BASIC ASSESSMENT REPORT

Draft

SAND MINING PERMIT APPLICATION

Application to mine Silica Sand over an approximate 4,68ha section of the Mtwalume River, over Remainder of Portion 6 of Glen Alie No. 2037 and over Portions 104, 107 and 128 of Southern Home No. 2052 situated within the Ugu District Municipality, KwaZulu-Natal.

Prepared on behalf of Lancelot Estates cc

BY

ENVIRONMENTAL

Tel: +27 31 566 2856 • **Mobile:** +27 83 700 8669 • **Fax:** +27 86 649 8450 • **Email:** envpro@iafrica.com
P O Box 918, Umhlanga Rocks, KwaZulu Natal 4320 • Suite 3D Royal Palms, 6 Palm Boulevard, Umhlanga Ridge, KwaZulu Natal

DMR Reference: *Pending*

March 2016

DETAILS OF THE INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

Compiled by:

EAP: Justin Ellero

Qualifications: MSc (Geography) (UKZN) • BSSH (Environmental Science – Cum Laude) (UKZN) • BSoc (Geography and Environmental Management) (UKZN)

Work Experience: Justin Ellero is a Junior Environmental Scientist with experience in conducting Full Scoping and Basic Environmental Assessments, Water Use License Applications, Mining applications and Waste Management Licensing. His project experience list includes municipal pipelines, Eskom powerlines and development at the King Shaka International Airport to name a few.

Reviewer: Michael Haynes

Approved by: Karl Wiggishoff

I, Justin Ellero, declare that this report has been prepared independently of any influence or prejudice as may be specified by the Department of Mineral Resources.

I hereby confirm that all comments received from I&APs will be included in the Final Basic Assessment Report and will be submitted to the Kwa-Zulu Natal Department of Mineral Resources (DMR). A record will be kept of all comments and will be submitted in the form of a Comments and Responses Report.

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ABBREVIATIONS

C	Construction
DMR	Department of Mineral Resources
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EKZNW	Ezemvelo KwaZulu-Natal Wildlife
EMP	Environmental Management Programme
ETo	Potential Evaporation
FEPA	Freshwater Ecosystem Priority Area
IDM	Integrated Development Management
KZN	KwaZulu-Natal
NFEPA	National Freshwater Ecosystem Priority Area
O	Operational
PGDP	Provincial Growth and Development Plan
ULM	Umdoni Local Municipality
WM	With Mitigation
WMA	Water Management Area
WOM	Without Mitigation

1 BACKGROUND INFORMATION

1.1 INTRODUCTION AND BACKGROUND

An application has been submitted to the Department of Mineral Resources (DMR) by Lancelot Estates cc, for a permit to mine silica sand along a 4.68 ha section of the Mtwalume River on the KwaZulu-Natal south coast.

The proposed project involves the winning of a silica sand from the sandbars and river bed, which is bounded by farms owned by the applicant. Depending on the nature and extent of operations both, or one of the following mining methods can be used. This includes the use of an excavator or a small floating dredge system. The sand in the Mtwalume River is a high grade silica sand of granitic origin and will provide good quality sand to the local building industry.

The proposed mining site is situated in and around the Mtwalume River on the KwaZulu-Natal south coast (Figure 1.1), slightly inland of Ifafa beach and located between the R102 (inland) and the N2 freeway, running perpendicular to the coast. The sand mining operation is located 3 km from the village of Mtwalume and falls within the Ugu (district) and Umdoni (Local) Municipalities respectively. The Mining permit site being applied for occurs over the Remainder of Portion 6 of Glen Alie No. 2037 and over Portions 104, 107 and 128 of Southern Home No. 2052. A more in-depth locality map is located in **Annexure A**, while **Annexure B** contains a detailed sketch plan.

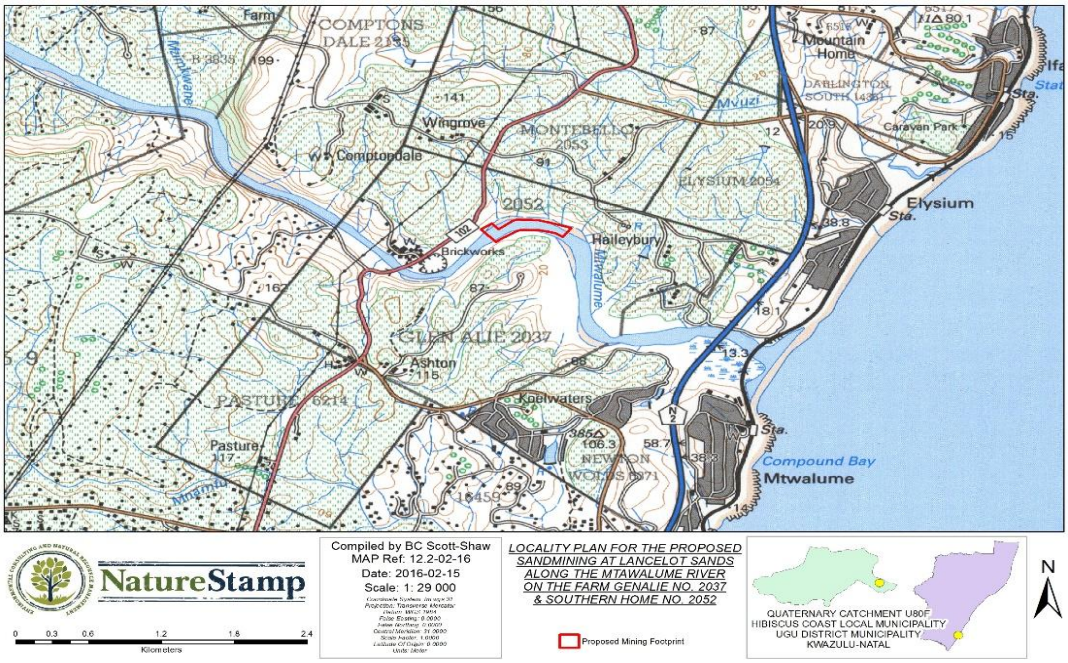

Figure 1.1: Map of mining permit area along the Mtwalume River

The Environmental Impact Assessment Regulations of 2014 promulgated in terms of Section 24(5) of the National Environmental Management Act, (Act No. 107 of 1998) as amended, requires Environmental Authorisation from the competent authority (KZN DMR) for activities listed in Government Notices R 983, R 984 and R 985 which pertain to mining. Table 1.1 below identifies the activity that has been triggered for the proposed development.

Table 1.1: Triggered Activity

Activity Number	Description	Impact on the proposed project
Activity 21 (GN R983)	Any activity including the operation of that activity which requires a mining permit in terms of section 27 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).	The proposed activity will require a mining permit from DMR as it involves the mining of silica sand from a portion of the Mtwalume River

1.2 TERMS OF REFERENCE

Regulation 19 of the Environmental Impact Assessment Regulations of 2014 determines that a Basic Assessment Procedure must be followed for all activities listed in Government Notice R 983 and 985. IDM Consultants (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner

(EAP) by the applicant and will therefore be responsible for the Basic Assessment procedures concerned with the proposed development.

According to the 2014 EIA Regulations, activities related to the following must be handled by the competent authority which is the Department of Mineral Resources:

a. Prospecting or exploration of a mineral or petroleum resource; or
b. Extraction and primary processing of a mineral or petroleum resource

1.3 APPROACH AND METHODOLOGY

The overall approach to this assignment included the following activities:

- Apply for Environmental Authorisation to the Department of Mineral Resources regarding the proposed sand mining activity on a portion of the Mtwalume River.
- A detailed analysis of the proposed development, the area where it will take place, and the identification of potential impacts.
- All legislative requirements in terms of the EIA Regulations and to provide the Department of Mineral Resources with sufficient information to take a decision regarding the development.

1.4 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations apply to the EIA Process:

- The EIA EAP is of the view that an adequate level of information is, provided in order to facilitate the required assessment of potential impacts of the proposed project alternatives and decision-making in this regard.
- The study involves the assessment of impacts on the current conservation value of affected river/estuary and not on either the historic or potential future conservation value.

1.5 OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic assessment process is to, through a consultative process:

a) Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
b) Identify the alternatives considered, including the activity, location, and technology alternatives;
c) Describe the need and desirability of the proposed alternatives,
d) Through the undertaking of an impact and risk assessment process inclusive of cumulative impacts which focused on determining 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 the these aspects to determine-

i. The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
ii. 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;

e) Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to-
   i. Identify and motivate a preferred site, activity and technology alternative;
   ii. Identify suitable measures to avoid, manage or mitigate identified impacts; and
   iii. Identify residual risks that need to be managed and monitored.

1.6 REPORT STRUCTURE

The report is structured as follows:

Section 2 consists of a summary **description of the proposed activity**.
Section 3 provides **a description of the environment that may be affected** by the activity.
Section 4 consists of a summary of the potential **impacts of the proposed activity** on the environment.
Section 5 provides describes the **public participation** process conducted during the scoping phase.
Section 6 provides a **Summary of the recommendations**

Supporting documents, reports, correspondence and other relevant information are contained in various Appendices attached to this report.

1.7 APPLICABLE LEGISLATION, POLICIES AND GUIDELINES

In addition to the Environmental Impact Assessment Regulations of 2014, Table 1.2 below indicates other applicable legislation that has been considered in the preparation of this Basic Assessment Report.

Table 1.2: Applicable Legislation

Legislation	Relevance to the development
The Constitution of the Republic of South Africa, Section 24 (Environmental Right)	The Constitution stipulates that everyone has the right to an environment that is not harmful to their health or well-being; and the right to have the environment protected, for the benefit of the present and future generations, through reasonable legislative and other measures. The Constitution paved the way for environmental legislation in South Africa.
National Water Act (No. 36 of 1998)	A Water Use License Application will need to be applied for from the Department

	of Water and Sanitation as the sand mining activity will take place within the Mtwalume River and is within 500 meters of a wetland.
National Environmental Management Act (No. 107 of 1998)	This development requires a Basic Assessment to be conducted in terms of the EIA Regulations of 2014.
National Environmental Management: Biodiversity Act (No. 10 of 2004)	There is a possibility that flora and fauna found on site may be impacted upon. If Protected species are found on site (None found as of yet), the Developer will be required to apply for a permit. Alien species will also be required to be removed as recommended in the specialist report and EMP.
National Environmental Management: Waste Act, 2008 (Act no. 59 of 2008)	All waste generated on site will need to be dealt with according the EMP.
National Environmental Management: Air Quality Act, 2004 (Act no.39 of 2004)	Mitigation measures to control air pollution and dust must be implemented to ensure compliance with this Act.
Occupational Health and Safety Act (No. 85 of 1993)	The employer needs to manage his/her staff and crew in strict accordance with the Occupational Health and Safety Act in order to prevent injuries to the staff.
Provincial Growth and Development Plan	The proposed development is aligned with the PGDP, as it addresses the first goal of the PGDP which is that of job creation.
KwaZulu-Natal Heritage Act (No. 4 of 1998)	This Act has been put into place to conserve, protect and conserve heritage resources.

2 DESCRIPTION OF PROPOSED ACTIVITY

2.1 PROJECT LOCATION

2.1.1 Co-ordinates

The outside figure co-ordinates for the proposed activity are illustrated in **Annexure B** hereof (Sketch Plan).

2.1.2 Farm Name

The site on which the activity is to take place is located on the Mtwalume River, over Remainder of Portion 6 of Glen Alie No. 2037 and over Portions 104, 107 and 128 of Southern Home No. 2052. All of which is owned by the applicant Lancelot Estates cc.

2.1.3 21 Digit Surveyor General

N0ET00000000203700000, – Remainder of Glen Alie No. 2037
N0ET00000000203700006, – Portion 6 of Glen Alie No. 2037

N0ET00000000205200104, – Portion 104 of Southern Home No. 2052
N0ET00000000205200107, – Portion 107 of Southern Home No. 2052
N0ET00000000205200128, – Portion 128 of Southern Home No. 2052

2.2 ACTIVITY DESCRIPTION

2.2.1 Extent of development

The total extent of the project area is approximately for 4.68 ha.

2.2.2 Description of the proposed activity

The Project involves the winning of silica sand from the sandbars and river bed of a 4. 68 ha section of the Mtwalume River, which area is bounded by various farms owned by the applicant. A summary of the mining process is elaborated in the next section. A more detailed explanation and description of the mining operation is set out in **Appendix 2** hereof.

The material proposed to be mined is Silica Sand. Extraction of sand will be facilitated by the following two mining methods, which will either run unilaterally or simultaneously depending on the nature and extent of operations required.

1) Use of an excavator to skim the sandbars, and stack the sand on the river bed. A front-end loader and/or excavator will move the sand from the river bed to the stockpile area, from where it will be despatched.
2) Sand will also be removed from the river itself with a small floating dredge and pump system.

An excavator will be used to access the river bed and sand bars via a ramp. The sandbars will be skimmed to water level and deeper sediments dredged and/or pumped. Sand will be temporarily piled on the river bed or sand bar (depending on depth) and systematically transported from the temporary storage position to the established stockpile site for stockpiling. The stockpile site will be located on the northern bank of the Mtwalume River. The Riparian zone will be avoided to ensure that the river and riverbanks will not be disturbed or diverted. Access and haulage will involve the entry of vehicles (tip-trucks) for the collection of sand and removal off the site from the stockpile area.

In so far as the barge and pump system is concerned, the mining process involves the use of a floating barge system which is attached a del pipe of 8 inch HDPE (plastic) with a 8 inch steel suction pipe for pumping sand from the river to the stockpile area for settling and transport off the site. The pipe is kept buoyant above the river bed and floated above the surface by means of a series of floats connecting from the floating barge to the outlet area (stockpile area). The pipe length itself and the laying thereof, causes no negative impact or disturbance of the river bed, the river flow, or the river bank.

Image 2.1: Example of Pipe

The head of the pipe contains a jet and suction mechanism which jets out approximately 35m^3 of water an hour to agitate the sand, which is then simultaneously sucked back into the pipe at 450m^3 per hour, thereby negating any possible silt plume and/or consequential siltation effects downstream of the mining site.

The pipe floats on the river surface, before reaching the river's edge and banks, where it traverses until it reaches the stockpile area where the sand is pumped out for stockpiling and distribution. The watery sand is allowed to settle through the creation of temporary sand berm, and the residue water allowed to seep back into the sand and/or channelled (gravity fed) back under the berm into the river.

The laying of the pipe has no negative impact on the river, the river bed, the river bank and the stockpile area, and the quality of the water re-entering the river from the stockpile area, having been naturally filtered through the clean sand is, therefore, of a better quality than it was when first pumped from the river.

Image 2.2: Example of Floating Barge, Pump and Pipe System

Image 2.3: Example of Temporary sand berm

Image 2.4: Example of Pipe outlet into stockpile area

Image 2.5: Example of a small dredge with a floating polyprop pipeline that pumps to a discharge pad

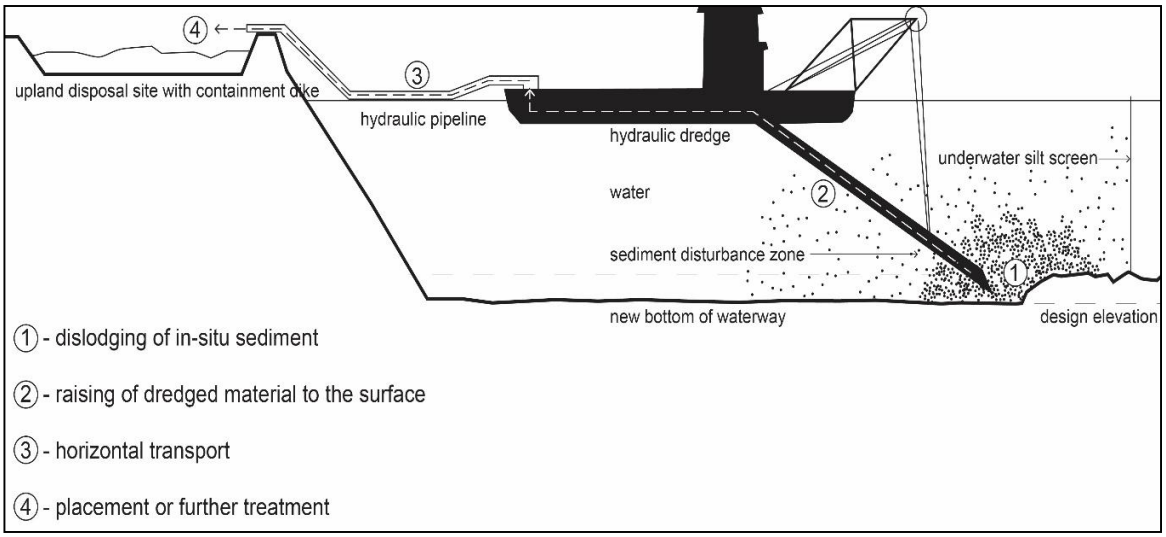

Figure 2.1: Schematic section diagram of dredge extracting sand from riverbed

The floating poly-pipe continues from the river bank up the existing piping ramp and over a sand containment wall and discharges onto the drainage pad. The sand is allowed to settle and moved across to the adjacent stockpile area. Excess water filters through a sand berm and is channelled back to the river. The sand storage area (stockpile) is located adjacent to the sand mining. The sand is then loaded using a front end loader onto tip-trucks for sale.

In summary, the operational system, comprising the use of an excavator, dredge barge, the pump, the piping of sand and the driving of the front-end loader/excavator is operated and managed by a certified diesel mechanic, who is well qualified to effectively attend to all these tasks.

2.2.3 Access to site

Access and haulage will involve the entry of vehicles for the collection of sand. Entry is from the R102 along an existing access road to the edge of the stockpile pad where loading will take.

2.2.4 Mining operation

The mine will operate for a two year permit period and will be renewable for a further two consecutive one year periods thereafter. It is the intention that sand would be mined during low flow conditions from the channel and large sand bars along the river bed and bank; it would be stock piled on the northern bank within the demarcated stockpile area. The sand deposits and sand banks are replenished during the

summer rainy season. The mining volume would be based on measured annual replenishment of sand, as discussed in **Appendix **** hereto.

2.2.5 Decommissioning of sand mine

The river section of the permit area will be rehabilitated by the following rainy season with flood waters depositing more sand across the mined area. The stockpile pad surface will be ripped, have topsoil spread across the area and replanting and re-establishment of vegetative cover, as well as monitoring and evaluation. A Rehabilitation and Close out Plan is contained in **Appendix 3**.

2.3 CONSIDERATION OF ALTERNATIVES

Alternatives are seen as different means of meeting the general purpose and need of a proposed activity. Alternatives could include, amongst others, the following:

- Activity Alternatives: This requires a change in the nature of the proposed activity. This alternative is most appropriate at a strategic decision making level.
- Location Alternatives: Alternative locations for the entire project proposal, or for components of the project proposal.
- Layout Alternatives: This alternative allows different spatial configurations of an activity on a specific site.
- Scheduling Alternatives: also refer to alternative phasing options for the development. This alternative considers different phasing options during the implementation of the development.
- Infrastructure/ Input Alternatives: Also referred to as technological or equipment alternatives. This option considers various alternatives that will result in the same end result.

Layout and Infrastructure (technology) alternatives are the most pertinent to this EIA process, however all the above mentioned alternatives are briefly explored in the subsections below as well as the alternative of maintaining the status quo, commonly known as the “no-go” option.

2.3.1 Activity alternatives

Activity alternatives refer to the consideration of alternatives requiring a change in the nature of the proposed activity to be undertaken. The site on which the activity is to be undertaken is the Mtwalume River. A basic mapping exercise indicated that there were no other minerals located within the system.
Apart from sand mining, there are no other activities that can be considered.

2.3.2 Location alternatives

Two locations were considered for the proposed sand mining activity. The initial location was further downstream. However, it was discovered that the site was located within the estuarine functional zone of

the Mtwalume system. To minimize the impacts of the sand mining operation, this site was ruled out in favour of a site located outside the estuarine functional zone. Locational alternatives were limited to areas where the applicant owns farm land. The sand mining operation, if approved will occur on land that is owned by the applicant and is located outside the estuarine functional zone to ensure environmental impacts of the mining operation are reduced.

2.3.3 Layout Alternatives

The proposal layout for the sand mining activity will be as per the sketch plan **(Annexure B)**. There will be one area for stockpiling, with its own access road. There will be no site office. A portable toilet will be placed 100 metres away from the River, which will be utilised by the employees. The site has been minimised to impact the smallest possible area. The site does not allow for functional layout alternatives.

2.3.4 Scheduling alternatives

The sand mining activity will commence as soon as DMR issues a permit. No scheduling alternatives were therefore considered. The sand mining intensity will be based on the demand for silica sand in the area.

2.3.5 Infrastructure alternatives

Infrastructure alternatives were not considered as the activity to be undertaken is that of sand mining and no infrastructure will be constructed.

2.3.6 Input Alternatives

The only practical means of sand mining from a river is per a front-end loader and excavator method, and/or by means of the barge, hose and pump system. Accordingly no other input alternatives were considered.

2.3.7 "No-go" alternative

The "no-go" alternative should in all instances be considered as part of the EIA process. It assumes that the activity does not proceed, implying a continuation of the current situation of status quo. Should this permit not be granted, there will be no socio-economic benefits such as job creation and local economic development.

3 SITUATION ASSESSMENT OF PROJECT AREA AND AFFECTED ENVIRONMENT

Note: The sub-sections set out in the section below should be read in conjunction with the specialist report enclosed herewith as **Appendix 4.**

3.1 CLIMATE

The Mtwalume region receives a mean annual precipitation of 981 mm, occurring mainly in the summer months between December to February. The reference potential evaporation (ETo) is approximately 1605 mm (A-pan equivalent, after Schulze, 2011) and the mean annual evaporation is less than 1200 mm, which exceeds the annual rainfall. This suggests a high evaporative demand and a water limited system. This problem has been worsened by the recent drought experienced across South Africa. Summers are characterised as being hot and humid, while winters are cool. The mean annual temperature is approximately 22.9 ºC (11.4 ºC minimum and 34.4 ºC maximum) in summer and 16.4 ºC (4.1 ºC minimum and 33 ºC maximum) in the winter months.

3.2 LANDSCAPE CHARACTERISTICS

The majority of the land comprises of commercial sugarcane with some peri-urban/rural settlements and natural grassland pockets nearby. Some natural forest areas can be found along the river. Most of the watercourse systems on site have been invaded by invasive alien plants. A municipal water works is

located upstream of the site. There is currently extensive dredging of the river upstream of the site to allow for efficient pumping at the water works. Furthermore, commercial sand mining, illegal sand mining and dumping are present.

3.3 GEOLOGY

The terrain, as identified through a desktop analysis had a slope of between 4 & 12.1º on some of the banks. Numerous soil profiles were identified throughout the site. Some of the soil forms identified on the site (outside of the wetland areas) were Glenrosa soils (Orthic A-horizon underlain by Lithocutanic B-horizon), Hutton soil forms (Orthic A-horizon underlain by red a-pedal B-horizon) and Bonheim (Melanic A-horizon underlain by Pedocutanic B-horizon). The major geology features were Natal group arenite and Gneiss.

3.4 FLORA AND FAUNA

According to the EKZNW database three vegetation types exist in the Umdoni Municipality namely South Coast grassland, South Coast Bushland and KwaZulu-Natal Coastal Forests. Mucina and Rutherford (2006) recognise the South Coast Grassland and South Coast Bushland as one vegetation type, CB3 KwaZulu-Natal Coastal Belt. The KwaZulu-Natal Coastal Belt vegetation type is a long, and in places, broad coastal strip along the KwaZulu-Natal coast, from Mtunzini in the north, via Durban to Margate and just short of Port Edward in the south and occurs in an altitude range from 20 to 450 meters. It is characterised by highly dissected undulating coastal plains which presumably used to be covered to a great extent with various types of subtropical coastal forest. There are areas dominated by Themeda triandra in the higher slopes. At present the KwaZulu–Natal Coastal Belt is about 50% transformed and is affected by an intricate mosaic of very extensive sugarcane fields, timber plantations, road infrastructure and coastal holiday resorts, with interspersed secondary Aristida grasslands, thickets and patches of coastal thornveld (Scott-Shaw & Escott, 2011). Only a very small part is statutorily conserved in the Ngoye, Mbumbazi and Vernon Crookes Nature Reserves, which are outside of the ULM boundary.

3.5 WATER MANAGEMENT AREAS

The site is located within Quaternary Catchment U80F which falls under the Mvoti to uMzimkulu Water Management Area (WMA). The site is within the catchment area of the Mtwalume River (which flows into the Indian Ocean approximately 2.5 kilometers downstream). The Mtwalume River and its tributaries are classified as Class B (Largely Natural) NFEPA Rivers.

Most of the watercourse systems on site have been invaded by invasive alien plants. A municipal water works is located upstream of the site. There is currently extensive dredging of the river upstream of the site to allow for efficient pumping at the water works. Furthermore, commercial sand mining, illegal sand

mining and dumping are present. An artificial canal is present on the floodplain due to past irrigation activities. Wetland encroachment is present in the greater area due to the vast amount of sugarcane.

In accordance with the NFEPA guidelines, the relevant reach of the Mtwalume River and its associated riparian habitats have been classified as a river FEPA (PES Class B – Largely Natural), which indicates that these river systems are a national freshwater conservation priority. The Mtwalume River has been identified as a fish corridor and falls within the Indian Ocean Coastal Belt vegetation group (Critical: NFEPA, CSIR, 2011). The area around the development has been identified as available (has not been earmarked for conservation but is available for future conservation) within the EKZNW aquatic conservation plan (EKZNW, 2007).

The NFEPA project highlights the Mtwalume, associated sub-quaternary catchments, associated subquaternary catchments and Upstream Management Areas as a Freshwater Ecosystem Priority Areas (FEPAs) and Fish Support Area. As there is much focus on the Mtwalume River, the same considerations should be applied to its tributaries which cumulatively impact on this system. NFEPA wetlands were identified near the site. However, apart from the channel itself, no NFEPA wetlands are located around the proposed development. The proposed Mtwalume sand mine occurs above the estuarine functional zone.

3.6 PHOTOGRAPHIC OVERVIEW OF SIGHT

Image 3.1: Proposed mining area looking south

Image 3.2: Looking up river on proposed mining area from the east

Image 3.3: Proposed mining area access road

Image 3.4: Riparian vegetation located around proposed mining area

Image 3.5: The Mtwalume Water Works

3.7 SITES WITH ARCHEALOGICAL INTEREST

According to the KwaZulu-Natal Heritage Act, Amafa Akwazulu Natali (Heritage KwaZulu-Natal) is required to comment on the need for an archaeological assessment for proposed developments if:

- The development area is larger than 10 000 m^2.
- The development is longer than 300 m.

- The development area contains known archaeological sites.

It should be noted that a desktop study was conducted to identify landmarks and sites over 100 years. It was found that no landmarks or sites over 100 years are in close proximity to the site.

3.8 MINERAL DEPOSITS

A GIS desktop study for mineral deposits was conducted to identify if there are any mineral deposits in close proximity to the site. It should be noted that according to the desktop analysis (without having undertaken detailed high-tech analysis) there appear to be no mineral deposits in close proximity to the site, other than the silica sand deposits.

3.9 SOCIAL-ECONOMIC ENVIRONMENT

The Mtwalume settlement where the sand mining operation is based occurs within the uMdoni Local Municipality which is part of the Ugu District Municipality in the KwaZulu-Natal province of South Africa. The settlement is located 87km south of the city of Durban along the coast with its primary economic activity consisting of tourism.

The Mtwalume settlement falls within the uMdoni Local Municipality which is made up of 10 wards, with a geographical area of 238 square kilometres. Umdoni Municipality covers the areas of Amahlongwa, Amandawe, Umzinto, Ghandinagar, Shayamoya, Park Rynie, Scottburgh, Hazelwood, Asoka Heights, Malibu Heights, Pennington, Sezela, Ifafa, Bazley, Mtwalume, Malangeni and Esperanza. The municipality can be divided into three major land uses, being commercial agriculture, traditional authority areas and coastal urban nodes. The coastline stretches approximately 40km. The town of Scottburgh is approximately 50km from the city of Durban and 65km from Port Shepstone. The uMdoni Local Municipality has a population of 78 875 with 76,7% African, 13,3% Asian, 8,5% white and 1.2% Coloured. The dominate languages spoken are isiZulu and English. The unemployment rate is 33.30%, while youth unemployment is 43.30%. The uMdoni local municipality also suffers from poorly maintained road infrastructure and service delivery challenges including access to housing and electricity. These challenges make it vitally important for local economic development in the area to help alleviate challenges faced by communities

4 IMPACT ASSESSMENT

4.1 INTRODUCTION

The impact assessment aims at identifying potential environmental impacts (both positive and negative impacts) and evaluating these impacts in terms of its significance. This assessment is provided in the form of a systematic analysis framework to evaluate the nature, extent, duration, intensity, probability and

significance of the various impacts are considered both without and with mitigation and management measures.

4.2 IMPACT ASSESSMENT CRITERIA

The assessment of the potential impacts of the envisaged development is undertaken in accordance with the broad criteria required by the integrated environmental management procedure and includes the following:

4.2.1 Nature of impact

A brief description of the type of impact the proposed development will have on the affected environment.

4.2.2 Extent/Scale

The physical extent of the impact.

i. Footprint
   The impacted area extends only as far as the actual footprint of the activity.
ii. Site
   The impact will affect the entire or substantial portion of the site/property.
iii. Local
   The impact could affect the area including neighbouring properties and transport routes.
iv. Regional
   Impact could be widespread with regional implication.
v. National
   Impact could have a widespread national level implication.

4.2.3 Duration

The duration of the impact.

i. Short term
   The impact is quickly reversible within a period of one year, or limited to the construction phase, or immediate upon the commencement of floods.
ii. Medium term
   The impact will have a short term lifespan (project lifespan 1 – 10 years).
iii. Long term
   The impact will have a long term lifespan (project lifespan > 10 years).
iv. Permanent
   The impact will be permanent beyond the lifespan of the development.

4.2.4 Intensity

This criteria evaluates intensity of the impact and are rated as follows:

i. Minor

The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.

ii. Low
The activity will have a low impact on the affected environment

iii. Medium
The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.

iv. High
The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

v. Very high
The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

4.2.5 Probability

This describes the likelihood of the impacts actually occurring.

i. Improbable
The possibility of the impact occurring is highly improbable (less than 5% of impact occurring).

ii. Low
The possibility of the impact occurring is very low, due either to the circumstances, design or experience (between 5% to 20% of impact occurring).

iii. Medium
There is a possibility that the impact will occur to the extent that provision must be made therefore (between 20% to 80% of impact occurring).

iv. High
There is a high possibility that the impact will occur to the extent that provision must be made therefore (between 80% to 95% of impact occurring).

v. Definite
The impact will definitely take place regardless of any prevention plans, and there can only be relied on migratory actions or contingency plans to contain the effect (between 95% to 100% of impact occurring).

4.2.5.1 Determination of significance

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the extent, duration, intensity and probability of the impacts.

i. No significance
The impact is not substantial and does not require any mitigatory action.

ii. Low
The impact is of little importance, but may require limited mitigation.

iii. Medium
The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

iv. High
The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation and management is essential.

The following assessment scale is used to determine the significance of the identified potential impacts on the environment.

Significance = (probability + duration + scale) x intensity

Probability: 1 – 5
Extent: 1 – 5
Duration: 1 – 4
Intensity: 1 – 10

Significance rating criteria

>75	High environmental significance
50 – 75	Medium environmental significance
<50	Low environmental significance

4.2.6 Assessment of Potential Impacts

4.2.6.1 Ecological characteristics

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Impact on functional contribution of the larger ecosystem (e.g. terrestrial bird breeding and feeding, insect breeding and habitat for migrating small game)	O	Negative	Site	Medium	Medium	Medium	High	1. Disturbance of indigenous fauna and flora, and the natural ecology in the surrounding areas must be avoided. 2. Disturbance of mammals, birds, reptiles, other animals and their habitats must be prevented. 3. Invasive alien plants must be removed from site 4. No go and sensitive areas must be clearly marked and avoided. 5. A rehabilitation plan must be implemented once mining operations cease.	Medium

4.2.6.2 Soil characteristics and geology

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Soil stockpiles that are left unattended.	O	Negative	Site	Short	Medium	High	High	1. Stockpiled topsoil should be used as the final cover for all disturbed areas where re-vegetation is required. 2. Stockpiled soil should be protected by erosion-control berms if exposed for a period of greater than 14 days during the wet season. 3. Soil stockpiles should be located away from drainage lines and areas of temporary inundation.	Low
2. Soil pollution (diesel, oil etc.) during construction.	O	Negative	Site	Short	Medium	Medium	High	1. Should diesel be stored on site, it will need to be stored on a hard surface and 100m away from any drainage lines.	Low

								2. Ensure that the excavator and front-end loader are properly maintained. Equipment must be regularly serviced and inspected to make sure there are no leaks of oil, diesel, fuel, detergents or hydraulic fluids. 3. Servicing and maintenance of vehicles as far as possible must occur outside of the boundaries of mining permit area. If maintenance does occur on site due to breakdown, all steps must be undertaken to avoid hydrocarbon spills/leakages. 4. Drip trays (where appropriate) must be emptied regularly and secured 5. Under no circumstances should oil or diesel to be disposed of at the site.	
3. Dust pollution due to exposure to loose soils.	O	Negative	Site	Short	Low	Medium	Medium	1. Soil should be exposed for the minimum time possible once cleared of vegetation, i.e. the timing of clearing and grubbing should be coordinated as much as possible to avoid prolonged exposure of soils to wind and water erosion. The latter will facilitate the succession of indigenous vegetation. 2. Handling must minimise the creation of dust and handling must be reduced during windy conditions 3. Wetting of construction area must occur during very dry or windy conditions or if dust becomes a major problem 4. Rehabilitation will ensure good vegetative cover which will reduce dust creation	Low
4. Compaction of soils by use of site vehicles	O	Negative	Local	Short	Low	Medium	Medium	1. Where roads have become compacted, they shall be ploughed, ripped and re-vegetated.	Low

5. Extraction of bed material in excess of natural replenishment from the barge and strip mining.	O	Negative	Site	Medium	Low	Medium	Medium	1. Adequate monitoring levels of how much material is removed from the river beds and pumped onto the surface shall be implemented.	Low
6. Siltation/Sedimentation of watercourses increased turbulence from the barge dredging and influx of dust from the strip mining	O	Negative	Local	Medium	Medium	Medium	Medium	1. Reduce the turbulence produced from sucking up material from the river bed. 2. Prevent erosion caused by the erosive power of the return flow from the jet mechanisms 3. Control levelling and compaction during mining activities so to reduce the sedimentation. 4. During flooding, siltation of the river will take place due to increased incidence of erosion of alluvial sand into the river from disturbed areas devoid of vegetation. Mitigation will involve ripping the soil in these areas and planting obligate and facultative wetland species to bind the soil, prevent erosion and consequent siltation (once mining activities have ceased in those areas). 5. A suitable stormwater drainage system must be implemented to prevent soil and silt erosion, to protect storage areas, to prevent uncontrolled stagnant ponds forming and avoid siltation of water resources.	Low
7. Erosion of River Banks	O	Negative	Site	Short	Medium	High	High	1. Keep surrounding vegetation, especially larger trees and shrubs, to create a screen that reduces flood impacts 2. Restrict river access to only one corridor through the Riparian buffer. Ensure water course is not altered to the extent that the integrity of the river banks are compromised and eroded.	Low

								3. During the mining activities, there shall be the protection of areas susceptible to erosion by installing necessary temporary and permanent drainage works as soon as possible and by taking measures to prevent the surface water from being concentrated in streams and from scouring slopes, banks or other areas	

4.2.6.3 Fauna and flora

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Impact on faunal activity on surrounding properties during activity (e.g. trapping of animals, construction vehicles, etc.).	O	Negative	Local	Short	Medium	Medium	Medium	1. Any fauna found on the stockpile site needs to be relocated to the private conservation area of the development without causing any damage or harm. 2. No trapping, snaring, hunting, fishing or killing of any animal may occur on the mining permit site. 3. Any malicious damage to any fauna species present on site will be considered a punishable offence, and the appropriate measures will be followed.	Low
2. Impact on vegetation (Both in the Riparian and stockpiling areas)	O	Negative	Local	Short	Medium	Medium	High	1. Limit the removal of vegetation to the sand mining footprint. 2. Prevent illegal removal of protected vegetation 3. Minimise scarring of the soil surface and land features.. 4. Minimise disturbance and loss of topsoil. 5. Keep surrounding vegetation, especially larger trees and shrubs, to create a screen that reduces flood impacts.	Medium

4.2.6.4 Ground and surface water

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Pollution of groundwater/ surface water with typical construction related pollutants such as oil and diesel, and enterobecteria/viruses and plant nutrients if sanitation for mine operators is not properly managed.	O	Negative	Local	Short	Medium	Medium	High	1. No disposal of sewage should occur on or near the site. 2. Chemical toilets must be provided by the contractor in accordance with DWS requirements.	Low
2. Bed degradation and morphology caused by strip mining and dredging the river bed	O	Negative	Site	Medium	Medium	High	Medium	1. Ensure that the mining operation operates within the limits so not to exceed the threshold limit thus in turn degrading the morphology of the river	Low
3. Altering channel hydraulics caused by dredging the river for sand and by strip mining	O	Negative	Local	Medium	Medium	High	Medium	1. Operate within the thresholds so there isn't an excess of stockpiles, thus causing less resistance by the river channels causing undercutting causing the bank to collapse. 2. Cause the morphology of the channels to change as less resistance in place.	Low

4.2.6.5 Archaeological, historical and cultural significance

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Impact on sites with valuable archaeological, history and cultural significance	O	Negative	Site	Short	Minor	Low	Low	1. Should any archaeological artefacts be exposed during excavation, work on the area where the artefacts were found, shall cease immediately and the ECO and Amafa KZN Heritage should be notified as soon as possible.	Low

4.2.6.6 Socio-economic impacts

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Direct employment creation.	O	Positive	Local	Short	Minor	High	Medium	No mitigation required	Medium (Positive)
2. Training of Workers	O	Positive	Local	Short	Minor	High	Medium	No mitigation required	Medium (Positive)
3. Local economic Development	O	Positive	Local	Short	Minor	High	Medium	No mitigation required	Medium (Positive)

4.2.6.7 Safety and Security

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. The operation may result in an increased security risk to adjacent properties and the residents thereof.	O	Negative	Local	Short	Medium	Low	Low	1. Staff should be informed that access to adjacent properties is strictly off-limits and that it will be deemed a serious offence (i.e. no fences should be jumped at any time and no gates are to be opened without permission from the relevant landowner).	Low
2. Similarly operational activities on site may pose various risks to workers safety.	O	Negative	Local	Short	Medium	Medium	Medium	1. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) and the National Building Regulations.	Low
3. Traffic and spills transporting silica sand to the market along the R102 and other main roads	O	Negative	Local	Short	Medium	Low	Low	1. When transporting silica sand on public roads, these should be kept clear of spills, leaks, mud and sand. Should any mud and sand deposited onto public roads by the mining activities, it will need to be cleared immediately	Low

4.2.6.8 Potential Environmental Impacts

Nature	Phase	Type	Extent	Duration	Intensity	Probability	WOM	Mitigation	WM
1. Increase in air pollution (dust) 2. Impact on the ambient air quality due to vehicle tailpipe emissions from increased traffic volumes.	O	Negative	Local	Short	Medium	High	Medium	1. Air filters on all mechanized equipment must be properly designed and maintained. 2. Onsite burning of waste is not permitted. 3. A dust suppression programme should be implemented on the gravel road surfaces of the existing access roads by means of periodic water sprinkling.	Low
3. Increase in ambient noise level affecting surrounding properties.	O	Negative	Local	Short	Low	Medium	Medium	1. Silencers on diesel-powered equipment must be properly designed and maintained. 2. Construction activities should be limited to normal office hours. 3. Mining should take place between 07:00- 17:00. Mondays to Fridays.	Low
4. Impact of lighting on surrounding properties, including light trespass and over-illumination. Apart from being a visual impact, over-illumination is also a waste of energy.	O	Negative	Local	Long	Medium	High	Medium	1. Avoid shiny metals in structures. If possible shiny metal structures should be darkened or screened to prevent glare. 2. Night-time light sources must be directed away from nearby communities and farms. 3. Avoid activities outside of normal working hours.	Low

4.3 SPECIALIST STUDES UNDERTAKEN

A Watercourse Delineation and Impact Assessment study was undertaken by Naturestamp. The report is located in **Appendix 4**. Table 4.1 contains a brief overview of the specialist study's recommendations that were incorporated into the Basic Assessment Report.

List of specialist studies undertaken	Recommendations of specialist	Specialist recommendations that have been included in study	Reference to applicable section of report where specialist recommendation has been included
Watercourse Delineation & Impact Assessment	Enhanced erosion potential and compaction	Yes	4.2.6.2 and 4.2.6.4
	Change in the linear channel flow, banks and channel bed	Yes	4.2.6.2 and 4.2.6.4
	Decrease in water quality	Yes	4.2.6.2 and 4.2.6.4
	Spread of alien invasives (applies to rehabilitation stage)	Yes	4.2.6.1
	Air pollution	Yes	4.2.6.8
	Noise Pollution	Yes	4.2.6.8

4.1: Details of specialist study mitigation measures

4.4 ENVIRONMENTAL IMPACT STATEMENT AND SUMMARY ON NEED AND DESIRABILITY

4.4.1 Environmental Impact Statement

The major environmental impacts, which are likely to result from this activity, may be assessed according to the potential impacts. The impact assessment illustrates that there is a potential for both negative and positive impacts that may result from the proposed operation of the Sand mining. These impacts include visual, noise, social and biophysical impacts as have previously been mentioned throughout the course of the chapter.

It is the option of the EAP that the implementation of suitable mitigation measures can result in the enhancement of the positive impacts while mitigating the negative impacts to acceptable levels. Table 4.2 below considers both the advantages and disadvantages of the proposed development:

Table 4.2: Advantages and Disadvantages of the proposed development

Advantages	Disadvantages
Provides a high grade of sillca sand for the local building industry.	The proposed activity is located in the sensitive Mtwalume River, located above the estuarine functional zone.
Create employment.	Spillage of diesel, petrol and oil can lead to soil and water contamination.
Create skills development i.e. educate the employees of sand mining and how to use machinery.	Impacts on local flora and fauna.
Will stimulate Local Economic Development and will aid the Umdoni Local Municipality in meeting its 2016/2017 IDP goals.	Potential impact on the Mtwalume River, without proper mitigation measures can be high.
Through the implementation of mitigation measures the positive impacts can be enhanced and the negative impacts mitigated to acceptable levels.	Current drought impacting the province and country.

Furthermore, there should be no activity within the designated buffer zones of all watercourses other than the access points and temporary mining areas. A buffer zone is designed to act as a barrier between anthropogenic activities and sensitive water resources. This allows for the protection of these water resources. Buffer zones promote the maintenance of basic aquatic processes, the reduction of up-stream impacts and the preservation and provision of aquatic species.

All operation activities (e.g. camp and vehicle maintenance) must stay outside of these areas. Figure 4.1 below contains a map of sensitive areas and buffers identified by the aquatic specialist that must be implemented before mining commencement. The specialist recommended that two areas be strictly avoided. The first is the sensitive wetland that borders the proposed mining area to the North. Secondly, the riparian forests on either side of the river must be avoided. These areas must be clearly demarcated as no go areas.

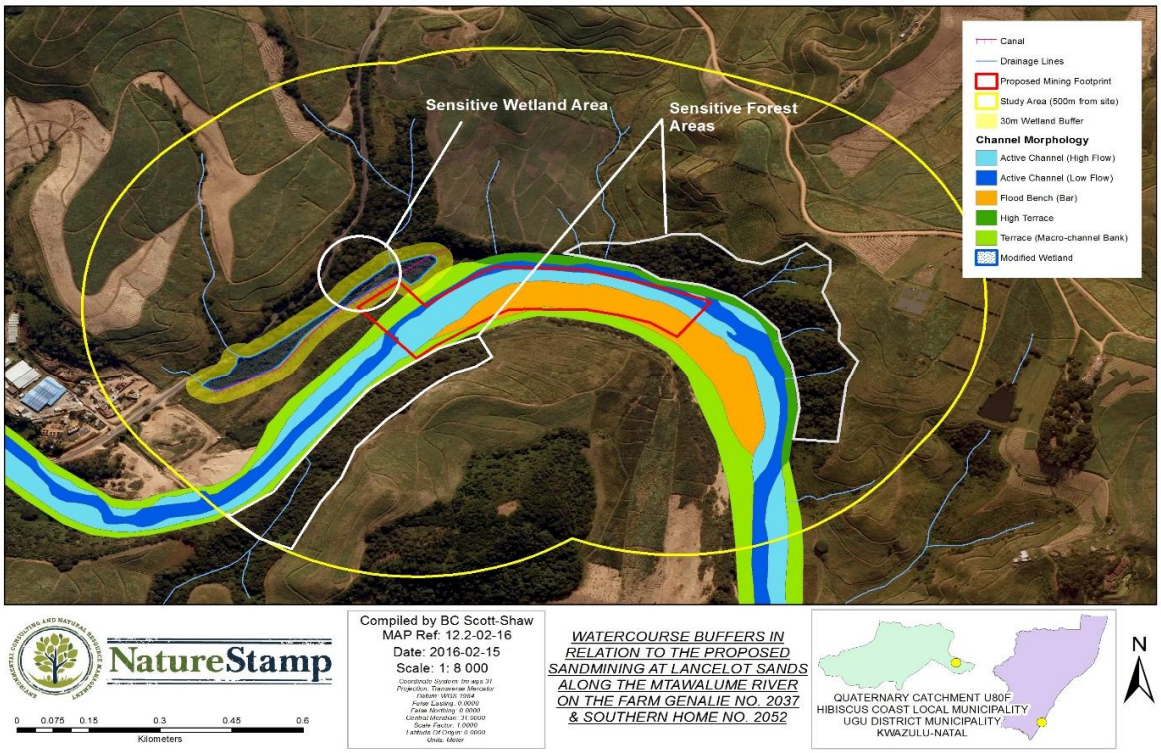

Image 4.1: Sensitive areas within 500m of proposed mining site

4.4.2 Need and Desirability

The sand in the Mtwalume River is a high grade silica sand of granitic origin that will provide good quality sand to the local building industry for cement and concrete work. This cement and concrete work are key materials used in the construction of roads and buildings. The mining operation will help the Umdoni Local Municipality's achieve the 2016/2017 IDP which plans to meet the key challenges facing the area including housing and road infrastructure. The Umdoni Local Municipality furthermore plans to promote local economic development and tourism potential. The sand can thus help meet demands of the Local Municipality in terms of service delivery and promoting development of the area by the provision of sand for cement to be used in construction.

The broader socio-economic benefits of the project include employment, skills development, local economic development through the availability and affordability of the sand, and increased business development for the area generally. While the project is small in operation, the providing of high quality sand to be used as cement and concrete work will aid the construction sector in the area in terms of service delivery and local economic development.

5 PUBLIC PARTICIPATION

**** Consultation In progress: To be included in final BAR**

6 SUMMARY RECOMMENDATIONS OF EAP

It is the opinion of the Environmental Assessment Practitioner that the project can be supported on condition that the Mitigation and Management measures described in Section 4 and EMPr (**Appendix 6**) should be strictly adhered to by the developer.

A variety of mitigation measures have been identified that will serve to mitigate the scale, intensity, duration or significance of the impacts. The proposed mitigatory measures, if implemented, will reduce the significance of the majority of the identified impacts and allow for the proposed project to precede with minimal effect to the environment, local community and surrounding land use practice.

IDM Environmental recommend the following:

- The mining volume be based on measured annual replenishment;
  - Elaborated on per **Appendix 2** hereto
- Limit in-stream mining methods to bar skimming;
  - Elaborated on per **Appendix 2** hereto
- Extract sand and gravel from the downstream 2/3rds portion of the sand bar;
- Concentrate in-stream extraction activities to minimise area of disturbance;
- Review cumulative effects of sand and gravel extraction;
- Maintain river channel flood discharge capacity;
- Minimise activities that release fine sediment to the river;
- Retain riparian buffer at edge of water and against river bank; and
- Limit in-stream operation to the period between April and November and during dry season only.

Any decision regarding the granting of authorization of this activity should also be subject to the implementation of all the management recommendations as contained in the Environmental Management Programme.

It is the opinion of the EAP that the information contained in the Basic Assessment Report, and the Specialist study have been compiled to address specific areas of concern, provided sufficient information to undertake a sound assessment of the proposal and provide an informed recommendation with a sufficient degree of confidence.