	Potentially affected watercourses			Intensity of Impact on Resource Quality					Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance max = 100	Risk Rating	Confidence level
						Abiotic Habitat (Drivers			Biota (Responses											
			Name/s	PES	Ecological Importance	Hydrology	Water Quality	Geomorph	Vegetation	Fauna										
OPERATIONAL	Disposal of the dredged spoil within the floodplain	Potential for sediment runoff and refilling of the dredged channels	uMsunduze River/estuary	E	High	4	3	3	2	3	**8**	1	2	**11**	**4**	**44**	0.8	**35,2**	**M**	High
		Potential for the spread of alien invasive plant species	uMsunduze River/estuary	E	High	2	1	1	3	1	**6**	2	3	**11**	**4**	**44**	0.4	**17,6**	**L**	High
	Dredging of the uMfolozi and uMsunduze	Improved water flow within the river	uMsunduze River/estuary	E	High	-4	-3	-4	-1	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-27**	**+**	Medium
		Increased water exchanged with the upper reaches of the uMfolozi and uMsunduze resulting in improved esturiane functioning and the recovery of estuarine dependent biota	uMsunduze River/estuary	E	High	-4	-3	-3	-3	-4	**-8**	2	2	**-12**	**4**	**-48**	0.6	**-27**	**+**	Medium
		A reduction in inundated habitat and wetland processes associated with improved drainage	uMsunduze River/estuary	E	High	3	1	3	4	2	**8**	2	3	**13**	**4**	**52**	0.6	**31,2**	**M**	Medium

Impact of Increased Turbidity as a Result of Dredging Activities on Plant Communities.

Impact	Nature	Effect			Probability	Total Score	Significance
		Extent	Duration	Magnitude			
Without mitigation	Direct	2	1	6	4	36	Medium
With mitigation	Direct	2	1	2	3	15	Low

Operational Phase

Table 30. :Anticipated Environmental Impacts of Phase 1: Vegetation removal from the Msunduzi and Mfolozi channels, on the marine and estuarine environment: Operational phase.

No	Nature of Impact: post-vegetation removal phase	Extent	Duration	Intensity	Probability	Consequence	Significance	Status	Confidence
1	Lowering of water levels on lower floodplain and faster drainage after flooding	Regional	Medium - Long	Moderate	Possible	**High**	Medium	+ve	Low
2	Reduced backflooding to farmlands due to improved drainage allows for planting and harvesting of crops	Local	Short-Medium	Meduim	Possible	Low	Very Low	+ve	Low
3	Changes in water flow and sediments to a major delta distributary	Regional	Long	Moderate	Definite	**High**	**High**	-ve/+ve	Low
4	Reduction in inundated habitat and wetland processes	Regional	Medium-Long	Moderate	Possible	**High**	Medium	-ve/+ve	Low
5	Changed aquatic habitat in upper reaches of Mfolozi-Msunduzi flats due to improved water exchange; leads to recovery of estuarine-dependent biota	Regional	Medium - Long	Moderate	Possible	**High**	Medium	+ve	Low
6	Changes in zooplankton, benthos and fish species and abundance following vegetation removal	Regional	Short-Long	Moderate	Possible	**High**	Medium	-ve/+ve	Low
7	Improved estuarine function, leading to potential cessation of mangrove die-off and positive expansion of the mangrove forest and swamp forest zones	Regional	Medium - Long	Moderate	Possible	**High**	Medium	+ve	Low
8	Increased water flow through the Msunduzi and Mfolozi channels results in increased water flow to the estuary mouth, which may assist in maintaining an open mouth, improving estuarine function	Regional	Medium - Long	Moderate	Possible	**High**	Medium	+ve	Low
9	Increased silt to ocean when mouth open **Mitigation:** Improved catchment management upstream to prevent undue amounts of silt being washed down rivers.	Regional Regional	Short-Long Short-Long	Moderate Moderate	Probable Possible	**High** **High**	**High** Medium	-ve/+ve +ve/-ve	Medium Medium

10	Increased silt to estuary when mouth closed. **Mitigation:** Improved catchment management upstream reduces silt load; artificially open the estuary mouth	Regional Regional	Short-Long Short-Long	Moderate Moderate	Probable Possible	**High** **High**	**High** Medium	-ve +ve/-ve	Medium Medium
11	Potential for vegetation to recolonise and accumulate within the channels again, leading to backflooding. **Mitigation:** channels monitored for regrowth of vegetation and flood debris; clear ASAP	Regional Regional	Medium-Long Medium-Long	Moderate Low	Possible Probable	**High** Medium	Medium Medium	-ve -ve/+ve	Low Low
12	Backflooding during large flood events will not be significantly reduced. **Mitigation:** Regular monitoring and maintenance of vegetation in the channels may facilitate more speedy drainage of the floodplain post-flood; Improved catchment management upstream reduces silt load	Regional Regional	Short-Long Short-Long	**High** Moderate	Possible Possible	**Very High** **High**	**High** Medium	-ve -ve	Medium Low

Table 31 : Anticipated Environmental Impacts of Phase 2: Dredging the sediment lobe from the Msunduzi channel, on the marine and estuarine environment: Operational phase.

No	Nature of Impact: Post-dredging phase	Extent	Duration	Intensity	Probability	Consequence	Significance	Status	Confidence
1	Lowering of water levels on lower floodplain and faster drainage after flooding	Regional	Long	Moderate	Possible	**High**	Medium	+ve	Low
2	Projected relief of backflooding to farmlands allows for planting and harvesting of crops	Local	Short-Medium	Medium	Possible	Low	Very Low	+ve	Low
3	Changes in water flow and sediments to a major delta distributary	Regional	Long	Moderate	Definite	**High**	**High**		Low
4	Reduction in inundated habitat and wetland processes	Regional	Medium-Long	Moderate	Possible	**High**	Medium	-ve/+ve	Low

5	Changed aquatic habitat in upper reaches of Mfolozi-Msunduzi flats due to increased water exchange; leads to recovery of estuarine-dependent biota	Regional	Medium - Long	Moderate	Possible	**High**	Medium	+ve	Low
6	Changes in zooplankton, benthos and fish species and abundance following dredging	Regional	Short-Long	Moderate	Possible	**High**	Medium		Low
7	Improved estuarine function leads to potential cessation of mangrove die-off and positive expansion of the mangrove forest and swamp forest zones	Regional	Medium - Long	Moderate	Possible	**High**	Medium	+ve	Low
8	Increased water flow through the Msunduzi channel results in increased water flow to the estuary mouth, which may assist in maintaining an open mouth, improving estuarine function	Regional	Medium - Long	Moderate	Possible	**High**	Medium	+ve	Low
9	Increased silt to ocean when mouth open **Mitigation:** improved catchment management upstream to prevent undue amounts of silt being washed down rivers.	Regional Regional	Short-Long Short-Long	Moderate Moderate	Probable Possible	**High** **High**	**High** Medium	-ve/+ve +ve/-ve	Medium Medium
10	Increased silt to estuary when mouth closed. **Mitigation:** Improved catchment management upstream reduces silt load; artificially open the estuary mouth	Regional Regional	Short-Long Short-Long	Moderate Moderate	Probable Possible	**High** **High**	**High** Medium	-ve +ve/-ve	Medium Medium
11	Potential for dredge spoil runoff refilling the dredged channels. **Mitigation:** Ensure dredge spoil dump site is sufficiently away from potential run-off into dredged channels	Local Local	Short-Medium Short-Medium	Moderate Moderate	Possible Possible	Low Low	Very Low Very Low	-ve -ve	Low Low
12	Potential for sediments to eventually accumulate within the channels again, leading to backflooding. **Mitigation:** Channels to be monitored for vegetation growth and sediment accumulation, maintenance dredging might be required	Regional Regional	Medium-Long Medium-Long	Moderate Low	Possible Probable	**High** Medium	Medium Medium	-ve -ve/+ve	Low Low
13	Backflooding during large flood events will not be significantly reduced.	Regional	Short-Long	**High**	Possible	**Very High**	**High**	-ve	Medium

	Mitigation: Regular monitoring and maintenance of channels may facilitate more speedy drainage of the floodplain post-flood; Improved catchment management upstream reduces silt load	Regional	Short-Long	Moderate	Possible	**High**	Medium	-ve	Low

Table 32: Vegetation impacts: Operational phase:

Impact assessment of the potential loss of vegetation communities within the proposed clearing and dredging areas.

Impact	Nature	Effect			Probability	Total Score	Significance
		Extent	Duration	Magnitude			
Without mitigation	Direct	2	5	6	5	65	High
With mitigation	Direct	1	5	0	5	30	Medium

Impact assessment of the proliferation of alien invasive plant species within the study area.

Impact	Nature	Effect			Probability	Total Score	Significance
		Extent	Duration	Magnitude			
Without mitigation	Direct	3	5	8	4	64	High
With mitigation	Direct	1	5	2	3	24	Medium

Impacts Associated with Decreased Backflooding

Impact	Nature	Effect			Probability	Total Score	Significance
		Extent	Duration	Magnitude			
Without mitigation	Direct	3	3	6	4	48	Medium
With mitigation	Direct	3	2	2	3	21	Medium

8. STUDY FINDINGS AND CONCLUSIONS

8.1 ENVIRONMENTAL IMPACT STATEMENT

8.1.1. IMPACT SUMMARY

Potential environmental impacts [biophysical and social] associated with the Proposed Vegetation Clearance and Dredging within the Msunduzi Channel has been identified herein. This BA process assesses and addresses all potentially significant environmental issues to provide the Department of Forestry, Fisheries and the Environment (DFFE) with sufficient information to make an informed decision regarding the proposed project.

Table 29: Summary of Impacts

Impact	Significance without mitigation	Significance with mitigation
Watercourse ecology	Medium	Low -
fauna and flora	Low-Medium	Low -
Noise and air quality	Low	Low -
Waste management	Low-Medium	Low -
Heritage	Low	Low -
Soil and erosion	Low-Medium	Low -
Socio-economic safety and security	Low	Medium +

Table 30: Consolidated impacts and significance ratings

IMPACT	SIGNIFICANCE (before mitigation)	SIGNIFICANCE (after mitigation)
MAINTENANCE PHASE		
Alteration to water quality	**MODERATE**	**LOW**
Increase in mobilized sediment (turbidity)	**MODERATE**	**LOW**
Mobilised pollutants attached to sediments. Can cause the resuspension of sediments. This may increase the levels of nutrients available to marine organisms.	**LOW**	**LOW**
Bioaccumulation of contaminants within the water column affecting aquatic species	**LOW**	**LOW**
Release of hydrocarbons into water and within the soil which can be toxic to intolerant aquatic species	**MODERATE**	**LOW**
Increase in Suspended Particulate Matter (SPM) negatively affects visual predators such as fish and birds	**LOW**	**LOW**
Suspended particles, released into the water column from the disposal of dredge sediments, can decrease water transparency and release nutrients and hazardous substances affecting marine organisms, e.g., inorganic nutrients, heavy metals, and organic contaminants.	**LOW**	**LOW**
Affects photosynthesis in aquatic plants as well as interfering with the feeding mechanisms of some aquatic organisms too, causing harm at multiple levels in the food chain.	**LOW**	**LOW**

Use of dredger on land may cause diversion or flows	**MODERATE**	**MODERATE**
Removal of Phragmites may increase flows through systems	**LOW**	**LOW**
Removal of native species and outcompeting by invasive species	**LOW**	**LOW**
Suffocation of submerged vegetation from sediment	**LOW**	**NEGLIGIBLE**
-Alteration to nutrient cycling and productivity as well as light penetration affecting plant composition and richness.	**LOW –**	**LOW –**
Suffocation of benthic communities from spoil	**LOW –**	**LOW –**
Compaction of soils from dredger within wetlands	**MODERATE –**	**MODERATE**
Alteration to gradient from aggradation and degradation processes	**LOW–**	**LOW –**
Dust Creation	**LOW**	**NEGLIGIBLE**
Noise disturbance, ambient and in water column, human disturbance– affects aquatic and avi-fauna.	**MEDIUM**	**LOW –**
Impact on Archaeological Remains	**LOW –**	**NEGLIGIBLE –**
Impact on Paleontological Resources	**LOW –**	**NEGLIGIBLE –**
Impacts Resulting from Material Stockpiling	**LOW**	**MODERATE**
OPERATIONAL PHASE		
Removal of vegetation will mobilise sediment and reduce water quality. Turbid waters may suffocate benthic species . (**vegetation clearing**):	**MODERATE**	**LOW –**
Fish species are less likely to be impacted due to their ability to vacate an area which is experiencing disturbance. Benthic organisms are also more likely to be buried within the spoilwhich will be discharged in large quantities in the designated area. (**dredging**):	**LOW**	**LOW**
Aggradation and degradation processes will alter the gradient affect downstream hydrology and geomorphology. (Vegetation phase)	**LOW –**	**NEGLIGIBLE–**
The operation of the machinery within and along the channel banks may result in bank erosion and trampling of marginal or instream vegetation. The spoil which is deposited within the floodplain may be redeposited into the channel during flooding events or extreme high tides. This will result in increased turbidity, smothering of submerged vegetation and habitats and the potential contamination of water resources if the spoil has been contaminated with agrochemicals. (Dredging)	**LOW –**	**LOW -**
Trampling or vehicle damage to sensitive vegetation and faunal habitats during dredging operations (EMMPr to address to reduce)	**LOW**	**LOW**
Clearing Phragmites within the channel will improve flow of water through systems which may increase flows and alter aquatic habitat that has been adapted to infrequent or periodic saturation. (vegetation clearing):	**MODERATE**	**LOW–**
Toxic spills potentially result in fatalities of aquatic fauna sensitive to water quality changes, leading to a further shift in species composition, favouring tolerant species. During the dredging process, bottom sediments will be disturbed and resuspended. This will result in temporary increases in turbidity during the dredging process and for a short period after the activity. (dredging)	**MODERATE**	**MODERATE–**

8.1.2. KEY FINDINGS OF THE STUDY

Overall, the results of the BA process emerge as having a "***negative low***" environmental significance after mitigation. The socio-economic impacts are however strongly positive, in that the development will result in safe conditions for the receiving community.

8.1.3. KEY CONCLUSIONS AND RECOMMENDATIONS OF THE SPECIALIST STUDIES

8.1.3.1. VEGETATION ASSESSMENT STUDY

Removal of Phragmites australis dominated reedbeds.

Phragmites australis has become one of the most widespread aquatic species present within this system and its ability to spread has been linked to the presence of excess sediment within both rivers and the estuary, as well as the suitable salinity levels, both within the soils, and above, within the water column. Historically, and before joining the St Lucia to the uMfolozi-Msunduzi system, both the uMfolozi and Msunduzi Rivers were wide, with colonies of *P. australis* being confined to the edges of the channel and were absent in areas. Whereas St Lucia was already associated with large communities of *P. australis*, especially in proximity to the mouth, the "Link Channel" and the "Back Channel".

Typically, the best time to control *P. australis* would be during the growing phase (mid-spring to late summer) and the translocation phase (late summer to mid-autumn). Where possible, removal should at least be below the waterline (presumably to be performed at low tide) to ensure that the diebacks of each stand are longer lasting and more likely to be effective. Cut material should be collected after each clearing event to prevent possible regrowth from stems. Within both rivers, it is recommended that a schedule for removing vegetation from the channel is devised, and then further improved, based on the observations made between the dredging and clearing events. Depending on the rate of sediment deposition, as well as the level of salinity within the dredging area, these populations may either die back over the next decade or will continue to grow and occupy the dredged channel. This is keeping in mind that this species has the ability to grow up to 5 m or more by horizontal runners (Russel *et al* 1990). However, the specialist is of the opinion that should the channel be maintained at a sufficient depth, and that the mouth remains open for long enough periods of time, the *P. australis* will start to "thin out" along the tidal areas of both rivers, and parts of the beach channel. It is theorised that flushing of the system with substantially increased salinity could limit this growth over time (Adams and Bate, 1994). Outside of South Africa, the application of herbicides, such as glyphosate or imazapyr have proved effective in vegetation removal, followed by a secondary application, using mechanical means, such as cutting to remove the standing dead biomass (Yuckin, *et al.* 2022). However, the application of herbicides within this system is not recommended and may have more significant impacts on the ecosystem.

As mentioned above, the failure to collect cleared (fresh) stalks may result in exacerbating regrowth downstream. It is recommended that solutions to burning and/ or simply dumping material should be investigated. The establishment of a community compost site could be investigated. Where cleared plant material may be composted and sold to local farmers at a reduced price and used to fund alien invasive plant control or rehabilitation of the system to through the introduction of indigenous plant species. The compatibility of the material for composting should first be investigated (e.g., disease, pathogens,

chemicals found within the reeds etc.). Mixing of suitable dredged material at this site could also be investigated.

8.1.3.2. MARINE IMPACT ASSESSMENT

A number of environmental impacts caused by the proposed vegetation removal and dredging of accumulated sediments from the river channels have been identified. The proposed Phase 1, removal of vegetation (only) blocking the river channels, will have a lower intensity and overall environmental impact than dredging (proposed as Phase 2) and should be undertaken first. Should the vegetation removal, undertaken as Phase 1, facilitate sufficient throughflow in the channels to drain the back flooded areas, the more costly (in terms of environment and financial) dredging activity could possibly be avoided. If monitoring (after vegetation removal) indicates the sediments are still blocking the channels, preventing drainage of the Mfolozi flats farmland areas, then dredging will be required. Dredging impacts marine organisms negatively through entrainment, habitat degradation, noise, turbidity and remobilization of contaminants and sedimentation. In both cases, it is recommended that the St Lucia estuary mouth is maintained open in order to facilitate out flow of sediments that might be mobilised through vegetation removal and dredging activities.

Owing to the influence of the activities being confined to a localised area (where the activity is taking place), most of the dredge phase impacts were calculated to be of low to very low consequence and insignificant to low significance. However, during the operational phase the dredging of the Msunduzi channels potentially has more widespread and longer-lasting impacts, resulting in higher consequences of mostly medium to high significance. These can be reduced by following the recommended mitigations, which can be incorporated into the EMMPr. The anticipated impacts and mitigations are provided in detail in the specialist report and are tabulated in Tables 18, 19, 22 and 23 of this report.

Every anthropogenic intervention to the St Lucia-Mfolozi/Msunduzi system has had consequences, but experience has proven that the best way to inform management is to monitor, as it is only by monitoring that environmental system responses can be adequately evaluated to improve management. We don't necessarily know all the impacts and what the system responses might be, which is why in many cases there is low confidence in the impact categories. The environment isn't always predictable. It is recommended that a scientifically robust monitoring programme is undertaken before, during and after the dredging to scientifically evaluate the system responses to the proposed interventions.

Whether the channels will remain free of excessive sediment and vegetation growth over the medium to long term is unknown; this will require additional monitoring. However, considering that flood waters and associated sediments are carried through the Mfolozi and Msunduzi and deposited within the lower reaches, it is possible that sediments will eventually accumulate within the channels again.

8.1.3.3. AQUATIC IMPACT ASSESSMENT

Aquatic ecosystems, including wetlands, estuaries and rivers, are particularly vulnerable to human activities and these activities can often lead to irreversible damage or longer term, cumulative changes to these ecosystems. When making inferences on the impact of project activities on aquatic ecosystems, it is important to understand that these impacts speak specifically to their effect on the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) and ecosystem goods and services. All of these are linked to the physical components and processes of aquatic ecosystems, namely, hydrology, geomorphology, vegetation and the biota that inhabit these ecosystems (Macfarlane et al., 2014).

i. **Dredging mitigation measures (to be incorporated into the EMPr)** The activity must be planned in advance with a well-constructed method statement.
ii. The operator of the excavator must be suitably experienced.
iii. The activity must not take place during extreme weather conditions such as heavy rains and flooding events.
iv. The activity must not take place if notifiable water quality impacts are observed (e.g., sewage contamination).
v. The activity must not occur during dawn (04h00 to 06h00am) and dusk (17h00 to 19h00) to avoid vulnerable species which are likely to be more active during this period.
vi. The activity should preferably occur when the benthic organism populations are lowest. An estuarine specialist should be consulted on this matter.
vii. The excavator should be sprayed down before arrival on site to ensure any contaminants are removed. This will also prevent the accidental introduction of alien invasive species.
viii. The excavator must be checked for any oil leaks before entering the site.
ix. The turbidity of the channels must be measured before dredging activities begin.
x. The stability of the channels must be monitored post dredging. Turbidity levels must return to background levels within 24 hours after the activity. Elevated levels may be symptomatic of sedimentation and erosion of the watercourse banks.
xi. A comprehensive monitoring and rehabilitation programme should be initiated, which should be maintained during dredging, when impacts are anticipated to be most significant.
xii. A biomonitoring plan must be conducted before dredging and quarterly for 1 year post dredging. Indices which should be measured include water quality, WET-Health, invertebrates, and fish.

Dredge Footprint Limit & Demarcation

xiii. The operational footprint must be demarcated, and movement restricted to this area. (This includes the 10 vegetation hotspot areas requiring removal and the demarcated area for sediment removal). All sensitive areas outside of the operational footprint must be avoided.

xiv. Sensitive habitat along the watercourses, such as woody communities, must not be removed.

xv. Laydown, site offices and other storage areas must be clearly demarcated and located outside of the boundary of any riverine or wetland habitat, ideally on flat surfaces.

xvi. The use of existing access routes to the river channels must be prioritized as far as possible.

Soil Erosion and Sedimentation Control Measures

xvii. Sediment barriers should be installed in areas sensitive to erosion such as near water supply points, slopes, actively eroding streambanks or recently disturbed streambanks. These measures include but are not limited to - the use of sandbags, hessian sheets, silt fences, geotextiles, rock gabions, etc.

xviii. The silt fence / curtain must be maintained regularly to ensure continual functionality during the dredge phase.

xix. After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded.

xx. Unnecessary clearing of natural areas should be kept to a minimum in order to make use of natural erosion suppressors.

Pollution Prevention Measures

xxi. Any soil contaminated by hydrocarbons (fuel and oils), or grease must be removed, and the affected area rehabilitated immediately.

xxii. Fuels, chemical and binding agents must be stored in a bunded structure with a roof. The bund must be able to contain at least 110% of the volumes of fuel.

xxiii. Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface.

xxiv. Drip trays should be utilised at all dispensing areas.

xxv. A chemical spill kit must be always present onsite and once used it must be disposed of at a registered hazardous landfill site.

xxvi. All solid waste must be collected and placed in bins.

Invasive Alien Plant Control

xxvii. The control and eradication of listed invasive species must be carried out in areas that are disturbed directly during the project activities, using methods that are appropriate for the species concerned and the environment within which it occurs.

xxviii. All invasive alien plants must be removed from the dredge footprint.

xxix. Mechanical control methods such as digging, hoeing, pulling out of weeds and invasive plants are recommended.

xxx. Use of chemical treatment methods must be kept to a minimum.

xxxi. Where chemical treatment methods are used, the contractor must ensure the utilisation of watercourse friendly herbicides.

xxxii. The methods employed to control and eradicate a listed invasive species must also be directed at the new growth, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

Disposal of removed vegetation.

i. Removed vegetation must be disposed of outside of the recommended 60 m watercourse buffer. This will reduce the likelihood of debris being washed into the channels during flooding events, resulting in blockages within the channels.

ii. It is recommended that the removed vegetation is stored in bags, left to dry out and then burnt, or taken to a municipal disposal site. Shredding the reeds into mulch which can be easily scattered within the floodplain may also be an option. However, if shredding is not done effectively, the Phragmites stands may reestablish from the redispersal of the seeds or stolon fragments from the rhizome. Therefore, burning or removal offsite should be preferred.

iii. Disposal methods must be investigated and comply with all environmental legislation and the regulations of the iSimangaliso Wetland Park.

iv. All necessary permits must be obtained to undertake the chosen disposal method (e.g., air emissions permit should burn of removed vegetation be considered).

Recommendations and Monitoring

It is recommended that vegetation clearing and removal of all debris blocking the Msunduzi and the uMfolozi channels first be conducted prior to any dredging activities. The removal of vegetation may improve water flow in the channels and possibly assist in the mobilisation of the accumulated sediments. This option will have lower environmental impacts and will be a lower cost intervention compared to dredging.

Should Phase 1 provide no relief to backflooding, dredging of the Msunduzi has been proposed. Before the dredging activities are to commence, adequate environmental information for the study site must be collected. This includes:

i. How much material is to be removed.

ii. Description of the bottom sediments which are to be dredged.

iii. Description of the sediments/ grain size in the disposal site.

iv. Hydraulic information for the watercourses and surrounding area (e.g depth, tidal amplitude, flood history).

v. Elevation of the proposed disposal area.

vi. Types and extent of vegetation in the disposal area.

vii. A description of the benthic communities within the watercourses.

viii. A description of the demersal fish species which may utilise the watercourses (particularly important as nursery grounds).

ix. The concentration of heavy metals, Chemical Oxygen Demand, Biological Oxygen Demand, oils and greases and nutrients within the dredged material.

x. The ambient water quality of the watercourses (Dissolved oxygen, pH, salinity, turbidity); and

xi. Weather and climate conditions for the area (particularly important for flooding events which may resuspend deposited spoil) (Wetzel et al., 1976)

Additionally, the following measures must be implemented **post activity** to mitigate against any impacts:

i. After the completion of the activity the stability of the banks must be monitored. Banks and any disturbed wetland areas must be rehabilitated and revegetated.

ii. The turbidity of the uMfolozi and Msunduzi Rivers must be monitored before and after the activity. If the turbidity does not return to background (pre-activity) levels within three days after the activity a more intensive monitoring programme must be implemented to evaluate the effect of the activities on the turbidity loads and associated impact of this elevated turbidity to the system.

iii. A biomonitoring plan must be implemented for 1 year post dredging. If indices depict potential impacts from the dredging operations, additional management initiatives or actions may be necessary.

The uMfolozi-St Lucia system has been subjected to dredging and spoil dumping previously which only resulted in a decrease in the estuarine state and functionality (Bate et al., 2011). The deposition of the dredged material on the floodplain, as planned, is therefore not supported. Considering that the proposed activities are to occur within a Protected Area and World Heritage site, it is recommended that the dredged material be removed from the site and used or deposited in areas outside of the Estuarine Functional Zone. If deposition is not possible outside of the EFZ, the spoil should be placed at least 60 m away from the watercourse channels and avoid any sensitive areas (refer to the terrestrial and estuarine report for details regarding sensitive areas). It is recommended that the spoil is spread out over the identified disposal site to best prevent any sediment runoff into the channel.

8.1.3.4 WETLAND FUNCTIONALITY

The impacts associated with the proposed channel clearing and dredging were deemed to be moderate to low with mitigation. Low risks were associated with the vegetation removal and moderate risk impacts were associated more with the dredging activity and dumping of the spoil within the floodplain. Impacts from dredging would include habitat loss, increased sedimentation, smothering of benthic organisms, changes in flow, and resuspension of contaminants (if available). A positive outcome of this activity would

be an improvement in natural water flow from the channel to the estuary mouth and the transfer of sediments as water moves back and forth (Bate et al., 2011). As a result, ecological functioning and processes may improve which would be beneficial for invertebrate and fish species.

Potential adverse impacts to aquatic resources were identified. Although mitigation measures can be implemented to reduce their significance, the nature of the dredging operation will always be regarded as highly disruptive. This is particularly prevalent for the site in question, which is an important conservation area, which has already been subjected to numerous anthropogenic pressures. The proposed activities are obliged to maintain the ecological state of the system and conform to the Resource Quality Objectives.

Importantly, the report hghlights that safe disposal of invasive Phragmites is required to prevent proliferation and recolonization, as *Phragmite*s can resprout from stems. The report recommends that the heads of stems should be removed and placed into a black bag to prevent dispersal of seeds. Cleared vegetation should be stockpiled and monitoring is essential.

If deposition of dredge spoil is not possible outside of the EFZ, the spoil should be placed at least 60 m away from the watercourse channels and avoid any sensitive areas. It is recommended that the spoil is spread out over the identified disposal site to best prevent any sediment runoff into the channel.

Continuous monitoring of the system is recommended to ensure long term solutions are reached that hold both ecological and social benefits.

8.1.3.5 PALAEONTOLOGY

If any fossils are found, a Palaeontologist must be notified immediately by the ECO and/or EAP and a site visit must be arranged at the earliest possible time with the Palaeontologist.

In the case of the ECO or the Site Manager becoming aware of suspicious looking palaeo-material:

- The dredge must be halted in that specific area and the Palaeontologist must be given enough time to reach the site and remove the material before excavation continues.
- Mitigation will involve the attempt to capture all rare fossils and systematic collection of all fossils discovered. This will take place in conjunction with descriptive, diagrammatic and photographic recording of exposures, also involving sediment samples and samples of both representative and unusual sedimentary or biogenic features. The fossils and contextual samples will be processed (sorted, sub-sampled, labelled, and boxed) and documentation consolidated, to create an archive collection from the excavated sites for future researchers.

8.1.3.6 AGRICULTURAL STATEMENT

The agricultural impact of the proposed activity is assessed as being acceptable because it results in zero loss of future agricultural production potential. From an agricultural impact point of view, it is recommended that the activity be approved. The conclusion of this assessment on the acceptability of the proposed activity and the recommendation for its approval is not subject to any conditions (Lanz, 2024). The full report is available in Appendix E.

8.2. THE EAP OPINION

This dBAR provides an assessment of the potential benefits and negative impacts anticipated by the proposed vegetation clearing of the Msunduzi and Mfolozi channels and drainage canals on the uMfolozi flats (Phase 1) and the dredging of sediments blocking the lower Msunduzi River (Phase 2).

Based on the findings of the environmental impact assessment, there is unlikely to be any significant negative environmental impacts and socio-economic benefits are evident. Owing to the influence of the activities being confined to a localised area (where the activity is taking place), most of the dredge phase impacts were calculated to be of low to very low consequence and insignificant to low significance. However, during the operational phase the dredging of the Msunduzi channels potentially has more widespread and longer-lasting impacts, resulting in higher consequences of mostly medium to high significance – many of these were positive impacts. Any negative impacts can be reduced by following the recommended mitigations, which can be incorporated into the EMMPr.

The proposed Phase 1, removal of vegetation (only) blocking the river channels, will have a lower intensity and overall environmental impact than dredging (proposed as Phase 2) and should be undertaken first. Should the vegetation removal, undertaken as Phase 1, facilitate sufficient throughflow in the channels to drain the backflooded areas, the more costly (in terms of environment and financial) dredging activity could possibly be avoided. If monitoring (after vegetation removal) indicates the sediments are still blocking the channels, preventing drainage of the Mfolozi flats farmland areas, then dredging (Phase 2) will be required. Dredging impacts marine organisms negatively through entrainment, habitat degradation, noise, turbidity and remobilization of contaminants and sedimentation.

In both cases, it is recommended that the Mfolozi/St Lucia estuary mouth is maintained open in order to facilitate out flow of sediments that might be mobilised through vegetation removal and dredging activities.

The **no-go alternative** would lead to the dominance of opportune species and land use activities that would have significant socio-economic impacts on a local economy already under significant pressures. It also would mean that land, in significant quantities, is likely to be abandoned and not managed. Falling

outside of the ISimangaliso Wetland Park Authority, this would have further negative impacts such as the proliferation of alien invasive plants species that are currently widespread in the area.

The proposed **dredge spoil site** on the Maphelane (south) side of the Msunduzi River was proposed as a desktop exercise and will require on-site evaluation to determine the suitability of this site for the disposal of dredged sediments, considering possible impacts on the existing vegetation, dune environment, estuary and its functional zone.

Likewise, the **disposal options for vegetation** removed from the river channels requires careful consideration. The option to use the vegetation as fertilizer on the agricultural lands need to be assessed. However, bigger trees, logs and branches will not be suitable for this purpose, therefore the option of stockpiling these for removal from site or burning stockpiles on site needs to be assessed.

Mitigation measures contained herein have been informed by the extent, nature, duration, and probability of impacts identified. Implementation of mitigation measures and conditions of the Environmental Management Programme appended to this document, which is intended for the management of the impacts of the dredge phase and operational phase, will result to minimal impacts attributed to the proposed project. Assessment findings, therefore, present no fatal flaws; the development will have long term positive impacts than negative impacts, the latter of which are short termed.

The following **recommendations / conditions**, although not exhaustive, may be considered for inclusion in the environmental authorisation:

- An Environmental Control Officer (ECO) must be appointed to oversee the conditions of the Environmental Authorization are carried out properly.
- Predredge environmental awareness training must be provided to all dredge staff on site.
- The area of operation should be clearly demarcated; works outside the "dredge footprint" is prohibited.
- All dredge vehicles should adhere to clearly defined and demarcated roads.
- Erosion management should be an integrated component of the operations and monitoring for erosion of channel margins is recommended.
- All hazardous materials should be stored appropriately to prevent contamination of the project site. Any accidental chemical, fuel and oil spills that occur at the project site should be cleaned up appropriately as related to the nature of the spill; significant spills to be reported to the relevant department.
- Sensitive areas should be marked as no-go areas and entry to such areas should be prohibited.

- Any animal fatalities (intentional or accidental) must be reported to the ECO and an incident report compiled.
- Control measures must be put in place by the Contractor to prevent dredged sediments from smothering nearby vegetation and entering the nearby riparian ecosystem outside of the operational footprint.
- The appointed Contractor responsible for completing the development must be legally responsible for complying with the approved EMMPr and EA.
- The Contractor must include environmental topics within the toolbox talks at least once a month and should be made aware of the protected plant species and faunal species located nearby.
- Lifesaving equipment (i.e., torpedo buoy and/or rescue lifebuoy) is to be made available on the dredger and on any vessel that may be used for vegetation clearing of the river channels.
- Staff employed to work from vessels in the river channels are to be provided with adequate safety equipment, e.g., lifejackets/buoyancy aids; no gumboots to be worn.
- All natural habitats found outside the operational area must remain untouched, and listed as a no-go area, unless for management and maintenance purposes or accessing the site.
- Due to the presence of wild animals, no activities should take place during the early morning or evening unless authorised and monitored by the ECO.

It is the EAP's opinion that the proposed development should receive a favourable outcome for the Environmental Application lodged with the Competent Authority (CA), provided that the conditions and mitigation techniques set out in this report are carefully implemented by the Applicant throughout the project lifecycle.

8.3 CONCLUSION

This study provided a quantified analysis of the impacts associated with the proposed development. The EAP is of the opinion that the project should be positively authorised, outlining the key findings of the study. The BA process and report complies with the EIA Regulations of 2014 [as amended in 2017], under which this project has applied and therefore meets all relevant requirements.

8.4 RECOMMENDATIONS

8.4.1 RECOMMENDATIONS TO THE CA

It is the EAP's opinion that the application be assessed holistically, taking into consideration the study area and need for backflooding relief. The impacts associated with the proposed developments are significantly low. There are no other layout and site alternatives recommended, as these are the affected areas that require intervention.

The project, in the EAP's opinion, does not pose a significant detrimental impact on the receiving environment and its inhabitants and can be mitigated to acceptable levels. Therefore, the proposed development should receive a favourable outcome for the Environmental Application lodged with the Competent Authority (CA), provided that the conditions and mitigation techniques set out in this report are carefully implemented by the Applicant throughout the project Lifecycle.

The Applicant should be bound to stringent conditions to maintain compliance and a responsible execution of the project. Operational phase monitoring is specified in this dBAR; and it is the duty of the Applicant to ensure this is applied.

8.4.2 RECOMMENDATIONS TO THE APPLICANT

The Applicant must adhere to the recommendations provided by the specialist and the EAP. The EMMPr details these recommendations. The Applicant must take full responsibility for the execution of the project in a manner which does not negatively impact on the environment by ensuring that responsible decisions are made.

9 REFERENCES

Adams, J. B., Bate, G. C. (1994). The ecological implications of tolerance to salinity by Ruppia cirrhosa (Petagna) Grande and Zostera capensis Setchell. *Botanica Marina*, 37, 449–456.

Corbella, S., Pringle, J. & Stretch, D.D. 2015. Assimilation of ocean wave spectra and atmospheric circulation patterns to improve wave modelling, *Coastal Engineering* 100 (2015) 1–10.

De Carvalho, C. 2024. *Watercourse Habitat Functionality and Impact Assessment: Proposed Dredging of the Msunduzi River and Beach Channel, near the St Lucia Estuary, KwaZulu-Natal, South Africa*, Afzelia Environmental Consultants, for Indaloenhle Environmental Consultants.

Guastella, L.A. 2023. *Marine Specialist Report for Proposed Dredging of the Msunduzi River and Beach Channel*, for Indaloenhle Environmental Consultants, on behalf of iSimangaliso Wetland Park Authority, revised January 2024.Independent Panel of Experts, 2022. *Review of the Scientific Basis for Breaching the Mouth of the Lake St Lucia Estuary*, on behalf of DFFE, 138pp.

Illenberger, W. & Clark, B.M. 2014. Review of sediment dynamics. Vol II. In: Clark, B.M & Turpie, J.K. (eds) *Analysis of alternatives for the rehabilitation of the Lake St Lucia estuarine system*. Anchor Environmental Consultants Report No. AEC/1487/2 submitted to iSimangaliso Wetland Park Authority.

Independent Panel of Experts, 2022. *Review of the Scientific Basis for Breaching the Mouth of the Lake St Lucia Estuary*, on behalf of DFFE, 138pp.

iSimangaliso Wetland Park Authority, 2020. *iSimangaliso Wetland Park Integrated Management Plan* (2022-2031).

Lanz, J. 2024. *SITE SENSITIVITY VERIFICATION AND AGRICULTURAL COMPLIANCE STATEMENT FOR PROPOSED DREDGING AND CLEARANCE OF THE MSUNDUZE CHANNEL IN ISIMANGALISO WETLAND PARK, KWAZULU-NATAL,* for Indaloenhle Environmental Consultants, on behalf of iSimangaliso Wetland Park Authority, January 2024.

Mather, A.A., Stretch, D.D. & Maro, A.Z. 2013. Climate change impacts, Chapter 21 in: Perissinotto RP, Stretch DD, Taylor RH (Eds), 2013. *Ecology and Conservation of Estuarine Systems. Lake St Lucia as a Global Model.* Cambridge, United Kingdom: Cambridge University Press.

Paul, B.W, 2023. Proposed Dredging of the Msunduzi River and Beach Channel, near the St Lucia Estuary, KwaZulu-Natal, South Africa, *Draft Vegetation Impact Assessment*, prepared by Afzelia Environmental

Consultants for Indaloenhle Environmental Consultants, on behalf of iSimangaliso Wetland Park Authority, 26 Oct 2023, 65pp.

Pringle, J, van der Waal, B & Green, A., 2023. *Specialist Report: On Dredging the uMsunduzi River and Beach Channel: Hydraulics and Geomorphology*, for Indaloenhle Environmental Consultants, on behalf of iSimangaliso Wetland Park Authority, 137pp.

Pringle, J, van der Waal, B & Green, A., 2024. *Specialist Report: Dredging the uMsunduzi River and Beach Channel: Hydraulics and Geomorphology*, for Indaloenhle Environmental Consultants, on behalf of iSimangaliso Wetland Park Authority, 145pp.

Ramsar Information Sheets (RIS), 1988. Information Sheet on Ramsar Wetland St Lucia System, 35pp.

Singh, K. 2023. *LiDAR SURVEY OF THE UMFOLOZI FLOODPLAIN AREA: GIS DERIVED PRODUCTS AND UAV SURVEY SUMMARY REPORT*, GroundTruth Environment & Engineering, GTE551/13112023/00, Nov 2023.

Van Schoor, N. 2023. *Desktop Aquatic Biodiversity Impact Assessment*, Proposed Clearance of the Umsunduze and Umfolozi Channels, within the of iSimangaliso Wetland Park, KwaZulu-Natal Province, prepared by Afzelia Environmental Consultants for Indaloenhle Environmental Consultants, November 2023, 38pp.

Theuns Theunissen ,2023, *Regional Manager: Northern Zululand & Elephant Coast*, Memorandum iSimangaliso Flooding – Urgent Call: Disaster Interventions Required by SA Canegrowers , 6pp.

UNESCO/ICCROM/ICOMOS/IUCN. 2022. Guidance and Toolkit for Impact Assessments in a World Heritage Context. Paris, UNESCO, 92pp.

10 DECLARATIONS BY THE EAP

I, Mbalenhle Mtshali , declare that:

- I act as the independent environmental practitioner in this application.
- I do not have and will not have any vested interest (either business, financial, personal, or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I have expertise in conducting environmental impact assessments, including knowledge of the National Environmental Management Act (Act 107 of 1998), Environmental Impact Assessment regulations, 2014 (as amended) and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations, and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan, or document to be prepared by myself for submission to the competent authority; all the particulars furnished by me in this report are true and correct.

Signature of the EAP:



_____

Mbalenhle S . Mtshali [EAPASA REG 2019/660]

11 APPENDICES

A – Locality Map

B – ECOLOGICAL SENSITIVITY MAP

C – FACILITY ILLUSTRATIONS

D – Screening tool/site verification report

E - Specialist reports

F – Public participation

F1– REGISTER OF I&APS

F2 – SITE NOTICE

F3 - Proof of advertisement

F4 – BACKGROUND INFORMATION DOCUMENT

F5 – NOTIFICATION OF INVITATION TO COMMENT

F6 – Meeting registers

F7 – Public participation Report

F8- Comments and Response report

G – DRAFT EMMPR\MMP

H – DETAILS AND EXPERTISE OF EAP

I – Specialist Declarations [copies]

J – Other Information