Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

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FILE REFERENCE NUMBER SAMRAD: KZN30/5/1/3/2/10507MP

Basic Assessment Process

PROPOSED SAND MINING PROJECT FOR MS SINGH OVER AN APPROXIMATE 5 HECTARES SECTION OF THE UMZIMKHULU RIVER

Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

CSIR Report Number: CSIR/IU/EMS/IR/2016/0002/A

August 2017

Prepared for:
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Lead Authors:
Babalwa Mqokeli and Minnelise Levendal

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1. IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme Report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any Report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17 (1) (c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

**It is therefore an instruction that** the prescribed Reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

**It is furthermore an instruction that** the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.
2. 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 managed, avoided 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 manage, avoid or mitigate identified impacts; and
   (iii) identify residual risks that need to be managed and monitored.
Requirements according to Appendix 1 of GNR 982 of 4 December 2014—Scope of Assessment and Content of BAR.

<table>
<thead>
<tr>
<th>Scope of Assessment and Content of BAR</th>
<th>SECTION IN BAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) A basic assessment report must contain all the information that is necessary for the competent authority to consider and come to a decision on the application, and must include -</td>
<td>Section a)</td>
</tr>
<tr>
<td>(a) details of –</td>
<td></td>
</tr>
<tr>
<td>i. the EAP who prepared the report; and</td>
<td></td>
</tr>
<tr>
<td>ii. the expertise of the EAP, including a curriculum vitae;</td>
<td>Appendix A</td>
</tr>
<tr>
<td>(b) the location of the activity, including:</td>
<td>Section b)</td>
</tr>
<tr>
<td>(i) the 21 digit Surveyor General code of each cadastral land parcel;</td>
<td></td>
</tr>
<tr>
<td>(ii) where available, the physical address and farm name;</td>
<td></td>
</tr>
<tr>
<td>(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;</td>
<td></td>
</tr>
<tr>
<td>(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale;</td>
<td>Appendix B</td>
</tr>
<tr>
<td>or, if it is-</td>
<td></td>
</tr>
<tr>
<td>(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or</td>
<td></td>
</tr>
<tr>
<td>(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;</td>
<td></td>
</tr>
<tr>
<td>(d) a description of the scope of the proposed activity, including-</td>
<td>Section d)</td>
</tr>
<tr>
<td>(i) all listed and specified activities triggered and being applied for; and</td>
<td>Appendix B</td>
</tr>
<tr>
<td>(ii) a description of the activities to be undertaken including associated structures and infrastructure;</td>
<td>(Map B2)</td>
</tr>
<tr>
<td>(e) a description of the policy and legislative context within which the development is proposed including-</td>
<td>Section dji)</td>
</tr>
</tbody>
</table>
**Scope of Assessment and Content of BAR**

(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;

(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;

(g) a motivation for the preferred site, activity and technology alternative;

(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 public participation process 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 interested and affected parties, 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;

(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the 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 determining 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.
### Scope of Assessment and Content of BAR

<table>
<thead>
<tr>
<th>SECTION IN BAR</th>
<th>aspects;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(viii) the possible mitigation measures that could be applied and level of residual risk;</td>
</tr>
<tr>
<td></td>
<td>(ix) the outcome of the site selection matrix;</td>
</tr>
<tr>
<td></td>
<td>(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and</td>
</tr>
<tr>
<td></td>
<td>(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;</td>
</tr>
<tr>
<td></td>
<td>(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:</td>
</tr>
<tr>
<td></td>
<td>(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and</td>
</tr>
<tr>
<td></td>
<td>(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;</td>
</tr>
<tr>
<td></td>
<td>(j) an assessment of each identified potentially significant impact and risk, including:</td>
</tr>
<tr>
<td></td>
<td>(i) cumulative impacts;</td>
</tr>
<tr>
<td></td>
<td>(ii) the nature, significance and consequences of the impact and risk;</td>
</tr>
<tr>
<td></td>
<td>(iii) the extent and duration of the impact and risk;</td>
</tr>
<tr>
<td></td>
<td>(iv) the probability of the impact and risk occurring;</td>
</tr>
<tr>
<td></td>
<td>(v) the degree to which the impact and risk can be reversed;</td>
</tr>
<tr>
<td></td>
<td>(vi) the degree to which the impact and risk may cause irreparable loss of resources; and</td>
</tr>
<tr>
<td></td>
<td>(vii) the degree to which the impact and risk can be avoided, managed or mitigated;</td>
</tr>
<tr>
<td></td>
<td>(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;</td>
</tr>
<tr>
<td>Scope of Assessment and Content of BAR</td>
<td>SECTION IN BAR</td>
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</tr>
<tr>
<td>(l) an environmental impact statement which contains-</td>
<td>Section I)</td>
</tr>
<tr>
<td>(i) a summary of the key findings of the environmental impact assessment;</td>
<td>Appendix B</td>
</tr>
<tr>
<td>(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</td>
<td>Section I(j)</td>
</tr>
<tr>
<td>(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;</td>
<td></td>
</tr>
<tr>
<td>(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;</td>
<td>Section m)</td>
</tr>
<tr>
<td>(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;</td>
<td>Section n)</td>
</tr>
<tr>
<td>(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;</td>
<td>Section o)</td>
</tr>
<tr>
<td>(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;</td>
<td>Section p)</td>
</tr>
<tr>
<td>(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;</td>
<td>Section q)</td>
</tr>
<tr>
<td>(r) an undertaking under oath or affirmation by the EAP in relation to:</td>
<td>Section r)</td>
</tr>
<tr>
<td>(i) the correctness of the information provided in the reports;</td>
<td></td>
</tr>
<tr>
<td>(ii) the inclusion of comments and inputs from stakeholders and I&amp;APs;</td>
<td></td>
</tr>
<tr>
<td>(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and</td>
<td></td>
</tr>
<tr>
<td>(iv) any information provided by the EAP to interested and affected parties</td>
<td></td>
</tr>
<tr>
<td>Scope of Assessment and Content of BAR</td>
<td>SECTION IN BAR</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>and any responses by the EAP to comments or inputs made by interested and affected parties; and</td>
<td>Section s)</td>
</tr>
<tr>
<td>(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;</td>
<td>Section t)</td>
</tr>
<tr>
<td>(t) any specific information that may be required by the competent authority; and</td>
<td>Section u)</td>
</tr>
<tr>
<td>(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.</td>
<td></td>
</tr>
</tbody>
</table>
PART A

SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

3. Contact Person and correspondence address

a) Details of

i) Details of the EAP

Name of the Practitioner: Council for Scientific and Industrial Research (CSIR) (Babalwa Mqokeli)

Tel No.: 021 888 2432
Fax No.: 021 888 2693
Email address: mlevendal@csir.co.za
bmqokeli@csir.co.za

ii) Expertise of the EAP

The Council for Scientific and Industrial Research has been one of the leading organisations in South Africa contributing to the development and implementation of environmental assessment and management methodologies. The CSIR’s Environmental Management Services (EMS) unit has over 20 years of experience in environmental management practices, involving conducting environmental assessment and management studies in over 15 countries in Africa. Key sectors of CSIR’s work include renewable energy, infrastructure, natural resource management, mining, industrial development and oil and gas. CSIR’s environmental assessments are conducted with national legal requirements as well as those of international agencies such as the World Bank, International Finance Corporation and World Health Organisation.

(1) The qualifications of the EAP (with evidence)

Minnelise Levendal: MSc Botany (Stellenbosch University)

Babalwa Mqokeli: MSc Ecological Science, Registered Candidate Natural Scientist (Cand.Sci.Nat.)

Please refer to Appendix A for the CVs

2) Summary of the EAP’s past experience

(In carrying out the Environmental Impact Assessment Procedure)

Minnelise Levendal is a Senior EAP in the EMS group of the CSIR and has a Master’s degree in Biological Science (Botany). She has 16 years of experience in Environmental Management (which includes ten years working as an EAP). Before she joined the CSIR she was employed at the DEA&DP where she assessed EIAs, BAs and EMPs. Minnelise is currently managing various EIAs for wind and solar renewable energy projects in South Africa. Minnelise was the CSIR project manager for the 100 MW Ubuntu Wind Energy Facility near Jeffreys Bay (Environmental Authorisation granted in June 2012), as well as the 50 MW Banna Ba Pifhu Wind Energy Facility proposed by WKN Windcurrent near Humansdorp in the
Eastern Cape (Environmental Authorisation granted in July 2014). She was the project manager of ten BAs for wind monitoring masts in South Africa as part of the National Wind Atlas Project of the Department of Energy. Environmental Authorisation from the DEA for all the ten masts was obtained in 2010. Minnelise is currently managing the Special Needs and Skills Development Programme.

Babalwa Mqokeli has 2 years of experience in the environmental management field, as an ecological scientist. She joined the CSIR in 2015 working under the Special Needs and Skills Development Programme and is currently a Junior Environmental Assessment Practitioner undertaking several Basic Assessments under this Programme for mining and agriculture, as well as EIAs for renewable energy projects in South Africa. Her expertise includes terrestrial and aquatic ecological monitoring, and environmental assessments.

b) Location of the overall Activity

The proposed mining site is situated approximately 1.5 km from the N2 Highway, located in and around the Umzimkulu River. The proposed project is situated over the Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area of KwaZulu-Natal.

Table 3-1: Property description and location

<table>
<thead>
<tr>
<th>Farm Name</th>
<th>Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application area (Ha)</td>
<td>5 hectares</td>
</tr>
<tr>
<td>Magisterial district:</td>
<td>Ray Nkonyeni Local Municipality and UGU District Municipality</td>
</tr>
<tr>
<td>Distance and direction from nearest town</td>
<td>The site is situated on the banks of the Umzimkulu River about 7 km inland from Port Shepstone. It is approximately 1 km from the main road in Batstones Drift.</td>
</tr>
<tr>
<td>21 digit Surveyor General Code for each farm portion</td>
<td>NOET000000001747400000</td>
</tr>
<tr>
<td></td>
<td>NOET0000000262400000</td>
</tr>
</tbody>
</table>
c) Locality Map
(show nearest town, scale not smaller than 1:250000)
d) Description of the scope of the proposed overall activity

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site (Please refer to the site layout map attached as Map 2 in Appendix B)

i) Listed and specified activities

<table>
<thead>
<tr>
<th>NAME OF ACTIVITY</th>
<th>AERIAL EXTENT OF THE ACTIVITY</th>
<th>LISTED ACTIVITY</th>
<th>APPLICABLE LISTING NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining activities in close proximity to and/or within water features on site</td>
<td>5Ha</td>
<td>X</td>
<td>GNR 327 of 2017: Activity 19</td>
</tr>
<tr>
<td>Mining operation requiring a mining permit, including associated infrastructure</td>
<td>5 Ha</td>
<td>X</td>
<td>GNR 327 of 2017: Activity 21</td>
</tr>
<tr>
<td>Clearing of less than 800 m² of vegetation within the footprint of the</td>
<td>0.08 Ha</td>
<td>X</td>
<td>GNR 324 of 2017: Activity 12 d. (iv) (v)</td>
</tr>
<tr>
<td>proposed mining operation. A portion of the mining site falls within a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>threatened ecosystem and CBA 3 in the 2011 KZN Terrestrial Systematic Conservation Plan.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(ii) Description of the activities to be undertaken

S. Singh requires a Mining Permit for the proposed establishment of a small scale 5 hectares sand mining operation. The mining project will be located on land adjacent to the Remainder of Farm Seafield No. 17474 and Remainder of Ambleside No. 2624, Port Shepstone, Kwa-Zulu Natal. The proposed method consists of the mining of +/-100 cubic metres of riversand per day from the riverbed using a mechanical pump and left to dry +/- 20 metres from the riverbank.

SITE INFRASTRUCTURE:

Construction phase

The main road in Batstones Drift will be used to access the site, where there is an existing road leading to the mining area.

Site infrastructure will include a chemical toilet and waste bin, and no buildings will be erected on site. Equipment and/or plant will include a Loader and truck for the transportation of sand material, and a vehicle for staff transport. Therefore no infrastructure associated with the mining site will require breaking down or demolishing at closure. The areas used for facilities or equipment will be
less 800 m² and will be rehabilitated post-mining operations by maintaining the general topography of the area, ensuring that there are no remnants of the structures.

**Operational phase**

The proposed project will include the mining of sand from the river bed of a 5 hectares section of the uMzimkhulu River. Sand will be removed together with the water using a pump system, where sand will be temporarily piled into a pit on the bank. The sand remains in the pit and the water flows back into the river. Disturbance of the Riparian zone will be avoided to ensure that the river bank is not disturbed and the river is not diverted. The Loader or Tip-truck will haul the sand for removal from the stockpile area.

**Decommissioning phase**

Closure and rehabilitation of the stockpile area will be undertaken when the project ceases operation. At the end of the project life cycle, a thick soil layer of approximately 333 mm will be spread across the disturbed areas; thereafter the soil will be ripped, fertilised and re-vegetated. Post-closure monitoring will assist in determining the success of the rehabilitation and also identify whether any additional measures need to be taken to ensure the area is restored to a reasonable and acceptable condition. The area where sand was mined will be rehabilitated naturally during the rainy season where flood waters will deposit more sand across the mined area.

e) Policy and Legislative Context

<table>
<thead>
<tr>
<th>APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT</th>
<th>REFERENCE WHERE APPLIED</th>
<th>HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE LEGISLATION AND POLICY CONTEXT.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)</td>
<td>Mining activities</td>
<td>This BA and EMP report has been compiled in accordance with the Act.</td>
<td></td>
</tr>
<tr>
<td>National Environmental Management Act (Act No. 107 of 1998)</td>
<td>Mining activities</td>
<td>This BA is being undertaken in terms of NEMA in order to determine any possible impacts on the environment and to undertake mitigation measures that reduce any potential harm to the environment.</td>
<td></td>
</tr>
<tr>
<td>Environmental Impact Assessment Regulations: GNR 326 to 324 of 7 April 2017</td>
<td>Mining activities</td>
<td>Listed activities as per the NEMA EIA Regulations have been considered and authorisation is thus required with regards to the triggering activities.</td>
<td></td>
</tr>
<tr>
<td>Act/Act No.</td>
<td>Purpose</td>
<td>Details</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>---------</td>
<td>---------</td>
<td></td>
</tr>
<tr>
<td>National Water Act, 1998 (Act No. 36 of 1998)</td>
<td>Mining activities</td>
<td>An application for a water use licence has been submitted to the competent authority and all water uses associated with the proposed project will be exercised upon authorisation.</td>
<td></td>
</tr>
<tr>
<td>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)</td>
<td>Not applicable</td>
<td>Listed activities as per the 2013 NEM:WA Regulations have been considered and it has been determined that a waste licence is not required.</td>
<td></td>
</tr>
<tr>
<td>The National Heritage Resources Act (Act No. 25 of 1999)</td>
<td>Management/monitoring measures</td>
<td>An application for Heritage Resources review was submitted to SAHRA (Case ID: 10367) in terms of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) as amended, in which consideration of heritage resources was requested. A heritage analysis was undertaken for the proposed development and a report from ASHA has been included in Appendix 2.19.2. of Appendix D.</td>
<td></td>
</tr>
<tr>
<td>BGIS (<a href="http://www.bgis.sanbi.org.za">www.bgis.sanbi.org.za</a>)</td>
<td>Baseline environmental description</td>
<td>Used during desktop research to identify sensitive environments within the proposed mining area.</td>
<td></td>
</tr>
<tr>
<td>Agricultural Geo-Referenced Information System (AGIS) Comprehensive Atlas</td>
<td>Baseline environmental description</td>
<td>Compilation of this report has made use of the atlas to determine land capability of the site with respect to the proposed development.</td>
<td></td>
</tr>
<tr>
<td>Municipal Integrated Development Plan (2015/2016 – 2017/2018)</td>
<td>Needs and desirability of the proposed activities</td>
<td>Municipal plans were used to identify relevant socio-economic information and spatial development information within which the area falls under.</td>
<td></td>
</tr>
<tr>
<td>KwaZulu-Natal Provincial Development Plan</td>
<td>Needs and desirability of the proposed activities</td>
<td>Municipal plans were used to identify relevant socio-economic information and spatial development information within which the area falls under.</td>
<td></td>
</tr>
</tbody>
</table>
f) Need and desirability of the proposed activities.

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

The proposed project is for a small-scale mining operation near Port Shepstone area, located in the Ray Nkonyeni Municipality, which falls within the UGU District Municipality. The Ray Nkonyeni Municipality is faced with challenges of unemployment and poverty, making socio-economic development one of the municipality’s main priorities, aimed to provide job opportunities and reduce poverty levels. The proposed mining operation will provide good quality sand to the local building industry for use in the construction of roads and buildings. It would ultimately contribute towards the wider socio-economic development of the area in the form of job opportunities and service delivery through promoting infrastructural development.

The South African mining industry has its origin in small-scale mining activities, with these operations offering much needed employment opportunities and entrepreneurship, as well as contributing to the local economy. The municipality’s 2016/17 Integrated Development Plan (IDP) objective in attaining the long-term vision; includes an enabling environment for socio-economic opportunities through creating employment opportunities, alleviating poverty and promoting socio-economic development, creating opportunities for youth and women empowerment, and supporting cooperatives and SMMEs in growth opportunities. Ms Singh has thus identified an opportunity as the proposed project will add great socio-economic value to the Port Shepstone area. It could contribute to the local economic opportunities, the business, ultimately impacting socio-economic development of the area in support of the municipality and district’s development opportunities and targets/goals.

g) Motivation for the overall preferred site, activities and technology alternative.

Mining is important for economic development, to construct durable, modern structures, employment creation and revenue collection. The proposed site has previous sand mining activities, known to provide good quality silica sand to the local building industry. This type of sand is commonly used for cement and concrete used in the construction of roads and buildings. The project site is located in the Ray Nkonyeni Municipality, and according to the municipality’s 2016/17 Local Economic Development Strategy, the identified economic sectors of the municipality are Tourism, Agriculture, Manufacturing and Mining.

h) Full description of the process followed to reach the proposed preferred alternatives within the site.

NB!! This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

(i) Details of the development footprint alternatives considered.

With reference to the site plan provided as Appendix 4 and the location of the individual activities on site, provide details of the alternatives considered with respect to:

(a) the property on which or location where it is proposed to undertake the activity;

No property alternatives have been considered as the envisaged mining operations will occur in an area of existing mining operations, and also in close proximity to the access road. The proposed site is the only land that is within reasonable reach to the applicant.
(b) the type of activity to be undertaken;

No alternatives to the mining of sand have been considered; sand mining is a viable business opportunity for the applicant. It is of the applicant’s personal knowledge that the site possessed viable volumes of minable sand deposits, as evident during previous mining activities undertaken by the applicant’s relative.

(c) the design or layout of the activity;

The site layout was determined by considering both spatial and practical mining operation aspects. The proposed layout and temporary nature of the mining activity and associated infrastructure will be implemented with the aim to reduce substantial impacts on the area.

(d) the technology to be used in the activity;

No alternative technology has been considered for the proposed mining activity.

(e) the operational aspects of the activity; and

The optimal operational activities have been proposed, inclusive of the site layout and mobile infrastructure, in consideration of spatial aspects, post-mining appearance, as well as reducing costs and impacts associated with stripping down built infrastructure.

(f) the option of not implementing the activity.

The option of not implementing the activity has been considered, and assumes that should the proposed activity not proceed then the status quo would remain. This includes no clearing of any vegetation, no digging of sand pits, no sand mining operations on site and no decommissioning at the end of the project life cycle. It also assumes that the high possibility of this activity to lead to socio-economic gains will not be realised and, therefore the option of not implementing the activity will not be pursued at this stage.

(ii) Details of the public participation process followed

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

A Basic Assessment is required to obtain Environmental Authorisation for Ms Singh’s proposed Sand Mining Project. A public participation process was undertaken as part of the Basic Assessment process and was done in the following manner:

**Project Announcement and Draft BA Report Phase**

Notice of the Basic Assessment process has been given by:

(1) placing a Site Notice on the Farm fence;

(2) posting and emailing written notice and Background Information Document (BID) regarding the proposed development to Interested and Affected Parties, including neighbours and Ward councillor, competent authority and other relevant Government departments;
(3) placing an advertisement in the South Coast Herald newspaper, which allowed potential Interested and Affected Parties to register and to submit comments within a 30-day period regarding the Basic Assessment of the proposed project;

(4) a copy of the Draft Basic Assessment Report was placed at the Port Shepstone Public Library;

(5) letters notifying I&AP’s of the release of the Draft Basic Assessment Report for 30-day review period were sent out on the 28th July 2017;

(6) the Draft Basic Assessment Report is also available on the project website: https://www.csir.co.za/environmental-impact-assessment

(7) all comments raised by I&APs during the review of the BID were captured and addressed within the Draft BA Report;

(8) the Draft BAR was distributed for 30-days to registered I&APs and organs of state. The commenting period ended on 29 August 2017.

**Final BA Report Phase**

All comments raised by I&AP’s during the 30-day review period of the Draft BA Report have been included in the enclosed Final Basic Assessment Report. Appendix C contains all correspondence received from I&AP’s and the Competent Authority, as well as the Issues and Responses Report. As part of the submission of this final report, I&AP’s will be notified of the submission and the report will be placed on the following website: http://www.csir.co.za/ems/specialneeds/
(iii) Summary of issues raised by I&APs

*Please note that the comments are taken verbatim from the comments provided by Interested and Affected Parties

Comments received following the project announcement on 26 September 2016 (prior to the release of the Draft Basic Assessment Report)

<table>
<thead>
<tr>
<th>Interested and Affected Parties</th>
<th>Date Comments Received</th>
<th>Comments/Issues raised</th>
<th>EAPs response to issues as mandated by the applicant</th>
<th>Section and paragraph reference in this Report where the issues and/or responses were incorporated</th>
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</thead>
<tbody>
<tr>
<td>Kraigen Govindsamy</td>
<td>26/09/2016</td>
<td>Please be advised that this particular project falls within the geographical boundaries of the Ugu District Municipality, and therefore under their area of jurisdiction in terms of the provision of comment/s. I have accordingly forwarded your correspondence to the relevant official (cc’d into this correspondence) for their attention. Kindly forward all further correspondence relevant to this project to her.</td>
<td>Thank you for your assistance in this regard, the information regarding the project was forwarded to Mr Ngcobo.</td>
<td>Correspondence to Mr Ngcobo is included in Appendix C4.1(b).</td>
</tr>
<tr>
<td>Interested and Affected Parties</td>
<td>Date Comments Received</td>
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</tr>
<tr>
<td>Name</td>
<td>Organisation</td>
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<tr>
<td>Philip Christiansen</td>
<td>UGU District Municipality</td>
<td>27/09/2016</td>
<td>- There is a need to provide adequate toilet facilities on site, as well as piped portable water supply. The toilets need to be proper flushed cisterns. Facilities need to be provided for refuse removal. There must be sufficient shower and locker facilities for all staff employed on the premises. All precautions need to be taken to ensure minimum environmental damage.</td>
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<td>- Thank you for the comments provided. The proposed project will make use of a portable chemical toilet which will be placed away from the river to avoid any contamination. Waste bins will be provided on site for general waste, and will be removed from site regularly. Shower and locker facilities are not considered for the proposed project as the only activity to be undertaken on site is sand mining. Workers will be transported to and from site, and it is thus expected that they will not need to shower on site. The temporary nature of the proposed project layout aims to reduce impacts associated with erecting structures on site and stripping down those structures post-mining activities. Precaution will be undertaken to avoid and/or minimise impacts that are detrimental to the environment. An Aquatic Ecology Assessment was undertaken with</td>
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<td></td>
<td>Facilities and structures proposed in association with the proposed project are included in Section d(ii) of this Draft Basic Assessment Report (BAR). Management of impacts, as well as mitigation measures recommended for the proposed project are addressed in Section (viii) of this Draft BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project.</td>
</tr>
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<thead>
<tr>
<th>Name</th>
<th>Details</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayanda Mnyungula</td>
<td>KZN Department of Agriculture, Forestry &amp; Fisheries</td>
<td>This letter serves as a notice of receipt for the above mentioned document(s) received on the 26th of September 2016. Should any further information be required, please do not hesitate to contact this office.</td>
</tr>
<tr>
<td>Dieter Wortmann</td>
<td>HNK Geomatics</td>
<td>Thank you for the comment, it is noted. Mr Wortmann was added to the project database, and the map was sent.</td>
</tr>
<tr>
<td>Karen M</td>
<td>Department of Agriculture, Forestry and Fisheries</td>
<td>Thank you for the comment. The requested file was sent to the Department.</td>
</tr>
<tr>
<td>Nomvuyo Nkotha</td>
<td>Department of Agriculture, Forestry and Fisheries</td>
<td>Thank you for the provided comment and/or feedback with reference to the proposed development.</td>
</tr>
</tbody>
</table>

Kindly refer to Appendix C4.4 for the proof of correspondence.
With regards to the BID received on the 3rd May 2017 and the site inspection conducted on the 5th May 2017, the proposed site consists of alien invasive plant species and had previously mining activities which was evident from the site. There are no natural forests and/or protected trees that were identified within the proposed development footprint that will be affected in terms of Section 7 and 15 the Natural Forests Act, 1998 (Act 84 of 1998). Therefore, DAFF has no objection towards the proposed project. However, the following mitigation measures should be considered:

- The pristine patch of natural coastal forest that falls outside the project footprint area on the northern bank of the river should be clearly identified.

C4.6.2 for the proof of correspondence.

Management of impacts, as well as mitigation measures recommended for the proposed project are addressed in Section (viii) of this Draft BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project.
**demarcated as a no-go area during all phases of construction.**

- ECO should ensure that staff is trained accordingly to ensure no destruction of this natural forest patch during all phases of the project.
- The temporary stockpile and Toilet area should be constructed on open areas or where there is a presence of alien invasive plant species.

| Liziswa Jiba | Ray Nkonyeni Municipality | 20/10/2016 | Loss of sand which is already a problem. Destruction of habitat and many other ecological and water quality issues. |
|--------------|---------------------------|------------|---------------------------------------------------------------------------------
<p>|              |                           |            | Thank you for the comment. Sand extraction will be limited to the dry season and extraction will not exceed the annual accumulation rate, that is monitoring and mitigation measures as proposed in the EMPr should be implemented to ensure sand extracted is replenished naturally by upstream transport and does not exceed the recruitment rate. |
|              |                           |            | An Aquatic Ecology Assessment has been undertaken with regards to the proposed project, a report was produced thereof which details of the impacts associated with the project and mitigation measure to reduce negative impacts on the environment. |
|              |                           |            | Kindly refer to <strong>Appendix D</strong> for the Specialist Report and the EMPr section of this Draft BAR. |</p>
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<tr>
<td>Bernadet Pawandiwa</td>
<td>21/11/2016</td>
<td>Thank you for submitting this application for comment in terms of NEMA. The application has been considered and it has been established that the site falls in a generally sensitive zone associated with human activity relating to the stone age and historical era. The fossil sensitivity map places this development in an area of moderate paleontological sensitivity. A Heritage Impact Assessment is therefore required. This should have an archaeological component and a paleontological component. The developer is therefore required to appoint specialists in this field to conduct a field-based archaeological study that looks at both cultural remains and a historical study as well as a desktop study covering the fossil sensitivity. The Study should cover: • Identification of all heritage resources in the development area and its surroundings - 50m • Assessment of the impact of the development on such heritage • Evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development</td>
<td>Thank you for the comments provided. Comment is noted.</td>
<td>Kindly refer to Appendix D of this Report.</td>
</tr>
<tr>
<td>Amafa Heritage KZN</td>
<td></td>
<td></td>
<td></td>
<td>Kindly refer to the supporting HIA report attached as Appendix D.</td>
</tr>
</tbody>
</table>

Thank you for the comments provided. Comment is noted.

A heritage analysis was undertaken for the proposed development, assessing both the archeology and paleontology, including a brief discussion on other aspects of heritage. A Heritage Impact Assessment Study, including the information pertaining to the Heritage Impact Assessment Exemption has been included in Appendix D of this report.

- A Heritage Impact Assessment study was carried out in this regard, assessing heritage resources in the vicinity of the study area.
- An assessment of the potential impacts to heritage resources that

Kindly refer to Section (viii) of this BAR, as well as in the Environmental
- Results of consultation with communities affected by the proposed development and other interested and affected parties regarding the impact of the development on heritage resources.
- Consideration of alternatives if heritage resources are affected by the development
- Mitigation plans for any adverse effects during and after completion of the project
- Table of all heritage resources identified. This should show Heritage resource type, description, location, significance and reasons for this rating.

Please download our list of Heritage Practitioners from our website [www.heritagekzn.co.za](http://www.heritagekzn.co.za).

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might occur through the proposed development was conducted.

- Proof of correspondence sent to registered I&APs and stakeholders during the Project Initiation and Draft Basic Assessment Phases is included in Appendix C of this Final BA Report. The issues raised and comments received from I&APs and key departments were captured in the Issues and Responses Trail and addressed in this finalised BA Report, where required and as applicable (this Section and Appendix C5 & C6 of the BA Report, i.e. this. The comments raised by stakeholders, I&APs and

- The HIA study concluded that there are no significant heritage resources present on the site and significant impacts are thus not expected.

- The applicable mitigation measures are included in this report and the supporting HIA report attached.

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Management Programme (EMPr) of the proposed project. Kindly refer to Appendix C of this Final BAR.

Kindly refer to the supporting HIA report attached as Appendix D. Kindly refer to Section (viii) of this BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project.
<table>
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</table>
| Ms RJ Madibe        | Department of Water & Sanitation | 22/11/2016             | - This Department would like these to be addressed in the Basic Assessment Report:  
  1. The management of solid waste and hazardous waste material generated during the mining phase of the project.  
  3. Wastewater and sewage treatment and/or management including the type of toilet facilities.  
  4. Erosion control measures to be implemented.  
  5. Environmental Management Programme for the mining phase of the project.  
  6. Spill contingency plan for the mining phase of the project.  
  7. Please note that any activity occurring within a 500 meter (m) radius from the boundary of any wetland requires a Water Use Licence in terms of Section 21 (c) and (i) – i.e. “impeding or diverting the flow of water in a watercourse” and “altering the bed, banks, course or |

  | EAPs response to issues as mandated by the applicant | Section and paragraph reference in this Report where the issues and/or responses were incorporated |
|---------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                     | Thank you to the Department for the comments provided. | Name |
|                     | Response to the Department comments:                 |                                              |
|                     | 1. Mitigation measures for Waste Management have been included in the EMPr section of this report. | Section and paragraph reference in this Report where the issues and/or responses were incorporated |
|                     | 2. Mitigation measures for stormwater management have been included in the EMPr section of this Report. | Section and paragraph reference in this Report where the issues and/or responses were incorporated |
|                     | Recommendations for stormwater management will be considered by the Applicant during the design, construction and operation phases, as applicable and where possible. | Section and paragraph reference in this Report where the issues and/or responses were incorporated |
|                     | 3 & 4. Key monitoring and mitigation measures have been included in the EMPr section of this Report, inclusive of recommendations from the specialist study undertaken and precautionary/monitoring | Section and paragraph reference in this Report where the issues and/or responses were incorporated |
characteristics of a watercourse” respectively in terms of the National Water Act, 1998 (Act No 36 of 1998) (NWA).

8. A Wetland Delineation Study and a Functional Assessment must be carried out in accordance with the following document “A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas” for all wetlands occurring onsite and in close proximity to the site (refer to Point 7).

9. The river, stream, and associated tributaries must be treated as sensitive environment areas. Caution must be exercised when developing near any watercourse. Please note that the Applicant will require an authorisation from the Department for any activity within the riparian habitat or 1:100 year floodline, whichever is the greatest distance.

10. The Applicant must note that river crossing structures such as bridges and causeways constitutes a Section 21 (c) and/or Section 21 (i) water uses and must be authorised under the provisions of the NWA.

11. It is the responsibility of the Applicant to identify all water uses applicable to his undertakings in terms of Section 21 of the NWA and ensure that all measures to avoid and/or minimise impacts.

5. An EMPr with detailed mitigation measures that must be adhered to during the mining activities is included in this Report.

6. Spill prevention measures have been included in the EMPr of this Report.

7. Comment noted and complied with. The Applicant has made contact with the Department with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm whether an application for a Licence is required. Proof of correspondence is included in Appendix C4.9 of this Report.

8. Comment noted and complied with. An Aquatic Ecology Assessment has been undertaken with regards to the proposed project.

9. Comment noted and complied with.

10. Comment noted and complied with. The Applicant
applicable water uses are authorised as such. The Applicant must consult with this Department if clarity is required with regard to water uses and water use authorisation. These water uses are listed in Table 1 (Included in Appendix C.8).

12. If one or more of the water uses as per the NWA is proposed or currently occurring on a property requires a water use licence, then by default all other water use activities taking place on that property, irrespective if it would be regulated by a GA, would require to apply for a water use licence.

13. The onus is on the Applicant to identify all the water uses activity to be undertaken in relation to the proposed project and ensure that authorisation is obtained prior to commencing with the activities. Ms Zama Hadebe of this Department’s Water Use Authorisation Section must be contacted (031 336 2700) for a pre-application meeting to determine the type of authorisations required and the requirements thereof.

This Department awaits a copy of the Basic Assessment Report for further comments.

has made contact with the Department with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm whether an application for a Licence is required. Proof of correspondence is included in Appendix C4.9 of this Report.

11. Comment noted and complied with.

12. Comment noted.

13. Comment noted, refer to Response 10 above.

A copy of this DBAR was sent to the Department for comment and/or review.
## Comments received following the release of the Draft Basic Assessment (BA) Report on 28 July 2017

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<tr>
<td><strong>Ms Liziswa Jiba</strong></td>
<td>15/08/2017</td>
<td>- The Section; Environmental Management has no objections towards the proposed project. The section trusts that all the necessary recommendations by the relevant authorities and specialists will be followed through in order to ensure compliance and maximum mitigation of all negative impacts on the environment</td>
<td>- Thank you for the comments provided. The EMPr of this proposed project must form part of the contractual agreement and be adhered to by both the contractors/workers and the applicant.</td>
<td>Management of impacts, as well as mitigation measures recommended for the proposed project are addressed in Section (viii) of this BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project.</td>
</tr>
<tr>
<td>Ray Nkonyeni Municipality</td>
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<tr>
<td><strong>Ms Seokwang Modise</strong></td>
<td>15/08/2017</td>
<td>- Based on the information provided on this DBAR, the proposed activity will have no impacts on trees or natural forests protected under the National Forests Act, Act No. 84 of 1998. Therefore, comments dated 11 May 2017 from the Department of Agriculture, Forestry and Fisheries (DAFF) still apply and should strictly be adhered to. These comments do not exempt you from considering other environmental legislations. Should there be any additional information required, please do not hesitate to contact this office.</td>
<td>- Thank you for the comment provided, it is noted.</td>
<td>N/A</td>
</tr>
<tr>
<td>KZN Department of Agriculture, Forestry &amp; Fisheries: Forestry Regulations &amp; Support</td>
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<td>Name</td>
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<tr>
<td>Ms P. Ncapayi</td>
<td>KZN Department of Economic Development, Tourism and Environmental Affairs</td>
<td>18/08/2017</td>
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</table>

1. According to the Environmental Assessment Practitioner (EAP), the total area available for the mining activity is 5 hectares including the stockpiling area and is along the Umzimkulu River within the Ugu Magisterial District. The method consists of mining of ±100 m$^3$ of river sand per day from the river bed using a mechanical pump.

2. The Draft Basic Assessment Report has been reviewed and the following must be addressed: i. A thorough assessment of the direct, indirect and cumulative impacts of this proposed sand mining operation in relation to the existing sand mining operations located up-stream and downstream of the uMzimkhulu River.

3. It is noted that the development has the potential to trigger the following listed activities as well, which have not been applied for nor assessed, activities 19 and 27 of listing Notice 1. Please note that it is the responsibility of the EAP to determine all listed activities that the proposed development will trigger.

4. It is the applicant’s responsibility to comply with any other statutory requirements that may be applicable to the carrying out of the activity.

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2. Management of impacts, as well as mitigation measures recommended for the proposed project are addressed in Section (viii) of this Final BAR, as well as in the Aquatic Ecology Assessment included as Appendix D.

3. Kindly refer to Section dji) and djj) of this Report for a list of activities identified, as well as the revised details of the area to be cleared.
**Interested and Affected Parties**

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</thead>
<tbody>
<tr>
<td>Mr T.G Ntlhanakoe</td>
<td>Department of Water &amp; Sanitation</td>
<td>25/08/2017</td>
<td>-</td>
<td>This Department has the following comments with regards to the proposed mining project: <strong>(1) Water Use Authorisations and Water Resources</strong> (1.1) Page 27 of the Report states that the proposed mining area is within the UMzimkhulu River bed. This Department would like to bring to the attention of the Applicant that River crossing structures such as bridges and causeways constitutes a Section 21 (c) and/or Section 21 (i) water uses, i.e. “impeding or diverting the flow of water in a watercourse” and “altering the bed, banks, course or characteristics of a watercourse,” respectively,” must be authorised under the provisions of the National Water Act, 1998 (Act No 36 of 1998) (NWA). (1.2) This Department would like to bring to the attention of the Applicant that any pollution control dam, attenuation pond, box cut, stockpile, settling ponds, waste dumps and mining voids are identified as Section 21 (g) water use, i.e. disposing of</td>
<td>Thank you to the Department for the comments provided. Response to the Department comments: (1.1) Comment noted and complied with. The Applicant has made contact with the Department with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm whether an application for a Licence is required. Proof of correspondence is included in Appendix C4.9 of this Report. A wetland study was undertaken and attached as part of this Report. The application for a Water Use Licence is in process, as with the pre-application meeting conducted with the Department (1.2) Comment is correct and noted. Kindly see Response (1.1) above with regards to Authorisation. Mitigation</td>
<td>(1.1) Kindly refer to Appendix C4.9 of this Report for proof of correspondence, as well as Appendix D for the wetland Study included as part of the Aquatic Ecology Assessment. (1.2) Management of impacts, as well as mitigation measures recommended for the</td>
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</table>
waste or water containing waste in a manner which may detrimentally impact on a water resource; and must be authorised as such in terms of the National Water Act, 1998 (Act No 36 of 1998) (NWA).  
(1.3) The Applicant will require an authorisation from this Department for any activity within the riparian habitat or 1:100 year floodline, whichever is the greatest distance.  
(1.4) Page 29 of the Report indicates the presence of wetlands on site. Please note that any activity within a 50m radius from the boundary of a wetland requires a water use licence in terms of Section 21 (c) and (i) of the NWA. Should an activity be identified as a possible Section 21(i) water use, the Applicant must delineate the watercourse and riparian habitat using the Departmental guideline, “A practical field procedure for identification and delineation of wetlands and riparian areas”.  
(1.5) A wetland delineation study and functionality assessment must be carried out for any wetland occurring on site.  
(1.6) Management and Rehabilitation plan after mining must be forwarded to this Department.  
(1.7) Please note that no mining should take place on the banks of any river, stream, dam, pan or lake without the measures for Waste Management and Recommendations for stormwater management have been included in the EMPr section of this report, and will be considered by the Applicant during the design, construction and operation phases, as applicable and where possible.  
(1.3) Comment is correct and noted. Kindly see Response (1.1) above with regards to Authorisation.  
(1.4) Comment noted and complied with. A Specialist study was undertaken as part of this assessment, kindly refer to the Aquatic Ecology Assessment Report included as Appendix D.  
(1.5) A wetland delineation study and functionality assessment was undertaken as part of this Basic Assessment.  
(1.6) Comment noted and will be complied with.  
(1.7) Comment noted and will be complied with proposed project are addressed in Section (viii) of this Final BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project and the Aquatic Ecology Assessment included as Appendix D.
necessary authorization in terms of Section 21 (c) and (i) of the NWA.  
(1.8) The project requirements do not include any abstraction of water apart from the sand mining activity of pumping sand from the river. Bottled water brought to site by the Applicant will be used for general activities such as drinking purposes.  
(1.9) Comment noted and will be complied with.  
(1.10) Key monitoring, prevention and mitigation measures have been included in Section (viii) of this Final BAR, and in the EMP section of this Report, inclusive of recommendations from the specialist study undertaken and precautionary/monitoring measures to avoid and/or minimise impacts associated with the proposed sand mining operation.  
(1.10) Kindly refer to Section (viii) of this BAR, as well as the Environmental Management Programme (EMPr) of the proposed project.
the activity will not impact on the water resource. Mitigation measures must also be included. The supporting documentation must be in the M40 series format.

(1.11) Please note that no person may use water other than as permitted under the NWA. Should you engage in any water use without the necessary water use authorisation it will be regarded as an unlawful water use and you will be guilty of an offence and liable for a fine or imprisonment as stipulated in Section 151 of the NWA.

(1.12) If one or more of the water uses as per the NWA is proposed or currently occurring on a property requires a water use licence, then by default all other water use activities taking place on that property, irrespective if it would be regulated by a GA, would require to apply for a water use licence.

(1.13) A pre-Water Use Licence Application meeting is recommended during which technical and administration requirements as well as the type of authorisation required will be discussed. Please contact Ms Zama Hadebe of the Water Use Authorisation Unit on 031 336 2767/2700.

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<tr>
<td>(1.11) Comment noted and will be complied with.</td>
<td>(1.11) N/A</td>
<td></td>
</tr>
<tr>
<td>(1.12) Comment noted and will be complied with.</td>
<td>(1.12) N/A</td>
<td></td>
</tr>
<tr>
<td>(1.13) Comment noted and complied with. The Applicant has made contact with the Department with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm whether an application for a Licence is required. A follow-up meeting is in process following to the submission of the wetland study as part of the</td>
<td>(1.13) Proof of correspondence is included in Appendix C4.9 of this Report.</td>
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</tbody>
</table>
(1.14) It is the responsibility of the Applicant to identify all water uses applicable to the mining project in terms of Section 21 of the NWA and ensure that all applicable water uses are authorised as such. The Applicant must consult with this Department if clarity is required with regard to water uses and water use authorisations. These water uses are listed in Table 1. (Table is in the proof of correspondence included in Appendix C4.13)

2. Solid Waste Management

(2.1) All waste material generated must be disposed of at a licenced/permitted landfill site that is authorised to accept such waste. Safe disposal certificates must be kept on record.

(2.2) Should private contractors be used, all solid waste must be disposed of at a licenced/permitted landfill site, and proof of this must be made available to this Department when required.

(2.3) Such waste must be placed in skips stored in a designated storage/collection area prior to being safely disposed of and must not cause any surface and groundwater pollution or pose any health hazards.

Draft Basic Assessment Report

(1.14) Comment noted.

2. Solid Waste Management

(2.1) Mitigation measures for Waste Management have been included in Section (viii) of this Final BAR, and the EMPr section of this report.

(2.2) Comment noted and will be complied with. The EMPr of this proposed project must form part of the contractual agreement and be adhered to by both the contractors and the applicant.

(2.3) Comment noted and will be complied with. Mitigation measures for waste storage and management have been included in Section (viii) of this Final BAR.
(2.4) All contaminated material and hazardous waste material must be disposed of at a licenced/permitted landfill site. The only 2 low hazardous landfill sites in the KwaZulu Natal province are the Shongweni and KwaDukuza landfill Sites.

(3) Sewage and Wastewater Management

(3.1) Washing, refuelling, maintaining of vehicles or the transfer of hazardous substances must be conducted within a bunded area. All drainage arising from the bunded area must be treated as a water containing waste and disposed of safely.

(3.2) The use of temporary, chemical toilet facilities must not cause any pollution to water sources as well as pose a health hazard, and must be located out of the 1:100 year floodline of a watercourse.

(3.3) No form of secondary pollution should arise from the disposal of sewage and refuse. The contractor must be clearly briefed on the method of disposal of such waste and compliance must be ensured/monitored. Any pollution problems arising from the above and the EMPr section of this report.

(2.4) Comment noted and will be complied with. Thank you to the Department for the provided information.

(3) Sewage and Wastewater Management

(3.1) Key monitoring and mitigation measures have been included in the EMPr section of this Report, inclusive of recommendations from the specialist study undertaken and precautionary/monitoring measures to avoid and/or minimise impacts.

(3.2) Recommendations for The toilet facility will be considered by the Applicant and implemented during the design, construction and operation phases. Spill prevention measures have been included in the EMPr of this Report.

(3.3) An EMPr with detailed mitigation measures, as well as the description for compliance that must be adhered to during the mining activities is included in

(3) Kindly refer to Section (viii) of this Final BAR, and the EMPr section of this report.
(4) Stormwater Management

(4.1) It is imperative that there is proper management of storm water on site. A Stormwater Management Plan must also be prepared in accordance with the “Best Practice Guidelines for Water Resource Protection in the South African Mining Industry” (G Series: G1 - DWAF, 2008). The Stormwater Management Plan must be approved by the relevant local Municipality.

(4.2) The Engineer or Contractor must ensure that only clean stormwater/runoff enters the environment.

(4.3) Drainage must be controlled to ensure that runoff on site does not culminate in off-site pollution, flooding or result in any damage to properties downstream of any storm water discharge.

(5) Erosion Control

(5.1) Potential sources of sediment must be minimised from the outset. This means limiting the extent (area) and this Report and Section (iv) of the EMPr.

(4.1) Comment noted and will be complied with. Mitigation measures for stormwater management have been included in the EMPr section of this Report

(4.2) Comment noted and will be complied with.

(4.3) Recommendations for stormwater management will be considered by the Applicant during the design, construction and operation phases, as applicable and where possible.

(5.1) Key monitoring and mitigation measures have been included in Section (viii) of this Report and the EMPr

(4) Kindly refer to Section (viii) of this Final BAR, and the EMPr section of this report.
<table>
<thead>
<tr>
<th>Duration (time period) of land disturbance to the minimum needed, and protecting surfaces once they are exposed.</th>
<th>Erosion control measures must be put in place to minimise erosion along the proposed mining area and must be implemented in areas sensitive to erosion such as near water supply points, edges of slopes, etc. These measures could include the use of sand bags, retention or replacement of vegetation. Extra precautions must be taken in areas where the soils are deemed highly erodible.</th>
<th>Comment noted. Erosion control measures have been included in Section (viii) of this Final BAR and in the EMPr section of this report.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(6) Incident Management</strong></td>
<td><strong>(6) Incident Management</strong></td>
<td><strong>(6) Kindly refer to Section (viii) of this Final BAR, and the EMPr section of this report.</strong></td>
</tr>
<tr>
<td>(6.1) The Applicant must submit a Spill Contingency Plan which must indicate the following steps:</td>
<td>An EMPr with detailed mitigation measures that must be adhered to during the mining activities is included in this Report. Spill prevention measures have been included in the EMPr section of this Report. Recommendation from the Department will be considered and complied with.</td>
<td></td>
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<tr>
<td>6.1.1 Stop the source of the spill;</td>
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<td>6.1.2 Contain the spill;</td>
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<td>6.1.3 All significant spills must be reported to this Department and other relevant authorities;</td>
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<tr>
<td>6.1.4 Remove the spilled product for treatment or authorised disposal;</td>
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<tr>
<td>6.1.5 Determine if there is any soil, groundwater or other environmental impact;</td>
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<tr>
<td>6.1.6 If necessary, remedial action must be taken in consultation with this Department, Department of Mineral Resources and the Department of Environmental Affairs; and</td>
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<td>6.1.7 Incident must be documented.</td>
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</table>

(7) General

(7.1) Sections (19), (20), (21), (22) and 26(1) (9) of the NWA must be complied with. These Sections relate to water usage, pollution control and prevention and mining product storage.

(7.2) The proposed mining operation must not contravene Government Notice 704 (4 June1999, Volume 408, No. 20119) regarding the ‘Regulations on use of water for mining and related activities aimed at the protection of water resources’ in terms of the NWA.

(7.3) Sufficient funds must be made available for the complete rehabilitation of the mining area after the cessation of the mining activities.

(7.4) A written agreement between the
mineral right owner and the landowner must be obtained with regard to who will be responsible for the rehabilitation of the mining site.

(7.5) The responsibilities and conditions in the Draft Environmental Management Programme (EMPr) titled, ‘Basic Assessment For The Proposed Sand Mining Project Over An Approximate 5 Hectares Section Of The UMzimkhulu River, Over Reminder Of Farm Seafied No. 174 74 And Rem Of Ambieside No. 2624 Situated In The Port Shepstone Area, KwaZulu-Natal’ are noted. Compliance to the final approved EMPr must be audited regularly by the designated Environmental Control Officer (ECO).

(7.6) The contents of the Report titled: “Aquatic Ecology Assessment For The Proposed Sand Mining Project,” dated June 2017 attached as Appendix D (Specialist Report) is noted. This Report must form part of Water Use Licence Application.

(7.7) Notwithstanding the above, the responsibility rests with the Applicant to identify any source or potential source of pollution from his undertaking and to take appropriate measures to prevent any pollution of the environment. Failure to comply
| Bernadet Pawandiwa | Amafa Heritage KZN | 28/08/2017 | Thank you for submitting the Heritage Impact Assessment Report in support of this development proposal. The specialist concluded that the development is not likely to impact on any significant resources as "the only heritage material that could possibly be impacted would be relatively recent isolated sub-fossils trapped in the Holocene and younger surficial sands targeted for mining. This material is of very low significance." it is also indicated that a very small possibility does exist that unmarked pre-colonial graves could be uncovered during excavation of the sand storage pit.

- Amafa therefore has no objection to the development within the parameter of prescribed recommendations stipulated in the report by Jaco van der Walt. You are also required to adhere to the below-mentioned standard conditions:

  Conditions:
  1. Amafa should be contacted if any heritage objects are identified during earthmoving activities and all development should cease until further notice. |

- Thank you for the comments provided. Comment is noted and correct.

  1. Comment is acknowledged.

  1. Comment is noted and will be complied with. | N/A |

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41
2. No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from Amafa.
3. No activities are allowed within 50m of a site, which contains rock art.
4. Sources of all natural materials (including topsoil, sands, natural gravels, crushed stone, asphalt, etc.) must be obtained in a sustainable manner and in compliance with the heritage legislation.

- Failure to comply with the requirements of the National Heritage Resources Act and the KwaZulu Natal Heritage Resources Act could lead to legal action being instituted against the applicant.
- This decision is **valid for a period of two years.**

<table>
<thead>
<tr>
<th>Sizo Mkhize</th>
<th>Department of Mineral Resources</th>
<th>30/08/2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. If you have applied for a water use licence please provide proof of such application.</td>
<td>Thank you to the Department for the comments provided.</td>
<td>1. Kindly refer to <strong>Appendix C4.9</strong> of this Report for proof of correspondence pertaining to the pre-application meeting.</td>
</tr>
<tr>
<td>Response to the Department comments:</td>
<td></td>
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</tr>
<tr>
<td>1. The Applicant has made contact with the Department with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm</td>
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</tr>
<tr>
<td>1.</td>
<td>Under your site description section please give clarity as to how far is the proposed sand mining operation from the bridge and the N2 Highway.</td>
<td>2. Comment noted and the recommendation is revised in the site description.</td>
</tr>
<tr>
<td>2.</td>
<td>In the list of the state organs and departments that you have consulted, you have omitted KZN Ezemvelo Wild Life.</td>
<td>3. Ezemvelo KZN Wildlife was included in the list of consulted stakeholders. Kindly refer to Appendix C8 with the contacted person being Nerissa Pillay in the list.</td>
</tr>
<tr>
<td>3.</td>
<td>4. Please provide a Regulation 2.2 plan that has co-ordinates and a conceptual layout.</td>
<td>4. Regulation 2.2 plan and layout has been included in Appendix B as Map B1.1 and Map B2, respectively.</td>
</tr>
</tbody>
</table>

whether an application for a Licence is required. Proof of correspondence is included in Appendix C4.9 of this Report. A wetland study was undertaken and attached as part of this Report and the application for a Water Use Licence is in process, as with the pre-application meeting conducted with the Department. Proof of application will be submitted to the Department as an Addendum to the Report as soon as it is available.
(iv) The environmental attributes associated with the alternatives. (The environmental attributes described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

1. Baseline Environment

1.1. Type of environment affected by the proposed activity.
(its current geographical, physical, biological, socio-economic, and cultural character).

Site description
The proposed project site is located on the Umzimkulu River, near Port Shepstone in KwaZulu-Natal. The project site lies within a rural area focused on sugarcane farming, and that of a residential suburb across the river to the south. The main road in Batstones Drift will be used to access the site. The majority of the proposed site (and all of the proposed mining area) is within the Umzimkulu River bed and is comprised of recently deposited river sand. The small section on the river bank where, storage, drying and transportation of sand will occur is a largely open and already disturbed area surrounded by dense grass and riparian vegetation.

Figure 1-1. Aerial view of the proposed project site (Red polygon), existing road to be used for access (black line) and surrounding area.
Climate
The Port Shepstone area is characterised of warm and temperate climatic conditions, with an average temperature of 20.2 °C. Summers are the warmest month with an average of 23.5 °C, July is the coldest month, with temperatures averaging 16.9 °C. The area receives a mean annual rainfall of 118 mm. The wettest months are between October and March, with June being the driest month receiving approximately 35 mm of rainfall and the wettest month is March averaging 145 mm of precipitation.

Table 1-1. Port Shepstone Climatic Conditions

<table>
<thead>
<tr>
<th></th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avg. Temperature (°C)</td>
<td>23.5</td>
<td>23.5</td>
<td>23</td>
<td>21</td>
<td>19</td>
<td>17.2</td>
<td>15.9</td>
<td>15.2</td>
<td>15.1</td>
<td>16.4</td>
<td>17.7</td>
<td>19.4</td>
</tr>
<tr>
<td>Min. Temperature (°C)</td>
<td>20.5</td>
<td>20.5</td>
<td>19.8</td>
<td>17.3</td>
<td>14.8</td>
<td>12.6</td>
<td>12.3</td>
<td>12.1</td>
<td>10.1</td>
<td>10.4</td>
<td>10.4</td>
<td>10.4</td>
</tr>
<tr>
<td>Max. Temperature (°C)</td>
<td>25.0</td>
<td>25.5</td>
<td>25.2</td>
<td>24.7</td>
<td>23.3</td>
<td>22</td>
<td>21.5</td>
<td>21.4</td>
<td>21.6</td>
<td>22.6</td>
<td>22.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Avg. Temperature (°F)</td>
<td>74.3</td>
<td>74.3</td>
<td>72.2</td>
<td>71.7</td>
<td>72.2</td>
<td>71.6</td>
<td>71.5</td>
<td>71.4</td>
<td>71.1</td>
<td>71.5</td>
<td>71.8</td>
<td>72.5</td>
</tr>
<tr>
<td>Min. Temperature (°F)</td>
<td>69.9</td>
<td>69.9</td>
<td>68.6</td>
<td>67.6</td>
<td>65.6</td>
<td>64.4</td>
<td>64.2</td>
<td>64.1</td>
<td>65.8</td>
<td>67.1</td>
<td>67.2</td>
<td>72.2</td>
</tr>
<tr>
<td>Max. Temperature (°F)</td>
<td>77.7</td>
<td>79.9</td>
<td>78.2</td>
<td>78.5</td>
<td>79.9</td>
<td>79.1</td>
<td>79.5</td>
<td>79.6</td>
<td>81.8</td>
<td>81.8</td>
<td>81.8</td>
<td>78.1</td>
</tr>
<tr>
<td>Precipitation / Rainfall (mm)</td>
<td>127</td>
<td>120</td>
<td>145</td>
<td>61</td>
<td>53</td>
<td>35</td>
<td>36</td>
<td>59</td>
<td>55</td>
<td>122</td>
<td>125</td>
<td>123</td>
</tr>
</tbody>
</table>

Geology
The topography of the Ugu District area rises from sea level to inland plateau, and has a slope of above 40%. The most likely parental geological material along the coast includes the Dwyka Group occurring south of the Mkomazi River, inland from the Mtwalume River to the Ifafa River, south of the Mzimkulu River and north of the Mtentweni River. The area along estuaries and river flood plains is characterised with highly productive soils ranging from sandy through loamy to clay deposits, rich and humus, prone to extensive development pressure for cultivation activity. Overlaying the bluff beds are bæra red sands representing the old dunes, north of Sezela, south of Mpambanyoni and south of Mkomaas rivers. The colour of the sands generally range typically from white to gray, red or brown to yellow depending on the oxidation state of the iron containing minerals coating the quartz grains, typically poor for cultivation as they are subject to erosion if disturbed through inappropriate development. Dolorite formations occur along the uMzumbe coast and in the vicinity of the Damba River. These soils are typically non-structured clay formations with loam. There are extensive deposits of Gneiss (Granite) along the entire coast with cretaceous marine sediment deposits. Small quantities of gold, asbestos, limestone, kaolinite, bauxite, graphite, copper and nickel occur on the coast.

Water Resources
Based on information obtained from the Freshwater specialist study undertaken by Ecotone, included in Appendix D, the quaternary catchment associated with the study area is T52M within the Mvoti to Umzimkulu Water Management Area (WMA). The study area is located within the riparian area of the Umzimkulu River, approximate 4.5km before it flows into the
Indian Ocean. The reach of the Umzimkulu River and its associated riparian zone fall within a Freshwater Ecosystem Priority Area (FEPA) (Figure 1-2) and has been classified as a river FEPA with a B category, inferring a *Largely Natural* state. Systems falling within a FEPA were identified as being in a Good condition (A or B ecological category) and therefore need to be maintained in order to contribute to the biodiversity of the area and support sustainable use of water resources (Nel *et al.*, 2011).

The Estuarine wetland unit and the Indian Ocean Coastal Belt Floodplain Wetland unit bordering the northwest and southern end of the study area (Figure 1-3) carries an NFEPA Wetland ID Rank of six, which is the lowest in the ranking matrix and does not hold a set of criteria for selecting wetland to achieve targets. In terms of conservation priorities, the study area has been identified as an area earmarked for conservation in terms of the Freshwater Systematic Conservation Plan (C-PLAN) of KwaZulu-Natal (EKZNW, 2007).

*Figure 1-2. Map indicating the study area in relation to the River NFEPAs (DWAF, 1995; Nel *et al.*, 2004; Nel *et al.*, 2011).*
Figure 1-3. Map indicating the study area in relation to the NFEPA wetland types. Data source: Chief Directorate – Surveys and Mapping DWAF, 1995; Nel et al., 2004; Nel et al., 2011.

**Biodiversity**

Based on information obtained from the Freshwater specialist study undertaken by Ecotone, included in Appendix D, with regards to the Terrestrial Systematic, the eastern portion of the study area is located within a “100% Transformed” area while the remainder of the area is associated with a “Critical Biodiversity Area 3” (Figure 1-4) important species are still located within them and should be accounted for in the environmental impact assessment (EIA) process” (EKZNW, 2010).

The proposed site consists of alien invasive plant species; there are no natural forests and/or protected trees identified on site. The vegetation in the riparian areas on site consists of a combination of indigenous and alien species, as well as a combination of woody and non-woody species. The wetter areas on site are dominated by obligate riparian species, but alien and invasive species are present in several areas, especially in disturbed areas within the study area. The riparian on the left bank is dominated by exotic vegetation and is severely impacted by vegetation clearing as a result of existing sand mining and sugarcane farming. The right bank is less impacted and characterized by a steep rocky slope, dominated by a woody component.
**Socio-economic**

The proposed sand mining site is located near Port Shepstone, which falls in the Ray Nkonyeni Local Municipality, under the UGU District Municipality. According to the Municipalities 2016 Integrated Development Plan (IDP) (based on Stats SA 2011 Census) the Municipality has an estimated population of 256135. The population distribution is dominated by black Africans, followed by the white community, the Indian community and lastly the coloured community. According to this IDP there is a steady population growth in the municipal area.

The figure below indicates the age distribution within the UGU District and Ray Nkonyeni Local Municipality (previously known as Hibiscus Coast Municipality). Understanding the age structure and population of a municipality is important for planning with regards to the anticipated demands for services and employment opportunities. It allows the municipality to identify the potential need and location of facilities, expected growth in economically active population and potential employment seekers, as well as project and plan for facilities to cater for the older persons. According to the 2016 IDP, the population growth is high within the municipality, as well as high unemployment rate, more especially amongst the Black race.
The 2016 IDP also states that the high population influx has over the years had negative impact in terms of social services and economic development. However, the municipality together with the Sector Departments responsible for social services have programmes in place to try and address the situation. The dependency ratio is quite high due to a number of social factors which include amongst others, death of parents due to the high pandemic disease, HIV/AIDS and the children are left with either their grandparents or by themselves. The Local Municipality has a relatively young population in terms of age with a high unemployment rate in this age group, making this a major concern of the municipality.

The economic sectors for the Municipality include Tourism, Agriculture, Manufacturing and Mining. The mining sector has experienced a negative economic growth, with income levels of 1%. This sector is regarded as having very few people employed and may be attributed to the fact that this sector needs highly skilled personnel which the municipality may be lacking in that regard. This is an indication that there is a need to develop such scarce skills for economic growth.

The proposed mining site is situated near Port Shepstone, within a largely rural area as well as a residential suburb across the river, 350m to the south. The rural area is characterised by agriculture focused on sugar cane farming. The suburb forms the approximate inland edge of Port Shepstone. A large sugar mill provides an industrial component to the landscape some 500 m to the west, also on the opposite side of the river. Slightly further afield some 3 km to the west of the study area, and again to the south of the river, there is a mine producing various building materials. The site also has evidence of historic sand mining activities.

Cultural Heritage

The Heritage study was undertaken by ASHA Consulting, and is included in Appendix D of this BAR. The mining area is located within an active river channel and is generally underwater. As such, no archaeology will be present there. The river bank section is largely disturbed by previous activities on the site and, being so close to the river, is unlikely to have allowed for human habitation in the past. Figure 4 shows that where indigenous riparian
vegetation has not been disturbed by farming activities, as is the case on the present site, the vegetation is incredibly dense making settlement and active use of the river bank virtually impossible.

In general, all types of archaeological material may be expected in the broader area. These include Early Stone Age (ESA), Middle Stone Age (MSA), Later Stone Age (LSA), Early and Late Iron Age (EIA & LIA) and historical period sites. Later Stone Age people would have made use of the riverine areas for hunting with game trails providing access through the dense vegetation. Habitation sites are likely to have been somewhat further from the river where the vegetation was less dense. ESA and MSA sites, by contrast, date from much further back in time and may be more widely encountered due to differences in vegetation cover through time.

One of the better known archaeological phenomena of the KwaZulu-Natal (KZN) coastline is the abundant Early and Middle Stone Age artefacts that can be found in places in the Berea Formation coastal dunes. While the area around Xolobeni just south of Port Edward and within the Eastern Cape is perhaps the best documented (Fisher et al. 2013; Kuman 2006; Van Schalkwyk & Wahl 2007), similar material has been found on the KZN south coast (Davies 1982). These resources tend to be located within about 1-2 km of the coastline.

Iron Age people arrived in the area some 1500 years ago. Their settlement pattern in the southern KZN area was guided by the following environmental features:

- Iron Age people favoured areas of Eastern Valley Bushveld for settlement. This vegetation type generally occurs in river valleys away from the coast at elevations of between 100 and 1000 m above sea level (Rutherford et al. 2006). The spoils of this vegetation type are arable and the vegetation includes a sweetveld understory (G. Whitelaw pers. comm. 2015); and
- Iron Age settlements are most likely to be found in river valleys with alluvial terraces and gently sloping terrain seeming to have been most popular. Very few sites are found on steeper slopes or hilltops.

Further north in KZN Iron Age sites are also known from the Berea Dunes (G. Whitelaw pers. comm. 2015).

In his large-scale survey of the area south of Port Edward – 50 km southwest of the study area – Derricourt (1977) found Iron Age sites to be rare in contrast to Stone Age sites. This may have been because of the elevation criterion noted above. The area is however known to contain sites from the Blackburn Branch of the Urewe ceramic tradition, dating to AD 1050 to 1500 (Huffman 2007). Approximately 60 km to the north at Scottburgh 2 km inland rescue excavations at the hilltop site of Mpambanyoni recorded a Late Iron Age site dating to the beginning of the second millennium A.D., suggesting a similarity with the site of Blackburn (Robey 1980).

The present study area is located at just 10 m above sea level and thus does not host Eastern Valley Bushveld. Being in an incised river valley it is also located in an area away from the coastal dunes of the Berea Formation. It may be concluded that Iron Age sites are unlikely to be found in the the study area.

Only a small number of cases are lodged on SAHRIS for this area. One of these examined three areas in the hills to the northwest of the study area and found no heritage resources
(Wahl & Van Schalkwyk 2014), while another to the west recorded only recent graves (Van Schalkwyk 2016).

The SAHRIS Palaeosensitivity Map indicates the site to be within an area of moderate palaeontological sensitivity (Figure 1-6). For this reason Dr John Almond of Natura Viva cc was commissioned to produce a desktop study, also included in Appendix D.

Almond (2017) notes that the bedrocks of the area belong to the Pietermaritzburg Formation (Ecca Group and Karoo Supergroup) which, in turn, overlie Dwyka Group glacial deposits to the south. The Ecca rocks are intensely intruded by Karoo Dolerite. Above these bedrocks is a thick layer (up to 38 m is on record for this area) of late Caenozoic alluvial deposits that fills the river valleys, especially close to the coast. While the older alluvium is likely to be tertiary or Quaternary in age, the less consolidated sands at the top of the sequence are all likely Holocene or recent in age.

Figure 1-6: Extract from the SAHRIS Palaeosensitivity Map indicating the site (yellow polygon) to be of medium sensitivity (green shading).

The palaeontology of the Pietermaritzburg Formation is not well understood, partly due to poor surface exposures and extensive weathering. However, these rocks will not be impacted at all by the proposed sand mine and are thus not of further relevance. The older and deeper-lying alluvial sediments along the Umzimkhulu River might contain palaeontologically important fossils (e.g. mammalian bones and teeth, fish, freshwater molluscs and crustaceans, and transported terrestrial plant material like wood and leaves). Such material is not yet known from the area but it is likely that these older alluvial deposits will not be impacted by the proposed superficial sand mining. The younger sandy alluvial deposits on the Umzimkhulu River bed and banks are expected to contain, at most, subfossil material of little or no palaeontological interest (Almond 2017).
In terms of historical aspects and the built environment, the simplest way to examine the local historical environment is via historical aerial photography. Three series were available. Going back 41 years to 1976 one finds that the site looked little different to what it looks like today (Figure 1-7). Sugar cane farming was well-entrenched on the north bank of the river and the sugar mill and residential suburb to the southwest and southeast of the site respectively were in place. The small stream to the northeast of the study area was meandering far more which suggests it may have been artificially straightened to increase the amount of land available for sugar cane cultivation. Although not shown in this view, the N2 freeway had yet to be built to the east of the study area, but a river crossing was available at Sugar Mill Road just west of the current N2 bridge location.

![Figure 1-7: Comparative 1976 (Job 766, strip 8, photograph 140) and modern aerial photographs.](image)

Stepping back further to 1963 we see a similar picture except that another river crossing was available to the west, opposite the sugar mill, and a small patch of land had not yet been cultivated just northwest of the site (Figure 1-8). Its uniformly dark colour suggests natural vegetation. The suburb to the southeast of the study area was beginning to be laid out but was still low density.

![Figure 1-8: Comparative 1963 (Job 631, strip 8, photograph 91) and modern aerial photographs.](image)
The earliest available image was from 1955 (Figures 1-8 & 1-9). While the sugar mill was already there, along with the adjacent river crossing, the Sugar Mill Road crossing had not yet been constructed. The area to the southeast was far more rural with very few buildings visible. Of most interest is that there are two small light patches within the area of undisturbed vegetation to the northwest of the site. These may either represent small structures or else clearings. They would have been located some 130-150 m away from the edge of the proposed mining area. There is very obviously no sign of these patches today with the area being completely cultivated and planted to sugar cane.
This series of images shows that the area has long been a rural one dominated by the cultivation of sugar cane and, as evidenced by the sugar mill, the production of sugar. Port Shepstone gradually grew and infrastructure (like the N2 freeway) was added as the population of the area became larger. At the site level it actually looks as though cultivation occurred even closer to the river in the past but that there has likely never been any sort of development on the site itself. The nature of this rural cultural landscape with scattered industrial activities (sugar mill and mining) and the small scale of the proposed activities are such that no significant changes are likely to come about. It is also notable that the site lies in the bottom of a river valley which means that its visual exposure is extremely limited.

Iron Age graves tend to be located within homestead settings and, because occupation of this area is unlikely to have occurred, the chances of such graves being present are negligible. It is unlikely that Stone Age graves would be located so close to the river in an area that was likely to have been very densely vegetated in the distant past. Nevertheless, a very small possibility does exist that unmarked pre-colonial graves could be uncovered during excavation of the sand storage pit.

Modern graves are also most commonly located within active or abandoned homesteads. No homesteads occur within close proximity of the study area. A recent survey some 3 km to the southwest of the present study area demonstrated this pattern very strongly (Van Schalkwyk 2016).

2.2 Km to the north of the study area is a grave site, simply referred to as Ndongeni’s Grave. Ndongeni was a 16 year old servant for Dick King, a 29-year-old wagon driver. They left Durban on horseback for Grahamstown to seek reinforcements for the British garrison under siege by Voortrekkers at Durban. Ndungeni never made it to Grahamstown but was later awarded a piece of land for his efforts, he was still alive in 1911 and buried here (Couzens 2004).

1.2. Description of the current land uses.
The farm land is largely rural focused on sugar cane farming. However, a residential suburb lies across the river 350 m to the south. This suburb forms the approximate inland edge of port Shepstone. A large sugar mill provides an industrial component to the landscape some 500 m to the west, also on the opposite side of the river. Slightly further afield some 3 km to the west of the study area, and again to the south of the river, there is a mine producing various building materials. Vegetation in the area consists of alien invasive plant species; there are no natural forests and/or protected trees identified on site. The riparian on the left bank is dominated by exotic vegetation and is severely impacted by vegetation clearing as a result of existing sand mining and sugarcane farming. The right bank is less impacted and characterized by a steep rocky slope, dominated by a woody component.

1.3. Description of specific environmental features and infrastructure on the site.
There are no infrastructure occurring on site and general area. The majority of the proposed site (and all of the proposed mining area) is within the Umzimkulu River bed and is comprised of recently deposited river sand. The small section on the river bank where processing, drying and storage of sand will occur is a largely open and already disturbed area surrounded by dense grass and riparian vegetation.
1.4. Environmental and current land use map.
(Show all environmental, and current land use features)
(v) Impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated).

<table>
<thead>
<tr>
<th>Nature of potential impact/risk</th>
<th>Extent</th>
<th>Duration</th>
<th>Consequence</th>
<th>Probability</th>
<th>Significance</th>
<th>Reversibility of impact</th>
<th>Irreplaceability of receiving environment/resource</th>
<th>Can impact be avoided?</th>
<th>Can impact be managed or mitigated?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on the riparian zone</td>
<td>Site</td>
<td>Short-term</td>
<td>Substantial</td>
<td>Very Likely</td>
<td>Moderate-low</td>
<td>Moderate (rehabilitation post mine closure)</td>
<td>Moderate</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Impact on ambient air quality as a result of dust and other emissions generated</td>
<td>Site</td>
<td>Medium-term</td>
<td>Moderate</td>
<td>Likely</td>
<td>Low</td>
<td>Moderate (rehabilitation after construction)</td>
<td>Moderate</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Noise generation</td>
<td>Site</td>
<td>Short-term</td>
<td>Slight</td>
<td>Likely</td>
<td>Very low</td>
<td>High</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Topography and visual alteration</td>
<td>Local</td>
<td>Medium-term</td>
<td>Substantial</td>
<td>Likely</td>
<td>Moderate</td>
<td>Moderate (rehabilitation post mine closure)</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Compaction of soils</td>
<td>Local</td>
<td>Medium-term</td>
<td>Moderate</td>
<td>Likely</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Soil and water resources contamination</td>
<td>Local</td>
<td>Medium-term</td>
<td>Substantial</td>
<td>Likely</td>
<td>Moderate</td>
<td>Low</td>
<td>Moderate</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Erosion of River bed and bank and sedimentation</td>
<td>Site</td>
<td>Long-term</td>
<td>Substantial</td>
<td>Very likely</td>
<td>Moderate</td>
<td>Moderate (rehabilitation post mine closure)</td>
<td>Moderate</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Impact on instream biota due to changes in water quality</td>
<td>Local</td>
<td>Short-term</td>
<td>Substantial</td>
<td>Likely</td>
<td>Moderate-low</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nature of potential impact/risk</td>
<td>Extent</td>
<td>Duration</td>
<td>Consequence</td>
<td>Probability</td>
<td>Significance</td>
<td>Reversibility of impact</td>
<td>Irreplaceability of receiving environment/resource</td>
<td>Can impact be avoided?</td>
<td>Can impact be managed or mitigated?</td>
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<tr>
<td>Impact on instream habitat due to increase sediment associated with loss in riparian cover</td>
<td>Local</td>
<td>Short-term</td>
<td>Substantial</td>
<td>Likely</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Moderate</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Impact on instream habitat due sand extraction</td>
<td>Local</td>
<td>Medium-term</td>
<td>Severe</td>
<td>Likely</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Impact on water quality due to sand extraction and due to runoff from sand processing area</td>
<td>Local</td>
<td>Medium-term</td>
<td>Severe</td>
<td>Very likely</td>
<td>High</td>
<td>Low</td>
<td>High</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Impact on vegetation due establishment of alien invasive species</td>
<td>Local</td>
<td>Long-term</td>
<td>Severe</td>
<td>Very likely</td>
<td>High</td>
<td>High</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Destruction of isolated fossils</td>
<td>Site</td>
<td>Permanent</td>
<td>Slight</td>
<td>Very unlikely</td>
<td>Very low</td>
<td>Non-reversible</td>
<td>High</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Alteration to the cultural landscape</td>
<td>Site</td>
<td>Medium-term</td>
<td>Slight</td>
<td>Likely</td>
<td>Very low</td>
<td>High (with rehabilitation)</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Impact on health, and safety of workers</td>
<td>Site</td>
<td>Medium-term</td>
<td>Moderate</td>
<td>Likely</td>
<td>Low</td>
<td>Non-reversible</td>
<td>Moderate</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Topography and visual alteration</td>
<td>Site</td>
<td>Medium-term</td>
<td>Substantial</td>
<td>Likely</td>
<td>Moderate</td>
<td>High (rehabilitation during closure)</td>
<td>Low</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Nature of potential Impact/risk</td>
<td>Extent</td>
<td>Duration</td>
<td>Consequence</td>
<td>Probability</td>
<td>Significance</td>
<td>Reversibility of impact</td>
<td>Irreplaceability of receiving environment/resource</td>
<td>Can impact be avoided?</td>
<td>Can impact be managed or mitigated?</td>
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<tr>
<td>Impact on health, and safety of workers</td>
<td>Site</td>
<td>Medium-term</td>
<td>Moderate</td>
<td>Likely</td>
<td>Low</td>
<td>Non-reversible</td>
<td>Moderate</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Loss of Species of Special Concern</td>
<td>Site and Local</td>
<td>Long-term</td>
<td>Substantial</td>
<td>Likely</td>
<td>Moderate</td>
<td>Moderate (rehabilitation during closure)</td>
<td>Moderate</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Generation of waste</td>
<td>Site</td>
<td>Short-term</td>
<td>Moderate</td>
<td>Likely</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Impact on Socio-economic development</td>
<td>Local</td>
<td>Long-term</td>
<td>Substantial</td>
<td>Likely</td>
<td>Moderate</td>
<td>High</td>
<td>Moderate</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
(vi) Methodology used in determining and ranking the nature, significance, consequence, extent, duration and probability of potential environmental impacts and risks;
(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision).

<table>
<thead>
<tr>
<th>APPROACH TO THE BASIC ASSESSMENT</th>
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</thead>
</table>

1) METHODOLOGY OF IMPACT ASSESSMENT

According to the DEA IEM Series guideline on "Impact Significance" (2002), there are a number of quantitative and qualitative methods that can be used to identify the significance of impacts resulting from a development. The process of determining impact significance should ideally involve a process of determining the acceptability of a predicted impact to society. Making this process explicit and open to public comment and input would be an improvement of the EIA/BA process. The CSIR’s approach to determining significance is generally as follows:

- Use of expert opinion by the specialists ("professional judgement"), based on their experience, a site visit and analysis, and use of existing guidelines and strategic planning documents and conservation mapping (e.g. SANBI biodiversity databases);
- Review of specialist assessment by all stakeholders including authorities such as nature conservation officials, as part of the report review process (i.e. if a nature conservation official disagreed with the significance rating, then we could negotiate the rating); and
- Our approach is more a qualitative approach - we do not have a formal matrix calculation of significance as is sometimes done.

2) SPECIALIST CRITERIA FOR IMPACT ASSESSMENT

The following methodology has been provided by the CSIR to the specialist who conducted the Ecological assessment, NSS, for incorporation into their specialist assessment:

Assessment of Potential Impacts

The assessment of impact significance is based on the following conventions:

**Nature of Impact** - this reviews the type of effect that a proposed activity will have on the environment and should include “what will be affected and how?”

**Spatial Extent** - this should indicate whether the impact will be:
- Site specific;
- Local (<2 km from site);
- Regional (within 30 km of site); or
- National.

**Duration** - The timeframe during which (lifetime of) the impact will be experienced:
- Temporary (less than 1 year);
- Short term (1 to 6 years);
- Medium term (6 to 15 years);
- Long term (the impact will cease after the operational life of the activity); or
- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).

**Intensity** - it should be established whether the impact is destructive or innocuous and should be described as either:
- High (severe alteration of natural systems, patterns or processes such that they temporarily or permanently cease);
- Medium (notable alteration of natural systems, patterns or processes; where the environment continues to function but in a modified manner); or
- Low (negligible or no alteration of natural systems, patterns or processes); can be easily avoided by...
implementing appropriate mitigation measures, and will not have an influence on decision-making.

**Probability** - this considers the likelihood of the impact occurring and should be described as:
- Improbable (little or no chance of occurring);
- Probable (<50% chance of occurring);
- Highly probable (50 – 90% chance of occurring); or
- Definite (>90% chance of occurring).

**Reversibility** - this considers the degree to which the adverse environmental impacts are reversible or irreversible. For example, an impact will be described as low should the impact have little chance of being rectified to correct environmental impacts. On the other hand, an impact such as the nuisance factor caused by noise impacts from wind turbines can be considered to be highly reversible at the end of the project lifespan. The assessment of the reversibility of potential impacts is based on the following terms:
- High - impacts on the environment at the end of the operational life cycle are highly reversible;
- Moderate - impacts on the environment at the end of the operational life cycle are reasonably reversible;
- Low - impacts on the environment at the end of the operational life cycle are slightly reversible; or
- Non-reversible - impacts on the environment at the end of the operational life cycle are not reversible and are consequently permanent.

**Irreplaceability** - this reviews the extent to which an environmental resource is replaceable or irreplaceable.

For example, if the proposed project will be undertaken on land that is already transformed and degraded, this will yield a low irreplaceability score; however, should a proposed development destroy unique wetland systems for example, these may be considered irreplaceable and thus be described as high. The assessment of the degree to which the impact causes irreplaceable loss of resources is based on the following terms:
- High irreplaceability of resources (this is the least favourable assessment for the environment);
- Moderate irreplaceability of resources;
- Low irreplaceability of resources; or
- Resources are replaceable (this is the most favourable assessment for the environment).

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**Figure...**: Guide to assessing risk/impact significance as a result of consequence and probability.
The status of the impacts and degree of confidence with respect to the assessment of the significance is stated as follows:

**Status of the impact:** A description as to whether the impact will be:
- Positive (environment overall benefits from impact);
- Negative (environment overall adversely affected); or
- Neutral (environment overall not affected).

**Degree of confidence in predictions:** The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as:
- High;
- Medium; or
- Low.

Based on the above considerations, the specialist provides an overall evaluation of the **significance** of the potential impact, which should be described as follows:
- **Low to very low:** The impact may result in minor alterations of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated;
- **Medium:** The impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated; or
- **High:** Where it could have a “no-go” implication for the project unless mitigation or re-design is practically achievable.

Furthermore, the following must be considered:
- Impacts should be described both before and after the proposed mitigation and management measures have been implemented.
- All impacts should be evaluated for the construction, operation and decommissioning phases of the project, where relevant.
- The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.

**Management Actions:**
- Where negative impacts are identified, mitigatory measures will be identified to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated.
- Where positive impacts are identified, augmentation measures will be identified to potentially enhance these.
- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.

**Monitoring:**
Specialists should recommend monitoring requirements to assess the effectiveness of mitigation actions, indicating what actions are required, by whom, and the timing and frequency thereof.

**Cumulative Impact:**
Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

**Mitigation:**
The objective of mitigation is to firstly avoid and minimise impacts where possible and where these cannot be completely avoided, to compensate for the negative impacts of the development on the receiving environment and to maximise re-vegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potentially negative impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested.
(vii) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

Kindly see Section (i) above; the advantages and disadvantages of the proposed site layout have been discussed in the reasons provided in this section, inclusive of the reasons for not considering alternatives.

(viii) The possible mitigation measures that could be applied and the level of risk.

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

<table>
<thead>
<tr>
<th>Potential Impact Description</th>
<th>Significance Rating (Positive or Negative)</th>
<th>Proposed Mitigation</th>
<th>Significance Rating after Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROPOSAL (preferred alternative)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct Impacts</td>
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</tr>
</tbody>
</table>
| • Impact on the riparian zone | Moderate (Negative) | - Development planning must ensure loss of vegetation and disturbance is restricted to within the minimum and designated areas only.  
- Vegetate and irrigate open areas to limit erosion, but take care not to promote erosion by irrigating.  
- Removal of vegetation during construction and operation will be minimised to reduce the risk of excessive open areas occurring.  
- Adhere to existing roads, and if new roads are constructed, these must not cross sensitive areas such as the ridges or drainage lines.  
- Protected plant or animal species encountered must be managed in accordance with an accepted management plan for these species. | Low |
| • Loss of Conservation Important (CI) species | Moderate (Negative) | - Preconstruction walk through the facility in order to locate species of conservation concern that can be translocated as well as comply with permitting conditions.  
- If removing CI species such as the Protected Poison bulb or Orange/Vaal River Lily then submit permits for their removal.  
- Prior to construction any CI and medicinally important floral specimens that may occur within the site layout should be collected and replanted in the | Low |
<table>
<thead>
<tr>
<th>Potential Impact Description</th>
<th>Significance Rating (Positive or Negative)</th>
<th>Proposed Mitigation</th>
<th>Significance Rating after Mitigation</th>
</tr>
</thead>
</table>
| • Impact on ambient air quality as a result of dust and other emissions generated. | Very low (Negative) | • Exposed areas should be re-vegetated with locally indigenous flora. If the soil is compacted, it should be ripped, and fertilised;  
• Implement effective and environmentally-friendly dust control measures, such as mulching or periodic wetting of the entrance road;  
• A complaints register should be kept on site, with records of complaints received and manner in which the complaint was addressed. | Very low |
| • Noise disturbances as a result of sand mining activities. | Very low (Negative) | - The noise created by the proposed development is not expected to be problematic. If required, noise reduction measures will have to be implemented in compliance with Noise standards and Regulations.  
- No sound amplification equipment to be used on site, except in emergency situations.  
- Limit vehicles travelling to and from the site to minimise traffic noise to the surrounding environment.  
- Limit construction activities to day time hours.  
- Mining related machines and vehicles to be serviced on a regular basis to ensure noise suppression mechanisms are effective.  
- Activities that will generate the most noise should be limited to during the day, where viable, in order minimise disturbance.  
- Equipment that is not in use should be switched off.  
- A complaints register should be kept on site, with records of complaints received and manner in which the complaint was addressed. | Very low |
| • Topography and visual alteration. | Moderate (Negative) | - Limit the footprint area of the construction where possible.  
- Topsoil stockpiles should be | Low |
<table>
<thead>
<tr>
<th>Potential Impact Description</th>
<th>Significance Rating (Positive or Negative)</th>
<th>Proposed Mitigation</th>
<th>Significance Rating after Mitigation</th>
</tr>
</thead>
</table>
| Vegetated and positioned to reduce visual disturbance where possible. |  | - Re-slope and reinstate the bank topography correctly during decommissioning.  
- Re-sloped and reinstated riparian areas should be armoured against surface runoff which may result in erosion and downslope sedimentation. |  |
| Generation of waste. | Low (Negative) | - Any waste generated must be stored in such a manner that it prevents pollution and amenity impacts.  
- Bins will be provided for waste and removed regularly from the site.  
- Waste to be disposed of at a licenced landfill site.  
- Hazardous waste to be correctly stored and disposed of in terms of relevant legislation and guidelines. | Low |
| Soil and water resources contamination. | Moderate (Negative) | - Storm water design should limit any uncontrolled runoff through disturbed areas on the bank.  
- Design and implement sand erosion sediment control management measures.  
- Prevent any spills from occurring; if a spill occurs it is to be cleaned up immediately and Reported to the appropriate authorities.  
- All vehicles are to be serviced in a correctly bunded area or at an off-site location.  
- Ensure that spillage control kits are available during transport and on storage sites in case of any accidental leakages of spillages, which can then be cleared immediately.  
- The temporary storage facilities of fuel, lubricants and explosives must be a hard park, roofed and bunded facility. This will prevent contamination of soils and the possibility of contamination of the surface water resources. | Low |
<table>
<thead>
<tr>
<th>Potential Impact Description</th>
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<th>Proposed Mitigation</th>
<th>Significance Rating after Mitigation</th>
</tr>
</thead>
</table>
| Erosion of River bed and bank and sedimentation. | Moderate (Negative) | - Removal of topsoil should be done systematically, only clearing the necessary areas.  
- The topsoil stockpiles should be vegetated as soon as possible to prevent erosion, which might cause siltation of the water resources.  
- Erosion berms are to be put in place where there is a high risk of erosion.  
- Monitor silt fences and erosion control measures | Low |
| Impact on instream biota due to changes in water quality. | Moderate (Negative) | - Only clear within permitted area.  
- Protect the exposed banks from erosion and silt from entering the water.  
- Maintain construction equipment outside the marginal (riparian area).  
- Create and implement a hydrocarbon spill prevention plan.  
- Prevent silt from entering the watercourse through the application of silt fences downslope of any disturbed areas | Low |
| Impact on instream habitat due to increase sediment associated with loss in riparian cover. | Moderate (Negative) | - Erosion and Sediment control management measures need to be implemented prior to the onset of pre-construction activity.  
- Protect the exposed banks from erosion and silt from entering the water. | Low |
<p>| Impact on instream habitat | High | - Sediment extraction should be processed in a controlled manner to minimize environmental impacts. | Moderate |</p>
<table>
<thead>
<tr>
<th>Potential Impact Description</th>
<th>Significance Rating (Positive or Negative)</th>
<th>Proposed Mitigation</th>
<th>Significance Rating after Mitigation</th>
</tr>
</thead>
</table>
| due sand extraction.         | (Negative)                               | limited to the dry season period (March to November).  
- The quantity of sand extracted should not exceed the annual accumulation rate. This will avoid extended impacts on channel morphology and instream habitat. Note that the cumulative volume of sand extraction should not exceed the recruitment rate.  
- Closely monitor the sand abstraction volumes and sediment recruitment rates.  
- The active channel dimensions should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand.  
- Control the annual timing and duration of sand abstraction. |  
| • Impact on water quality due to sand extraction and due to runoff from sand processing area. | High (Negative) | - Storm water design should limit any uncontrolled runoff through disturbed areas on the bank.  
- All areas downslope of disturbed areas should be sufficiently protected against erosion and sedimentation. | Moderate |
| • Destruction of isolated fossils. | Very low | - Should any features of heritage be identified on site, these should not be disturbed. They should be safeguarded, preferably in situ, and immediately reported to a Heritage specialist and/or SAHRA. | Very low |
| • Alteration to the cultural landscape. | | - Erosion and Sediment control management measures need to be implemented prior to the onset of pre-construction activity. | Very low |
| • Impact on health, and safety of workers. | Low (Negative) | - Training of workers in the correct use of the machinery and/or equipment so as to avoid incidents.  
- Workers to wear Personal Protective Equipment (PPE).  
- Hazardous material must be correctly labelled and handled in a safe manner. | Very low |

INDIRECT IMPACTS
<table>
<thead>
<tr>
<th>Potential Impact Description</th>
<th>Significance Rating (Positive or Negative)</th>
<th>Proposed Mitigation</th>
<th>Significance Rating after Mitigation</th>
</tr>
</thead>
</table>
| • Introduction and increase in alien vegetation.                | High (Negative)                          | - Keep the footprint of the disturbed area to the minimum and designated areas only.  
- Vegetate and irrigate open areas to limit erosion, but take care not to cause erosion by irrigating. Removal of vegetation during sand mining activities will be minimised to reduce the risk of excessive open areas occurring.  
- Limit the extent of riparian disturbance to the absolute minimum.  
- Adhere to existing roads, and if new roads are constructed, these must not cross sensitive areas such as the ridges or drainage lines.  
- Implement an alien and invasive plant management plan. The plan should include details of monitoring and removing or controlling the recruitment of alien and invasive species within the disturbed areas. Note that alien and invasive plant control will extend further than the footprint boundaries. |
| • Loss or transformation of instream habitat due to the existing mining activity and other land uses. | Moderate (Negative)                      | - Sediment extraction should be limited to the dry season period;  
- The quantity of sand extracted should not exceed the annual accumulation rate. This will avoid extended impacts on channel morphology and instream habitat.  
- The cumulative volume of sand extraction should not exceed the recruitment rate.  
- Closely monitor the sand extraction volumes and sediment recruitment rates; The active channel dimensions should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand.  
- Control the annual timing and duration of sand abstraction. |


<table>
<thead>
<tr>
<th>Potential Impact Description</th>
<th>Significance Rating (Positive or Negative)</th>
<th>Proposed Mitigation</th>
<th>Significance Rating after Mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cumulative loss of riparian habitat within the UMzimkhulu estuary.</td>
<td>High (Negative)</td>
<td>- Regulate the extent of cumulative riparian disturbance through the authorisation process; - Conditions to rehabilitate disturbed riparian areas during decommissioning must be adhered to and implemented effectively.</td>
<td>Low (Negative)</td>
</tr>
<tr>
<td>• Impact on Socio-economic development of the area.</td>
<td>Moderate (Positive)</td>
<td>- Ensure maximisation of job creation and promote local employment and skills training. - Explore opportunities for mineral markets. - Development of skills in mining for Small-Medium Micro Enterprises (SMMEs) as part of Municipal Local Economic Development initiatives. - Development of contractual agreements to supply local construction markets.</td>
<td>High (Positive)</td>
</tr>
</tbody>
</table>

**CUMULATIVE IMPACTS**

A number of sand mining operations occur in close proximity to the proposed sand mining operation. The cumulative impacts of these operations mirror the direct and indirect impacts highlighted for the proposed sand mining operation. This includes the loss or transformation of instream habitat due to the existing mining activity and other land uses. The cumulative impacts, without the effective implementation of the key mitigation measures proposed, are predicted to be of High Negative Significance. With the effective implementation of the key mitigation measures proposed in this Report, as well as that of the Specialist Report, the cumulative impacts are predicted to be of a Moderate to Low Negative Significance.

**NO-GO ALTERNATIVE**

**DIRECT IMPACTS:**

• None of the impacts mentioned above will occur.
• The status quo of the site will remain, no new clearance will occur which will result in no clearance of vegetation and no clearance of present alien species.

**INDIRECT IMPACTS:**

• If the proposed project does not proceed, increased income and economic benefits associated with the project will not be realised.
• No employment opportunities will be created.
• If the proposed project does not proceed, the potential to produce and supply good quality sand to the local building industry for use in the construction of roads and buildings, and the subsequent contribution to the Gross Domestic Product (GDP) of the municipality and Province will not be realised; thus hindering economic growth potential.
(ix) Motivation where no alternatives sites were considered.
No property alternatives have been considered as the envisaged mining operations will occur in an area of existing mining operations, and also in close proximity to the access road and local markets.

(x) Statement motivating the alternative development location within the overall site (Provide a statement motivating the final site layout that is proposed)

The site layout was determined by considering both spatial and practical mining operation aspects. The proposed layout and temporary nature of the mining activity and associated infrastructure will be implemented with the aim to reduce substantial impacts on the area. The environmental characteristics of the site were determined during the specialist studies undertaken for the proposed project, including making use of existing information to assess the sensitive area within the overall site. The potential impacts associated with the proposed development are of medium to low significance and with the implementation of the proposed mitigation measures, these can be significantly reduced to be of low to very low significance. The proposed site and layout is considered suitable provided that all the conditions, mitigation measures and environmental impact regulations are implemented. The site layout within the overall site is also supported by the specialist studies undertaken, in accordance with the recommended management measures.

i) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site (In respect of the final site layout plan) through the life of the activity. (Including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment 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.)

The identified risks and impacts for this study, specifically the proposed site layout, were informed by the environmental studies undertaken for this site, the socio-economic need of the surrounding area, as well as the evidence of historical sand mining on site and the landscape.
**NAME OF ACTIVITY**

(E.g. For prospecting - drill site, site camp, ablation facility, accommodation, equipment storage, sample storage, site office, access route etc... etc)

(E.g. For mining - excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablation, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc... etc... etc.)

**POSSIBLE IMPACT**

(Including the potential impacts for cumulative impacts)

(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc... etc... etc.)

**ASPECTS AFFECTED**

(See section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties).

**PHASE**

In which impact is anticipated

(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)

**SIGNIFICANCE if not mitigated**

**MITIGATION TYPE**

(modify, remedy, control, or stop) through

(e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc etc)

E.g.

Modify through alternative method.

Control through noise control

Control through management and monitoring through rehabilitation.

**SIGNIFICANCE if mitigated**

<table>
<thead>
<tr>
<th>NAME OF ACTIVITY</th>
<th>POTENTIAL Impact</th>
<th>ASPECTS AFFECTED</th>
<th>PHASE</th>
<th>SIGNIFICANCE</th>
<th>MITIGATION TYPE</th>
<th>SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dust emissions;</td>
<td>Air Quality</td>
<td>Construction Phase</td>
<td>Operation Phase Decommissioning Phase</td>
<td>High (Negative)</td>
<td>Monitor and manage through Dust Management Plan and Measures.</td>
<td>Moderate (Negative)</td>
</tr>
<tr>
<td>Soil erosion due to exposed soil;</td>
<td>Soils and water resources</td>
<td>Construction Phase</td>
<td>Operation Phase Decommissioning Phase</td>
<td>Very low (Negative)</td>
<td>Monitor and remedy through Emergency Response Plan;</td>
<td>Very low (Negative)</td>
</tr>
<tr>
<td>Noise generation;</td>
<td>Noise Receptors</td>
<td>Construction Phase</td>
<td>Operation Phase Decommissioning Phase</td>
<td>Very low (Negative)</td>
<td>Manage through Noise Reduction Measures and Regular Vehicle Inspections;</td>
<td>Very low (Negative)</td>
</tr>
<tr>
<td>Loss of vegetation and faunal habitat;</td>
<td>Flora and Fauna</td>
<td>Construction Phase</td>
<td>Moderate (Negative)</td>
<td>Remedy through Rehabilitation Plan, Conservation Management Plan and Alien Invasive Management Plan;</td>
<td>Low (Negative)</td>
<td></td>
</tr>
<tr>
<td>Stockpiles</td>
<td>Dust emissions;</td>
<td>Air Quality</td>
<td>Construction Phase</td>
<td>Operation Phase Decommissioning Phase</td>
<td>Very low (Negative)</td>
<td>Monitor and manage through Dust Management Plan and Measures;</td>
</tr>
<tr>
<td>Surface water contamination;</td>
<td>Water resources</td>
<td>Construction Phase</td>
<td>Operation Phase Decommissioning Phase</td>
<td>Moderate (Negative)</td>
<td>Monitor and remedy through Emergency Response Plan and Stormwater Management Plan;</td>
<td>Moderate (Negative)</td>
</tr>
<tr>
<td>Loading, hauling and transport</td>
<td>Topography and visual alteration;</td>
<td>Topography and Visual Environment</td>
<td>Construction Phase</td>
<td>Moderate (Negative)</td>
<td>Minimise through Mine Design and Management Plan;</td>
<td>Low (Negative)</td>
</tr>
<tr>
<td>Hydrocarbon spill</td>
<td>Soil and water resources contamination;</td>
<td>Surface and Groundwater</td>
<td>Construction Phase</td>
<td>Moderate (Negative)</td>
<td>Monitor and remedy through Emergency Response Plan and Stormwater Management Plan;</td>
<td>Very low (Negative)</td>
</tr>
<tr>
<td>Waste</td>
<td>Soil and water resources contamination;</td>
<td>Soils and water resources</td>
<td>Construction Phase</td>
<td>Moderate (Negative)</td>
<td>Monitor and remedy through Emergency Response Plan;</td>
<td>Very low (Negative)</td>
</tr>
<tr>
<td>Topography and visual alteration;</td>
<td>Topography and Visual Environment</td>
<td>Construction Phase</td>
<td>Operation Phase</td>
<td>Moderate (Negative)</td>
<td>Minimise through Mine Design and Management Plan;</td>
<td>Low (Negative)</td>
</tr>
<tr>
<td>Sand extraction</td>
<td>Environment and Natural Resources Biota</td>
<td>Construction Phase Operation Phase Decommissioning Phase</td>
<td>Moderate (Negative)</td>
<td>Remedy and Minimise through Rehabilitation Plan, Conservation Management Plan, Monitor and control through Mine Abstraction Plan.</td>
<td>Low (Negative)</td>
<td></td>
</tr>
<tr>
<td>Establishment and spread of alien plant species.</td>
<td>Fauna and Flora</td>
<td>Construction Phase Operation Phase Decommissioning Phase Post Closure</td>
<td>Moderate (Negative)</td>
<td>Manage and control through Alien Invasive Management Plan.</td>
<td>Low (Negative)</td>
<td></td>
</tr>
<tr>
<td>Destruction of features of heritage importance</td>
<td>Heritage</td>
<td>Construction Phase Operation Phase</td>
<td>Very low (Negative)</td>
<td>Manage and avoid through Environmental Conservation Management Plan.</td>
<td>Very low (Negative)</td>
<td></td>
</tr>
<tr>
<td>Topography and visual alteration</td>
<td>Topography and Visual Environment</td>
<td>Operation Phase</td>
<td>Moderate (Negative)</td>
<td>N/A</td>
<td>N/A</td>
<td></td>
</tr>
</tbody>
</table>

| Establishment and spread of alien plant species. | Fauna and Flora | Decommissioning Phase Post Closure | Moderate (Negative) | Manage and control through Alien Invasive Management Plan. | Low (Negative) |
| Destruction of vegetation | Fauna and Flora | Decommissioning Phase Post Closure | Moderate (Negative) | Manage and Minimise through Management Plan and Rehabilitation Plan. | Low (Negative) |
| Soil and water resources contamination | Soils Groundwater | Decommissioning Phase Post Closure | Low (Negative) | Monitor and remedy through Emergency Response Plan. | Very low (Negative) |
| Impact on upstream tributaries and water in the catchment | Surface water | Decommissioning Phase Post Closure | Moderate (Negative) | Manage and Minimise through Management Plan and Rehabilitation Plan. | Low (Negative) |
| Topography and visual alteration | Topography and Visual Environment | Decommissioning Phase Post Closure | Low (Negative) | Remedy through Rehabilitation and Closure Plan; | Very low (Negative) |
| Noise generation | Noise receptors | Decommissioning Phase Post Closure | Very low (Negative) | Manage through Noise Reduction Measures and Regular Vehicle Inspections. | Very low (Negative) |
| Air quality and dust emissions | Air quality | Decommissioning Phase Post Closure | Very low (Negative) | Monitor and manage through Dust Management Plan and Measures. | Very low (Negative) |
| Land capability reduction | Soils Vegetation | Decommissioning Phase Post Closure | Moderate (Negative) | Manage, minimise through Post-closure Management Plan and Rehabilitation Plan. | Low (Negative) |

| Employment of workers, and acquiring mining vehicles, machinery, equipment and materials | Socio-economic | Construction Phase Operation Phase | Moderate (Positive) | Promote through Local Based Employment Strategy, and Women and Youth Employment Initiatives. | High (Positive) |
| Contribution to the short term growth of the local economy | Socio-economic | Construction Phase Operation Phase | Moderate (Positive) | Promote through Local Construction Markets; Support to SMME Initiatives. | High (Positive) |
| Impact on health and safety of workers | Socio-economic | Construction Phase Operation Phase | Moderate (Negative) | Prevent through Awareness Campaigns and Training. | Low (Negative) |

CSIR: Please refer to the detailed specialist Reports appended to this Report, for the impact assessments conducted as part of this Study as well as Sections (v) and (viii) of this report:
k) Summary of specialist reports
(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):

<table>
<thead>
<tr>
<th>LIST OF STUDIES UNDERTAKEN</th>
<th>RECOMMENDATIONS OF SPECIALIST REPORTS</th>
<th>SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)</th>
<th>REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Ecology Assessment</td>
<td>It is imperative that an effective management plan is implemented to ensure that all mitigation measures discussed in the Aquatic Ecology Assessment report are adhered to. The project proposal will be permissible if all the conditions, mitigation measures and environmental impact regulations are implemented.</td>
<td>X</td>
<td>The mitigation measures, as well as the environmental management programme included in this report is informed by the Aquatic Ecology Specialist study undertaken, including the recommendations provided therein. The Report produced as part of the study is included in Appendix D.</td>
</tr>
<tr>
<td>Heritage Impact Assessment</td>
<td>It is unlikely that there will be any heritage indicators of concern in or close to the study area. The only heritage material that could possibly be impacted would be relatively recent isolated sub-fossils trapped in the Holocene and younger surficial sands targeted for mining. This material is of very low significance. Visual disturbance of the cultural landscape will be negligible because of the small scale of the proposed project. The Environmental Management Programme (EMP) should include a note on what to do in the vent that any heritage resource is uncovered during the proposed project. Although considered extremely unlikely, such finds may include buried foundations, a grave, or a dense concentration of fossils or artefacts. If any heritage resource is uncovered it should be protected in place and reported to an archaeologist or heritage practitioner or to Amafakazi as the responsible provincial heritage resources authority. Because of the extremely low likelihood of any heritage resources being encountered, there is no requirement for monitoring.</td>
<td>X</td>
<td>The mitigation measures, as well as the environmental management programme included in this report is informed by the Heritage Impact Study undertaken, including the recommendations provided therein. The Report produced as part of the study is included in Appendix D.</td>
</tr>
</tbody>
</table>
I) Environmental impact statement.

(ii) Summary of the key findings of the environmental impact assessment

A large extent of the study area has been transformed in terms of the soil profile, vegetation, and geomorphology, mostly as a result of previous sand mining activities and sugarcane fields. The overall instream ecological integrity of the system is inferred as Largely Natural, but with a small loss in ecological integrity observed. The main potential environmental impacts associated with the proposed project include:

**Impact on the riparian zone**
The developmental footprint of the proposed small-scale mining will be limited to the site boundaries with a temporary duration. Vegetation loss is unavoidable during the activities of the proposed mining project. The current state of the riparian zone is impaired due to previous sand mining and sugarcane farming activity; however the general area and transformed areas contain some indigenous vegetation, as well as alien species thus necessitating high consideration of the vegetation on site. Recommended mitigation measures described in the assessment must be adhered to in order to reduce the impacts from moderate to low and special care must be taken to manage any species of special concern.

**Impact on instream habitat and biota**
Extraction of sand from the stream bed has a direct impact on the stream’s physical habitat characteristics and biota. Sand extraction should be limited to the dry season and the quantity of extraction should not exceed the annual accumulation rate, that is monitoring and mitigation measures as proposed in the EMPr should be implemented to ensure sand extracted is replenished naturally by upstream transport and does not exceed the recruitment rate. This will avoid extended impacts on channel morphology and instream habitat.

**Noise generation**
Noise generation as a result of machinery and vehicles operated on site is likely to impact on the surrounding receptors in close proximity to the site. All reasonable measures need to be implemented to minimise noise levels to the nearby residents throughout the life cycle of the proposed mine. Due to the small-scale nature and size of the proposed mining activity, and therefore basic machinery and equipment, this impact is expected to be of very low significance.

**Air quality and dust emission**
Vehicles transporting alluvial material to and from the site, as well site preparation activities, excavation, processing and decommissioning activities will result in the generation of fugitive dust. Air quality emissions will be of low to very low significance. The recommended mitigation measures in this report should reduce the potential for these impacts on the ambient air quality.

**Topography and Visual Alteration**
Storage of material and equipment on site, vehicular activities, excavation and stockpiling of topsoil will alter the visual environment in the area. The impacts will be of moderate to low significance at the different phases and activities of the project. All reasonable measures need to be implemented to minimise and limit these impacts where possible, incorporating the recommended mitigation measures of the specialists included in this report. Rehabilitation of the disturbed areas to return the site to its similar visual state prior mining will have a neutral visual impact on the area.

**Soil erosion**
Mining activities on site will result in exposed soil, which could result in soil erosion. Erosion can lead to destruction of natural habitats and sedimentation of watercourses. This impact will have a low probability of occurrence with implemented mitigation measures and ultimately low impact.
### Soil and water resources contamination

The potential impact of contamination will arise throughout the life cycle of the proposed mine as a result of contaminants such as fuels, waste material on site, seepage of waste water, spills etc. These possible contaminants need to be managed and prevented through an effective Emergency Response Plan and Stormwater Management Plan, as well as the development of an appropriate Monitoring Plan in order to reduce the significance of these impacts.

### Destruction of features of heritage importance

It is of the opinion of the heritage study undertaken that the only possible impacts to heritage that might occur are to isolated sub-fossils and to the cultural landscape. However, the very low significance of the palaeontological material and the small scale of the proposed activity means that the impacts will not have any significance. These impacts would occur during the construction and operation phases, while decommissioning would result in a return to the status quo with no new impacts possible. Due to the extremely low likelihood of any heritage resources being encountered, there is no requirement for monitoring. It is recommended that the mine staff should be made aware of the possibility of uncovering fossils such as wood in the gravels and large stromatolites in the dolomite bedrock. With this plan in place the significance of impacts would be reduced from low to very low.

### Establishment and spread of alien plant species

Alien plant invasion is expected to occur in disturbed areas, however with the implementation of mitigation measures this impact can be reduced from moderate to low. This should be mitigated through the establishment of an alien invasive management plan to ensure the establishment of indigenous vegetation.

### Socio-economic

Mining is important for economic development, to construct durable, modern structures, employment creation and revenue collection. The proposed site has previous sand mining activities, known to provide good quality silica sand to the local building industry. This type of sand is commonly used for cement and concrete used in the construction of roads and buildings. The project site is located in the Ray Nkonyeni Municipality, and according to the municipality’s 2016/17 Local Economic Development Strategy, the identified economic sectors of the municipality are Tourism, Agriculture, Manufacturing and Mining. The proposed project is therefore an identified opportunity to add great socio-economic value to the Port Shepstone area.

Based on the environmental assessment presented in this report and the specialists’ reports, it is the conclusion of this Basic Assessment that the proposed project will have relatively moderate-low impacts on the environment. With effective implementation management and mitigation measures, as well as recommended monitoring plans suggested in this report and those of the specialists’, the significance of most potential environmental impacts on site from an environmental perspective will be reduced to low-very low. There will be potential impacts on vegetation, habitat and biota, water resources, soil, dust, air quality and visual environment as a result of earthworks associated with the activity, influx and movement of vehicles, chemical toilet and waste generated by the project as a whole. The Environmental Management Programme supporting this BA outlines adequate methods and mitigation measures that need to be implemented in order for the identified impacts to not pose any environmental flaws associated with the proposed establishment of a small-scale mining operation.
(ii) Final Site Map
Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. Attach as Appendix B.

*Note from CSIR:* A Site map depicting the proposed mining area layout on the farm has been included as Map 2 in Appendix B.

(iii) Summary of the positive and negative implications and risks of the proposed activity and identified alternatives;

A summary of the positive and negative potential impacts associated with the project has been outlined in Section (i) above.

m) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPR;

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPR as well as for inclusion as conditions of authorisation.

The EMPR addresses the environmental impacts associated with the project during Construction, Operation, Decommissioning and Post Closure Phases of the proposed project. The objectives of the EMPR will be to provide detailed information that will advise the planning design of Ms Singh’s mining activities in order to avoid and/or reduce impacts that may be detrimental to the environment. The following environmental management objectives are recommended for the proposed mining development and associated infrastructure:

- Alien plant monitoring should take place after construction, throughout the lifecycle of the mine, as well as post closure of the mine.
- Development planning must restrict the area of impact to a minimum and designated area only.
- Closely monitor the sand extraction volumes and sediment recruitment rates. The active channel dimensions should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand.
- Monitor and prevent contamination, and undertake appropriate remedial actions.
- Limit the visual and noise impact on receptors.
- Avoid impact on possible heritage finds.
- Promote health and safety of workers.
- Limit dust and other emissions to within allowable limits.
- Manage soils to prevent erosion.

n) Aspects for inclusion as conditions of Authorisation.

Any aspects which must be made conditions of the Environmental Authorisation

The following aspects as recommended by the specialist studies are emphasised to be included as conditions in the Environmental Authorisation:

- It is imperative that an effective management plan is implemented to ensure that all mitigation measures discussed in the report are adhered to. The project proposal will be permissible if all the conditions, mitigation measures and environmental impact regulations are implemented.
- If any archaeological or palaeontological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist or palaeontologist as appropriate. The project EMPR
should make reference to this possibility so that appropriate action can be taken as and when necessary.

**o) Description of any assumptions, uncertainties and gaps in knowledge.**

(Which relate to the assessment and mitigation measures proposed)

Uncertainties form part of any proposed development with regards to the actual degree of impact that the development will have on the immediate environment. Any actual and/or site specific results will only be determined once development has commenced and throughout the life cycle of the proposed project. Gaps in knowledge were also identified in terms of the site-specific meteorological data that is unavailable.

The following assumptions have been made for this study in terms of the specialists’ reports:

- **General** - The spatial and temporal extents of Ecotone’s services are described in the proposal and are subject to restrictions and limitations. A total assessment of all probable scenarios or circumstances that may exist on the study site was not undertaken. No assumptions should be made unless opinions are specifically indicated and provided. Data presented in this document may not elucidate all possible conditions that may exist.

- **Aquatic Macroinvertebrates** - The reach of the Umzimkulu River was characterized by deep homogenous flow with limited habitat available for the colonization of aquatic macroinvertebrates. The system is therefore not suitable for the application of the SASS5 methodology. The SASS5 methodology was designed for wadeable rivers/streams. However, the protocols and methodology were used to standardise sampling.

- **Fish** - The fish sampled during the field assessment are likely an underrepresentation of the actual fish assemblages. The efficacy of fish sampled was impeded by sampling conditions, access and time. No conclusion were drawn from the sampled fish community in relation to the expected fish community and the overall sensitivity, applied within the impact assessment, was based on the environmental preferences and tolerances of the expected fish assemblages.

- **Riparian Delineation** - A large extent of the study area has been transformed in terms of the soil profile, vegetation, and geomorphology, which to a large extent, diminishes the effective use of hydromorphic indicators to determine the riparian boundaries associated with the river. Any comments related to the riparian extent are of low/moderate confidence and should be interpreted with caution. Portions of the study area have been disturbed by soil and vegetation removal, infilling and agricultural activities (mainly sugarcane production).

- **Hydrogeomorphic classification** – The initial terms of reference suggested a freshwater system, on subsequent investigation the resource was classified as estuarine. This assessment includes elements of an estuarine health assessment but excludes a detailed assessment of micro-fauna. However, the assessment does include response metrics on different trophic levels, diatoms (primary) aquatic macroinvertebrates (secondary) and
fish (secondary and tertiary. Although the assessment refrains from categorically
classifying the water resource into an overall ecological class, enough detail on the
respective ecological components is provided to inform the impact assessment. The
implementation of the recommended mitigation measures will protect the resource
quality.

- It is assumed that the expected pattern of not finding any archaeological resources
  within active river channels or very close to the channel will hold true.

p) Reasoned opinion as to whether the proposed activity should or should not be authorised

i) Reasons why the activity should be authorized or not.

Mining is important for economic development, to construct durable, modern structures,
employment creation and revenue collection. The proposed site has previous sand mining
activities, known to provide good quality silica sand to the local building industry. This type
of sand is commonly used for cement and concrete used in the construction of roads and
buildings. The project site is located in the Ray Nkonyeni Municipality, and according to the
municipality’s 2016/17 Local Economic Development Strategy, the identified economic
sectors of the municipality are Tourism, Agriculture, Manufacturing and Mining.

Specialists’ studies were conducted as part of this BA, providing mitigation measures and
recommendations to ensure that environmental aspects of the site and surrounding area are
not impacted severely. The site is composed of transformed, and the undertaken specialist
studies did not identify any areas of high significance that could pose a fatal flaw prohibiting
the proposed development. It is the opinion of the EAP that the proposed project will
comply with current relevant legislation, and that with the implementation of the mitigation
measures suggested in this BAR, there are no environmental impacts identified as highly
detrimental to the environment. It is therefore recommended that following the above, the
proposed development be granted Environmental Authorisation.

ii) Conditions that must be included in the authorisation

The EMPr of this proposed project must form part of the contractual agreement and be
adhered to by both the contractors and the applicant. The applicant must also ascertain that
there is representation of the applicant on site, at all times of the project, ensuring
compliance with the conditions of the EMPr and specialist reports, and Environmental
Authorisation thereof.

q) Period for which the Environmental Authorisation is required.

The proposed sand mining project will have a Life of Mine of approximately 2 years upon
commencement of operation.
r) **Undertaking**

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Basic assessment report and the Environmental Management Programme report.

The undertaking is provided at the end of the EMPr.

s) **Financial Provision**

State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation.

The rehabilitation fee guarantee was calculated at R 28 000.

i) **Explain how the aforesaid amount was derived.**

This amount was determined using and compiling the financial and technical competence report that will be submitted with the mine permit application.

ii) **Confirm that this amount can be provided for from operating expenditure.** (Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be).

Ms S Singh (the Project Applicant), has confirmed that this amount can be provided for from operating expenditure.

t) **Specific Information required by the competent Authority**

i) **Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998).** The EIA report must include the:

1. **Impact on the socio-economic conditions of any directly affected person.** (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an Appendix.

   Kindly refer to the impact tables above for more detail. Sand mining is normally short to medium term in duration, creating job opportunities and the potential to contribute significantly to the local economy.

2. **Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act.** (Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6 and 2.12.herein).

   There are no significant heritage resources present on the site and significant impacts are thus not expected. The only concern isolated sub-fossils and to the cultural landscape. A Heritage Impact Assessment (HIA) study was carried out in this regard, and the applicable mitigation measures are included in this report and the supporting HIA report attached.
u) Other matters required in terms of sections 24(4)(a) and (b) of the Act.

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. The EAP must attach such motivation as Appendix 4).

Note from CSIR: Information on the preferred proposed alternative, as well the motivation has been included in Section g) and h), kindly refer to these sections above.
PART B
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Final environmental management programme.
   a) Details of the EAP, (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required).

      The requirements for the provision of the details and expertise of the EAP are included in Part A, Section a) and as Appendix A.

   b) Description of the Aspects of the Activity (Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required).

      The requirement to describe the aspects of the activity that are covered by the environmental management programme is included in PART A, Section d).

   c) Composite Map
      (Provide a map (Attached as an Appendix) at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers)

      The composite plan is included in Appendix B.

   d) Description of impact management objectives including management statements

      The proposed impact management objectives and management statements are informed by the environmental setting of the proposed mining site, as well as the desired state during closure and post closure of the mine.

      i) Determination of closure objectives. (ensure that the closure objectives are informed by the type of environment described)

         A large extent of the study area has been transformed in terms of the soil profile, vegetation, and geomorphology, mostly as a result of previous sand mining activities and sugarcane fields. The transformed areas contain invasive species and little indigenous vegetation. The overall instream ecological integrity of the system is inferred as Largely Natural, but with a small loss in ecological integrity observed. The main potential environmental impacts associated with the proposed project include:

         - Impact on the riparian zone;
         - Impact on instream habitat and biota;
         - Soil erosion;
         - Topography and Visual Alteration;
         - Soil and water resources contamination;
         - Impact on water quantity and quality;
         - Land capability reduction;
         - Spread of alien plant species.

         Therefore, effective and practical measures need to be implemented to prevent, reduce or control and remedy any impacts that may be detrimental to the environment, as well as to
rehabilitate the site to a desired state similar to that of the pre-mining state. These measures include:

- Rehabilitate the site in accordance with a detailed closure plan, and implement an alien invasive management plan to ensure the establishment of indigenous vegetation.
- Rehabilitation of the disturbed areas to return the site to its similar visual state prior mining.
- Identify and attend to possible areas of erosion.
- Implement an effective waste management plan to contain waste on site, as well as any spills that may occur.
- Closely monitor the sand extraction volumes and sediment recruitment rates. The active channel dimensions should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand.

ii) **Volumes and rate of water use required for the operation.**

Not applicable

iii) **Has a water use licence has been applied for?**

The Applicant has made contact with the Department of Water and Sanitation with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm whether an application for a Licence is required. A wetland study was undertaken and forms part of this report which was submitted to the Department for a response with regards to a Licence Application. Proof of correspondence is included in Appendix C4.9 of this Report.
iv) Impacts to be mitigated in their respective phases

Measures to rehabilitate the environment affected by the undertaking of any listed activity

<table>
<thead>
<tr>
<th>ACTIVITIES</th>
<th>PHASE</th>
<th>SIZE AND SCALE of disturbance</th>
<th>MITIGATION MEASURES</th>
<th>COMPLIANCE WITH STANDARDS</th>
<th>TIME PERIOD FOR IMPLEMENTATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>(E.g. For prospecting - drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route etc...etc...etc)</td>
<td>(of operation in which activity will take place. State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure).</td>
<td>(describe how each of the recommendations herein will remedy the cause of pollution or degradation and migration of pollutants)</td>
<td>(A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excavations</td>
<td>Construction Operational Decommissioning</td>
<td>Local</td>
<td>• Development planning must ensure loss of vegetation and disturbance is restricted to within the minimum and designated areas only. • Vegetate and irrigate open areas to limit erosion, but take care not to promote erosion by irrigating. • Removal of vegetation during construction and operation will be minimised to reduce the risk of excessive open areas occurring; • Adhere to existing roads, and if new roads are constructed, these must not cross sensitive areas such as the ridges or...</td>
<td>• Manage and avoid through Environmental Conservation Management Plan; • Minimise through Mine Design and Management Plan; • Monitor and manage through Dust Management Plan and Measures; • Implement noise reduction measures in compliance with Noise standards and Regulations;</td>
<td>Daily and on-going during the Life of Mine;</td>
</tr>
<tr>
<td>Activity</td>
<td>Phase</td>
<td>Location</td>
<td>Actions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------------------------</td>
<td>----------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| Stockpiles                                   | Construction Operational | Local    | - Exposed areas should be re-vegetated with locally indigenous flora. If the soil is compacted, it should be ripped, and fertilised.  
- Implement effective and environmentally-friendly dust control measures, such as mulching or periodic wetting of the entrance road.  
- A complaints register should be kept on site, with records of complaints received and manner in which the complaint was addressed.  
- Erosion and Sediment control management measures need to be implemented prior to the onset of pre-construction activity  
- Manage and avoid through Environmental Conservation Management Plan.  
- Minimise through Mine Design and Management Plan. Implement in accordance with the rehabilitation plan and standards;  
- Comply with the Alien invasive Management Plan in accordance with NEM:BA.  
- Monitor and manage through Dust Management Plan and Measures to ensure that the acceptable standards as set out in Regulation 3 of NEMAQA National Dust Control Regulations.  
- Manage through Best Practice Guidelines.                                                                 |
| Loading, hauling and transport Hydrocarbon spill | Construction Operational | Local    | - Adhere to existing roads, and if new roads are constructed, these must not cross sensitive areas such as the ridges or drainage lines.  
- Implement effective Stormwater Management measures.  
- Create and implement a hydrocarbon spill prevention plan.  
- Minimise through Mine Design and Management Plan;  
- Monitor and remedy through Emergency Response Plan.  
- Manage in accordance with the rehabilitation plan.  

On-going during the construction and operational phase.
| Waste | Construction Operational Decommissioning | Local | • Any waste generated must be stored in such a manner that it prevents pollution and amenity impacts.  
• Bins will be provided for waste and removed regularly from the site.  
• Waste to be disposed of at a licenced landfill site. Hazardous waste to be correctly stored and disposed of in terms of relevant legislation and guidelines. | • Minimise through Mine Design and Management Plan;  
• Manage in accordance with Best Practice Guidelines, NWA, NEMWA. | Ongoing during the Life of Mine. |

| Sand extraction | Operational | Local | • Sediment extraction should be limited to the dry season period (March to November).  
• The quantity of sand extracted should not exceed the annual accumulation rate. This will avoid extended impacts on channel morphology and instream habitat. Note that the cumulative volume of sand extraction should not exceed the recruitment rate.  
• Closely monitor the sand abstraction volumes and sediment recruitment rates. Undertake closure and rehabilitation of pits when activities are completed in those pits. The active channel dimensions should remain relatively unchanged as annual wet season sediment recruitment | • Remedy and Minimise through Rehabilitation Plan, Conservation Management Plan;  
• Monitor and control through Mine Abstraction Plan. | Ongoing during the Life of Mine. |
<table>
<thead>
<tr>
<th><strong>Rehabilitation and restoration of disturbed areas.</strong></th>
<th><strong>Decommissioning Post Closure</strong></th>
<th><strong>Local</strong></th>
<th><strong>Manage in accordance with the Rehabilitation Plan, Environmental Conservation Plan, Alien Invasive Management Plan, NEM:BA and Best Practice Guidelines.</strong></th>
<th><strong>Ongoing during Decommissioning and Post Closure Phase.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• All disturbed areas must be rehabilitated.</td>
<td></td>
<td>• Limit activity footprint and avoid disturbance of rehabilitated areas.</td>
<td>• Implement an effective Alien Invasive Management Plan.</td>
<td></td>
</tr>
<tr>
<td>• Implement an effective Alien Invasive Management Plan.</td>
<td></td>
<td>• Removal of structures to be done cautiously.</td>
<td>• Monitoring to be undertaken for a long enough period post closure, eg, 2-3 years.</td>
<td></td>
</tr>
<tr>
<td>• Removal of structures to be done cautiously.</td>
<td></td>
<td>• Manage in accordance with the Rehabilitation Plan, Environmental Conservation Plan, Alien Invasive Management Plan, NEM:BA and Best Practice Guidelines.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Monitoring to be undertaken for a long enough period post closure, eg, 2-3 years.</td>
<td></td>
<td>• Manage in accordance with the Rehabilitation Plan, Environmental Conservation Plan, Alien Invasive Management Plan, NEM:BA and Best Practice Guidelines.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Employment of workers, and acquiring mining vehicles, machinery, equipment and materials.</strong></th>
<th><strong>Construction Operational</strong></th>
<th><strong>During Planning phase and ongoing during the construction and operational phase.</strong></th>
<th><strong>Promote through Local Based Employment Strategy, and Women and Youth Employment Initiatives.</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ensure maximisation of job creation and promote local employment and skills training.</td>
<td></td>
<td>• Promote through Local Based Employment Strategy, and Women and Youth Employment Initiatives.</td>
<td>• Promote through Local Construction Markets.</td>
</tr>
<tr>
<td>• Explore opportunities for mineral markets.</td>
<td></td>
<td>• Promote through Local Construction Markets.</td>
<td>• Support to SMME Initiatives.</td>
</tr>
<tr>
<td>• Development of skills in mining for Small-Medium Micro Enterprises (SMMEs) as part of Municipal Local Economic Development initiatives.</td>
<td></td>
<td>• Support to SMME Initiatives.</td>
<td></td>
</tr>
<tr>
<td>• Development of contractual agreements to supply local construction markets.</td>
<td></td>
<td>• Support to SMME Initiatives.</td>
<td></td>
</tr>
</tbody>
</table>
### Impact Management Outcomes

(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph (i);

<table>
<thead>
<tr>
<th><strong>ACTIVITY</strong></th>
<th>POTENTIAL IMPACT</th>
<th>ASPECTS AFFECTED</th>
<th>PHASE</th>
<th>MITIGATION TYPE</th>
<th>STANDARD TO BE ACHIEVED</th>
</tr>
</thead>
<tbody>
<tr>
<td>(whether listed or not listed).</td>
<td>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc....etc...)</td>
<td>(e.g. Construction, commissioning, operational Decommissioning, closure, post-closure)</td>
<td>(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc)</td>
<td></td>
<td>(Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.</td>
</tr>
</tbody>
</table>

Please see section d (ii) of Part A for a list of activities to be undertaken. Please see section (v) and (viii) of Part A for the description of potential impacts associated with the project. Please see section j) of Part A. Please see section j) of Part A for mitigation type. Please see section iv) above in terms of compliance, as well as section e) of Part A for compliance with legislation and policy.
### Impact Management Actions

(A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (c) and (d) will be achieved).

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>POTENTIAL IMPACT</th>
<th>MITIGATION TYPE</th>
<th>TIME PERIOD FOR IMPLEMENTATION</th>
<th>COMPLIANCE WITH STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>whether listed or not listed. (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc...etc...etc.)</td>
<td>(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc...etc...)</td>
<td>(modify, remedy, control, or stop) through (e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity etc. etc) E.g. • Modify through alternative method. • Control through noise control • Control through management and monitoring Remedy through rehabilitation.</td>
<td>Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. With regard to Rehabilitation, therefore state either: Upon cessation of the individual activity or. Upon cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.</td>
<td>(A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)</td>
</tr>
</tbody>
</table>

Please see section d (ii) of Part A for a list of activities to be undertaken. Please see section (v) and (viii) of Part A for the description of potential impacts associated with the project. Please see section j) of Part A for mitigation type. Please see section iv) above. Please see section iv) above in terms of compliance, as well as section e) of Part A for compliance with legislation and policy.
i) Financial Provision

(1) Determination of the amount of Financial Provision.

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.

Closure and rehabilitation of the stockpile area will be undertaken when the project ceases operation. At the end of the project life cycle, a thick soil layer of approximately 333 mm will be spread across the disturbed areas; thereafter the soil will be ripped, fertilised and re-vegetated. Post-closure monitoring will assist in determining the success of the rehabilitation and also identify whether any additional measures need to be taken to ensure the area is restored to a reasonable and acceptable condition. The area where sand was mined will be rehabilitated naturally during the rainy season where flood waters will deposit more sand across the mined area.

Rehabilitation measures and objectives will be undertaken in compliance with legislation and policy governing the requirements for rehabilitation such as the National Environmental Management Act 107 of 1998 and the Mineral and Petroleum Resources Development Act 28 of 2002.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

This Report highlights the rehabilitation and management objectives with regards to mitigating negative environmental impacts associated with the proposed mining operation. These environmental objectives related to the closure of the mining operation contained in this report will be subjected to a 30-day review period by Interested and Affected Parties.

(c) Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure.

The rehabilitation plan for the proposed sand mining operation aims to mitigate the negative impacts associated with the mining activities, and ultimately to return the affected land to its desired land use standard. The objectives of the plan are to ensure that the condition of the site post mining operation are suitable to and in agreement with the affected neighbouring community and the competent authority, that there is minimal loss to the biodiversity of the area, and that rehabilitation restores the land use and capability of the area/site.
The rehabilitation process will be undertaken during the mine closure phase. A more detailed closure plan will be developed during the life of mine, prior to the cessation of mining activities; adapted to the developed information and environmental impact status of the project in order to achieve a site-specific closure plan.

A map showing the site layout and aerial extent of the proposed mining activities, depicting the anticipated mining permit area at the time of closure is included as Map 2 in Appendix B.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The closure plan will assist the proposed mining operation to achieve the following objectives:

- Comply with relevant legislation and policy requirements with regards to mine rehabilitation.
- Avoid or mitigate impacts associated with the project which may be detrimental to the environment.
- Land rehabilitation to a predetermined and agreed upon state that allows sustainable land use and capability of the site, that is to return the site to the condition that existed prior to mining or an agreed upon state.
- Cost effective and efficient closure of mining operations.
- Management and monitoring of the area post-closure.

The rehabilitation plan will thus be aligned to the closure objectives and tailored to the project to achieve these objectives. It will include information about the site prior to the mining operation and provide information on the maintenance of resources required for the rehabilitation process, as well detail how rehabilitation will be undertaken. It will also provide information on the management and monitoring of disturbance to avoid or minimise detrimental impacts, as well as an estimate of the financial closure provision. It will also include information associated with post-closure environmental monitoring of the site to ensure that the rehabilitation plan is followed and its objectives are achieved.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

The rehabilitation fee guarantee was calculated at R 28 000. This amount was determined using and compiling the financial and technical competence report to be uploaded on the SAMRAD portal (also attached below) as part of the submission for the mine permit application.
1. TECHNICAL COMPETENCE

1.1 Complete the table below regarding the technical competence forecast.

<table>
<thead>
<tr>
<th>SKILLS CATEGORY</th>
<th>STATE THE QUALIFICATIONS REQUIRED FOR EACH JOB CATEGORY</th>
<th>STATE PART TIME OR FULL TIME</th>
<th>QUARTER 1 (R'000)</th>
<th>QUARTER 2 (R'000)</th>
<th>QUARTER 3 (R'000)</th>
<th>QUARTER 4 (R'000)</th>
<th>QUARTER 5 (R'000)</th>
<th>QUARTER 6 (R'000)</th>
<th>QUARTER 7 (R'000)</th>
<th>QUARTER 8 (R'000)</th>
<th>TOTAL FOR TWO YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mine manager</td>
<td>experience</td>
<td>Full</td>
<td>30000</td>
<td>30000</td>
<td>30000</td>
<td>30000</td>
<td>33000</td>
<td>33000</td>
<td>33000</td>
<td>33000</td>
<td>252000</td>
</tr>
<tr>
<td>Payloader operator</td>
<td>previous experience</td>
<td>Full</td>
<td>12000</td>
<td>12000</td>
<td>12000</td>
<td>12000</td>
<td>13200</td>
<td>13200</td>
<td>13200</td>
<td>13200</td>
<td>100800</td>
</tr>
<tr>
<td>Barge operators</td>
<td>previous experience</td>
<td>Full</td>
<td>10800</td>
<td>10800</td>
<td>10800</td>
<td>10800</td>
<td>10908</td>
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<tr>
<td>Cleaner</td>
<td>non</td>
<td>Full</td>
<td>8640</td>
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<td>8640</td>
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<td>9504</td>
<td>9504</td>
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<td>69576</td>
</tr>
</tbody>
</table>

**TOTAL ESTIMATED EXPENDITURE:**

- Quarter 1: 61260
- Quarter 2: 61260
- Quarter 3: 61260
- Quarter 4: 56612
- Quarter 5: 66612
- Quarter 6: 66612
- Quarter 7: 66612
- Quarter 8: 511488
### 2. ABILITY TO MANAGE AND REHABILITATE RELEVANT ENVIRONMENTAL IMPACTS

#### TABLE 2: Environmental cost estimate.

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>POTENTIAL IMPACT</th>
<th>MITIGATION MEASURE</th>
<th>STATE QUARTERLY COST OF MITIGATION MEASURES IN THE AVAILABLE SPACE BELOW, IN RANDS</th>
<th>STATE THE ESTIMATED REHABILITATION COST RELATED TO THE ACTIVITY IN THE AVAILABLE SPACE BELOW, IN RANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavating</td>
<td>Surface disturbance</td>
<td>Rehabilitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Dust control measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Noise</td>
<td>Noise control measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contaminated Drainage</td>
<td>Storm water system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blasting</td>
<td>Fly Rock</td>
<td>Access control measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stockpiles</td>
<td>X</td>
<td>Surface disturbance Rehabilitation</td>
<td></td>
<td>R12000</td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Dust Control Measures</td>
<td>2000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contaminated Drainage</td>
<td>Storm water system</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Discard dumps or dams</td>
<td>Surface Disturbance</td>
<td>Rehabilitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Dust Control Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contaminated Drainage</td>
<td>Storm water system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loading, hauling and transport</td>
<td>X</td>
<td>Noise control measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Dust Control Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Water supply dams and boreholes.</td>
<td>Surface disturbance</td>
<td>Rehabilitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Dust Control Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contaminated Drainage</td>
<td>Storm water system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accommodation, offices, ablution, stores, workshops etc.</td>
<td>X</td>
<td>Surface disturbance Rehabilitation</td>
<td></td>
<td>500</td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Dust Control Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contaminated Drainage</td>
<td>Storm water system</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Processing Plant</td>
<td>Noise</td>
<td>Noise control measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dust</td>
<td>Dust Control Measures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Contaminated Drainage</td>
<td>Storm water system</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Surface disturbance</td>
<td>Rehabilitation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>R3500</strong></td>
<td></td>
<td><strong>R12500</strong></td>
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</tr>
</tbody>
</table>
### 3. FINANCIAL COMPETENCE

**TABLE 3.1: Financial Implications of the Project**

<table>
<thead>
<tr>
<th>ITEM</th>
<th>Quarter 1</th>
<th>Quarter 2</th>
<th>Quarter 3</th>
<th>Quarter 4</th>
<th>Quarter 5</th>
<th>Quarter 6</th>
<th>Quarter 7</th>
<th>Quarter 8</th>
<th>TOTAL</th>
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<td>4000</td>
<td>4000</td>
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<td>4000</td>
<td>4000</td>
<td>4000</td>
<td>3200</td>
</tr>
<tr>
<td>The mass or volume of the product to be produced in each quarter, either in tons, m³, grams, carats, etc., whichever is applicable.</td>
<td>cubic metres</td>
<td>cubic metres</td>
<td>cubic metres</td>
<td>cubic metres</td>
<td>cubic metres</td>
<td>cubic metres</td>
<td>cubic metres</td>
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<tr>
<td>REVENUE</td>
<td>R200 000</td>
<td>R200 000</td>
<td>R200 000</td>
<td>R200 000</td>
<td>R240 000</td>
<td>R240 000</td>
<td>R240 000</td>
<td>R240 000</td>
<td>R1 760 000</td>
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<tr>
<td>The mass or volume of production multiplied by the price</td>
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<tr>
<td>Estimated quarterly operating cost (as shown in Table 4.2 herein) of stores, materials, electricity, water, fuel and other (excluding labour and environmental cost)</td>
<td></td>
<td></td>
<td></td>
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<td>TECHNICAL COMPETENCE COST TO BE PROVIDED FOR</td>
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<td>61260</td>
<td>61260</td>
<td>66612</td>
<td>66612</td>
<td>66612</td>
<td>66612</td>
<td>R511 488</td>
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<tr>
<td>Estimated quarterly cost shown in Table 1 above, i.e. salaries, wages, labour, service providers, subcontractors, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>ENVIRONMENTAL COST</td>
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<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>28000</td>
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<tr>
<td>Estimated quarterly cost shown in Table 2 above and divide the total rehabilitation cost among the quarters. The total of the environmental cost must equal all the quarterly environmental costs and the total rehabilitation cost combined.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAPITAL AND OTHER</td>
<td>50740</td>
<td>50740</td>
<td>50740</td>
<td>50740</td>
<td>61388</td>
<td>61388</td>
<td>61388</td>
<td>61388</td>
<td>352512</td>
</tr>
<tr>
<td>The cost (as shown in Table 4.1 herein) of land, machinery, the plant, buildings and infrastructure and any other costs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WORKING PROFIT / LOSS</td>
<td>50740</td>
<td>50740</td>
<td>50740</td>
<td>50740</td>
<td>61388</td>
<td>61388</td>
<td>61388</td>
<td>61388</td>
<td>352512</td>
</tr>
<tr>
<td>The revenue minus all the costs listed above</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** If the total is a working loss, then it means that the applicant cannot provide for the technical ability or mine the mineral optimally in a period of two years.
(f) Confirm that the financial provision will be provided as determined.

Ms Singh confirms that the financial provision will be provided as determined.
Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

g) Monitoring of Impact Management Actions
h) Monitoring and reporting frequency
i) Responsible persons
j) Time period for implementing impact management actions
k) Mechanism for monitoring compliance

<table>
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<tr>
<th>SOURCE ACTIVITY</th>
<th>IMPACTS REQUIRING MONITORING PROGRAMMES</th>
<th>FUNCTIONAL REQUIREMENTS FOR MONITORING</th>
<th>ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)</th>
<th>MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining operation activities</td>
<td>Impacts on soil, air, surrounding land uses, access roads, visual impacts, biophysical environment inclusive of alien vegetation control and water.</td>
<td>Monitor and inspect on a daily basis throughout the mining operation and assess against the recommendations and conditions of the specialist studies, and that of the Environmental Authorisation.</td>
<td>Applicant and Environmental Control Officer</td>
<td>Ongoing during the Life of Mine. Compile monthly reports.</td>
</tr>
</tbody>
</table>
l) Indicate the frequency of the submission of the performance assessment/environmental audit report.

The Environmental Control Officer will undertake audits in compliance with the provided EMP contents and guidelines and will compile audit reports, which will ultimately be submitted to the DMR every two years.

m) Environmental Awareness Plan

(1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

Management of the proposed project has to appoint an independent Environmental Control Officer whose duty is to also implement an effective environmental awareness plan aimed to educate workers and contractors in terms of the biodiversity on site, environmental risks associated with the proposed development and land management of the site. Training and/or awareness should be raised and effectively communicated prior to the commencement of the construction phase. Training sessions should incorporate the management plans addressed in this EMP as well as any new information and documentation provided by the ECO, as well as that of the Environmental Health & Safety Officer. The ECO would be the most suitable person to conduct these training sessions, identifying sensitive environments as well as all the risks and impacts associated with the mining operation and the methods in which to deal with the impacts in order to avoid environmental degradation. Training sessions can be monitored by providing an attendance register indicating the workers that received training as well as evidence of the training and/or awareness received. These sessions would also need to be carried out throughout the Life of Mine, at least once a year, or as new information becomes available.

(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment.

Kindly refer to the table of possible mitigation measures that could be applied in section (viii) of Part A for an indication of the manner in which risks will be dealt with.

n) Specific information required by the Competent Authority

(Among others, confirm that the financial provision will be reviewed annually).

No specific information requirements have been made by the competent authority at this stage.
2) **UNDERTAKING**

The EAP herewith confirms

a) the correctness of the information provided in the reports ☑

b) the inclusion of comments and inputs from stakeholders and I&APs ; ☐

c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☑ and

d) that the information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties are correctly reflected herein. ☑

Signature of the environmental assessment practitioner:

[Signature]

Council for Scientific and Industrial Research

Name of company:

31/08/2017

Date:

-END-
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal
## APPENDICES

<table>
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<th>Appendix</th>
<th>Description</th>
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<tr>
<td>Appendix A</td>
<td>CVs of the EAPs</td>
</tr>
<tr>
<td>Appendix B</td>
<td>Locality map, Regulation 2.2 plan, Site Layout Plan, Land Use Map</td>
</tr>
<tr>
<td>Appendix C</td>
<td>Public participation information: including a copy of the register of interested and affected parties, the comments and responses report, proof of notices, advertisements and any other public participation information as required.</td>
</tr>
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<td>Appendix D</td>
<td>Specialist Reports</td>
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<td>- Aquatic Ecology Assessment</td>
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<td>- Heritage Impact Assessment Study</td>
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APPENDIX A

CVs of the EAPs

Contents

Annexure A.1: Minnelise Levendal (Project Reviewer)

Annexure A.2: Babalwa Mqokeli (Project Manager)
Annexure A.1: Minnelise Levendal (Project Leader)

CURRICULUM VITAE OF MINNELISE LEVENDAL – PROJECT LEADER

<table>
<thead>
<tr>
<th>Name of firm</th>
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<tbody>
<tr>
<td>Name of staff</td>
<td>Minnelise Levendal</td>
</tr>
<tr>
<td>Profession</td>
<td>Environmental Assessment and Management</td>
</tr>
<tr>
<td>Position in firm</td>
<td>Project Manager</td>
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<td>Years’ experience</td>
<td>8 years</td>
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<td>Nationality</td>
<td>South African</td>
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<td>Languages</td>
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CONTACT DETAILS:

Postal Address: P O Box 320, Stellenbosch, 7599
Telephone Number: 021-888 2495/2661
Cell: 0833098159
Fax: 0865051341
e-mail: mlevendal@csir.co.za

BIOSKETCH:

Minnelise joined the CSIR Environmental Management Services group (EMS) in 2008. She is focussing primarily on managing Environmental Impact Assessments (EIAs), Basic Assessments (BAs) and Environmental Screening studies for renewable energy projects including wind and solar projects. These include an EIA for a wind energy facility near Swellendam, Western Cape South Africa for BioTherm (Authorisation granted in September 2011) and a similar EIA for BioTherm in Laingsburg, Western Cape (in progress). She is also managing two wind farm EIAs and a solar Photovoltaic BA for WKN-Windcurrent SA in the Eastern Cape. Minnelise was the project manager for the Basic Assessment for the erection of ten wind monitoring masts at different sites in South Africa as part of the national wind atlas project of the Department of Energy in 2009 and 2010. She was also a member of the Project Implementation Team who managed the drafting of South Africa’s Second National Communication under the United Nations Framework Convention on Climate Change. The national Department of Environmental Affairs appointed the South African Botanical Institute (SANBI) to undertake this project. SANBI subsequently appointed the CSIR to manage this project.
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

EDUCATION:

- M.Sc. (Botany) Stellenbosch University 1998
- B.Sc. (Hons.) (Botany) University of the Western Cape 1994
- B.Sc. (Education) University of the Western Cape 1993

MEMBERSHIPS:

- International Association for Impact Assessment (IAIA), Western Cape (member of their steering committee from 2001-2003)
- IUCN Commission on Education and Communication (CEC); World Conservation Learning Network (WCLN)
- American Association for the Advancement of Science (AAAS)
- Society of Conservation Biology (SCB)

EMPLOYMENT RECORD:

- 1996: University of the Western Cape. Lecturer in the Botany Department.
- 1999: University of Stellenbosch. Research assistant in the Botany Department (3 months)
- 1999: Bengurion University (Israel). Research assistant (Working in the Arava valley, Negev – Israel; 2 months). Research undertaken was published (see first publication in publication list)
- 2004 to present: Employed by the CSIR in Stellenbosch:
  - September 2004 – May 2008: Biodiversity and Ecosystems Services Group (NRE)
  - May 2008 to present: Environmental Management Services Group (EMS)

PROJECT EXPERIENCE RECORD:

The following table presents a list of projects undertaken at the CSIR as well as the role played in each project:

<table>
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<th>Project Description</th>
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<tr>
<td>2011 (in progress)</td>
<td>EIA for the proposed Electrawinds Swartberg wind energy project near Moorreesburg</td>
<td>Project Manager</td>
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<td>in the Western Cape</td>
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<td>EIA for the proposed Ubuntu wind energy project, Eastern Cape</td>
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<td>EIA for the proposed Banna ba pifhu wind energy project, Eastern Cape</td>
<td>Project Manager</td>
<td>WKN Windkraft SA</td>
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<td>2010-2011 (in progress)</td>
<td>BA for a powerline near Swellendam in the Western Cape</td>
<td>Project Manager</td>
<td>BioTherm Energy (Pty Ltd)</td>
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<tr>
<td>2010-2011 (Environmental Authorisation granted in September 2011)</td>
<td>EIA for a proposed wind farm near Swellendam in the Western Cape</td>
<td>Project Manager</td>
<td>BioTherm Energy (Pty Ltd)</td>
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<td>2010 (complete)</td>
<td>Basic Assessment for the erection of two wind monitoring masts near Swellendam and Bredasdorp in the Western Cape</td>
<td>Project Manager</td>
<td>BioTherm Energy (Pty Ltd)</td>
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<td>2010 (complete)</td>
<td>Basic Assessment for the erection of two wind monitoring masts near Jeffrey’s Bay in the Eastern Cape</td>
<td>Project Manager</td>
<td>Windcurrent (Pty Ltd)</td>
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<td>2009-2010 (Environmental Authorisations granted during 2010)</td>
<td>Basic Assessment Process for the proposed erection of 10 wind monitoring masts in SA as part of the national wind atlas project</td>
<td>Project Manager</td>
<td>Department of Energy through SANERI; GEF</td>
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Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

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<th>Completion Date</th>
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<td>2010</td>
<td>South Africa’s Second National Communication under the United Nations Framework Convention on Climate Change</td>
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<td>SANBI</td>
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<td>2009 (Environmental Authorisation granted in 2009)</td>
<td>Basic Assessment Report for a proposed boundary wall at the Port of Port Elizabeth, Eastern Cape</td>
<td>Project Manager</td>
<td>Transnet Ltd</td>
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<tr>
<td>2008</td>
<td>Developing an Invasive Alien Plant Strategy for the Wild Coast, Eastern Cape</td>
<td>Co-author</td>
<td>Eastern Cape Parks Board</td>
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<td>2006-2008</td>
<td>Monitoring and Evaluation of aspects of Biodiversity</td>
<td>Project Leader</td>
<td>Internal project awarded through the Young Researchers Fund</td>
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**PUBLICATIONS:**


**LANGUAGES**

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<td>Afrikaans</td>
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Minnelise Levendal

31 August 2017
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

Annexure A.2: Babalwa Mqokeli (Project Manager)

CSIR
Jan Cilliers Street
PO Box 320 Stellenbosch 7600
South Africa
Phone: +27 21 888 2432
Fax: +27 21 888 2693
Email: bmqokeli@csir.co.za

CURRICULUM VITAE OF BABALWA MQOKELI – PROJECT MANAGER

Surname: Mqokeli
First names: Babalwa Ruth
ID No. 8804040578087
Gender: Female
Languages: IsiXhosa, English and IsiZulu
Nationality: South African
Driver’s licence: Code C1
Membership: SACNASP Membership, IAIAsa

CONTACT DETAILS:
Postal Address: P O Box 320, Stellenbosch, 7599
Telephone Number: 021 888 2432
Fax: 021 888 2693
E-mail: bmqokeli@csir.co.za

EDUCATIONAL QUALIFICATIONS:

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<td>Institute:</td>
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<td>Duration:</td>
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<td>Qualification:</td>
<td>MSc Ecological Science</td>
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|  |
| --- | --- |
| Institute: | University of KwaZulu-Natal |
| Duration: | 2010 |
| Qualification: | BSc Honours Ecological Science |

|  |
| --- | --- |
| Institute: | University of Zululand |
| Duration: | 2006-2009 |
| Qualification: | BSc Biological Science |

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<tr>
<td>Institute:</td>
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</tr>
<tr>
<td>Duration:</td>
<td>01-02 August 2016</td>
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<tr>
<td>Qualification:</td>
<td>Presentation Skills</td>
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**Institute:** Council for Scientific and Industrial Research (CSIR)  
**Duration:** 10-11 November 2015  
**Qualification:** Project Management I  

**Institute:** Business Success Solutions  
**Duration:** 29-30 October 2015  
**Qualification:** Environmental Law (Short Course)  

### SECONDARY  
**School:** Durban Girls’ Secondary School  
**Year:** 2004  
**Qualification:** Matric  
**Subjects passed:** Mathematics, Biology, Business Economics, History, English and Afrikaans  

### SKILLS  
**Computer skills:** Microsoft Office, Email, Internet and Databases search  
**GIS skills:** ArcGIS 10  

### EMPLOYMENT INCLUDING VOLUNTEER WORK:  
**Company:** Council for Scientific and Industrial Research (CSIR)  
**Duration:** August 2015- Currently  
**Job title:** Environmental Assessment Practitioner  
**Responsibilities:** Project manager for Basic Assessment Reports, Conduct EIA, Public Participation, GIS Mapping, Conduct site visits, Project assistant for EMF development and Report Compilation  

**Company:** University of KwaZulu-Natal  
**Duration:** February 2015-May 2015  
**Job title:** Teaching Assistant  
**Responsibilities:** Leading a 1st year laboratory in conducting and guiding biology practicals, liaising with other demonstrators in running the laboratory, interacting and assisting learners with biology practicals, assessing learners and compiling a marks list to provide to the Schools’ administrator  

**Company:** Nature’s Valley Trust (WWF-SA Environmental Leaders Programme)  
**Duration:** April 2013- September 2014  
**Job title:** Conservation Research Intern  
**Responsibilities:** Coordinating the Groot River monitoring research project, coordinating the Invasive alien Mosquito fish research project and the Groot Estuary fish research project, assisting with administrative tasks and field work for the Fynbos research project as well as that of the conservation forums, assisting in NVT’s public events and social media management, Involved in environmental education activities with local schools and community outreach programmes  

**Company:** University of KwaZulu-Natal  
**Duration:** 2010-2012 (when needed)  
**Job title:** Voluntary Research Assistant  
**Responsibilities:**  
- Conducting field work  
- Compiling data  

**Company:** University of KwaZulu-Natal  
**Duration:** 2010-2012
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

<table>
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<tr>
<th>Job title:</th>
<th>Undergraduate Biology Tutor</th>
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</thead>
</table>
| Responsibilities: | • Assisting students with the module  
• Assisting learners with biology practicals  
• Marking of learners work |

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<td>Duration:</td>
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<th>Job title:</th>
<th>Tutor</th>
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</table>
| Responsibilities: | • Assisting students with the module and practicals  
• Assisting the lecturer in class  
• Marking of learners work |

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<th>Company:</th>
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<tr>
<th>Job title:</th>
<th>Herbarium Volunteer</th>
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<tr>
<td>Responsibilities:</td>
<td>• Plant pressing and classification</td>
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**CONFERENCES PAPERS**

**International Association for Impact Assessors South Africa (IAIAsa) 2016 Annual Conference** - Overlap between biodiversity conservation & economic development: a case study of a proposed piggery near Cedarville, Eastern Cape, A project under the DEA Special Needs and Skills Development Programme.

**Microscopy Society of Southern African Annual Conference (MSSA) 2011** - Palatal and lingual adaptations for frugivory and nectarivory in the Wahlberg’s epauletted fruit bat (Epomophorus wahlbergi).

**WORKSHOPS:**

- 2016 Technical Workshop on the Roles and Responsibilities of Environmental Control Officer, Brackenfell, November 2016.

**PROFESSIONAL REGISTRATION**

South African Council for Natural Scientific Professions: Candidate Natural Scientist (100215/15)

**RESEARCH PUBLICATIONS**


Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

REFEREES

<table>
<thead>
<tr>
<th>Name</th>
<th>Minnelise Levendal</th>
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<tbody>
<tr>
<td>Title</td>
<td>Senior Environmental Assessment Practitioner</td>
</tr>
<tr>
<td>Organisation</td>
<td>Council for Scientific and Industrial Research</td>
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<tr>
<td>Contact</td>
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<table>
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<tr>
<th>Name</th>
<th>Dr Mark Brown</th>
</tr>
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<tbody>
<tr>
<td>Title</td>
<td>Program Director</td>
</tr>
<tr>
<td>Organisation</td>
<td>Nature’s Valley Trust</td>
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<tr>
<td>Contact</td>
<td>044 531 6820</td>
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<table>
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<tr>
<th>Name</th>
<th>Prof Colleen Downs</th>
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<tbody>
<tr>
<td>Title</td>
<td>Associate Professor/ Lecturer/ SARCHI Research Chair</td>
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<tr>
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Babalwa Mqokeli

31 August 2017
APPENDIX B

Locality & Layout Maps

Contents

Map B1: Ms Singh’s Proposed Sand Mining Site Location on over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

Map B1.1: Regulation 2.2 plan map including co-ordinates

Map B2: Ms Singh’s Proposed Sand Mining Site Layout Plan

Map B3: Environmental and Current Land Use Features found in the area of the proposed Sand Mining Site

Map B4: Map highlighting provincial terrestrial conservation priorities for the study area based on the Freshwater Systematic Conservation Plan for KwaZulu-Natal
Map B1: Ms Singh's Proposed Sand Mining Site Location on over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal
Map B1.1: Regulation 2.2 plan map including co-ordinates

Legend

- 5Ha Mining Area
- National Road 2
- Access Road

Stockpile & Toilet Area

Points

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Signature: ________________________________
Date: ________________________________
**Map B2: Ms Singh’s Proposed Sand Mining Site Layout Plan.**
Map B3: Environmental and Current Land Use Features found in the area of the proposed Sand Mining Site
Map B4: Map highlighting provincial terrestrial conservation priorities for the study area based on the Freshwater Systematic Conservation Plan for KwaZulu-Natal
APPENDIX C

Public Participation Information

Contents

Appendix C1: Proof of Site Notice.
Appendix C2: Written notices issued as required in terms of the regulations.
Appendix C3: Proof of newspaper advertisements.
Appendix C4: Communications to and from interested and affected parties.
Appendix C5: Comments and Responses Report.
Appendix C6: Comments from I&APs on Basic Assessment (BA) Report.
Appendix C7: Comments from I&APs on amendments to the BA Report - N/A at this stage of the BA process.
Appendix C8: Copy of the register of I&APs.
Appendix C1: Proof of Site Notice

English and IsiZulu Site notices placed on the Farm fence
Contents of the English Site notice

Ms Singh Sand Mining Project
(uMzimkhulu River, Port Shepstone in KwaZulu-Natal)

Reference Number: CSIR/IU/EMS/IR/2016/0002/A

NOTICE OF A BASIC ASSESSMENT (BA) PROCESS

Notice is hereby given, in terms of the Environmental Impact Assessment (EIA) Regulations, under sub-regulation 4 (2) (a), published in Government Gazette No 38282 of 4 December 2014, of the National Environmental Management Act 1998 (Act No. 107 of 1998), that Ms Singh proposes a Sand Mining Project to be located on 5 hectares of the uMzimkhulu River, Port Shepstone in KwaZulu-Natal.

The Council for Scientific and Industrial Research (CSIR) has been appointed by Ms Singh to undertake the required Basic Assessment Process for the proposed project. The project will be registered with the KwaZulu-Natal Department of Mineral Resources. The need for a Basic Assessment is triggered by the following project activities listed in Government Notice Regulations (GNR) 983 and 985 of 4 December 2014.

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To obtain further information with regards to the project and Basic Assessment process, or to register as Interested and Affected Party (I&AP), please contact the Project Manager below, and quote the CSIR Reference Number:

Ms Babalwa Mokeli
P.O. Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2963
Email: bmokeli@csir.co.za

Fig. 1. Sand Mining Site located on the uMzimkhulu River, on land adjacent to the Remainder of the Farm Seafiel No. 17474 and Remainder of Ambleside No. 2624, Port Shepstone in KwaZulu-Natal
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

Contents of the IsiZulu Site notice

Ms Singh Sand Mining Project
(uMzimkhulu River, Port Shepstone, KwaZulu-Natal)

Inombolo ye-Nkomba: CSIR/IU/EMS/IR/2016/0002/A

ISAZISO NGOQHUBO LOKUHLOLA SISEKELO (BASIC ASSESSMENT (BA))


iCouncil for Scientific and Industrial Research (CSIR) izakwe uMs Singh ukuhla ipathhe ughubha lokuhlola Sisekelo okudingeka kule projekti ehlongwaziwe. (Projekthi izikhathwa kuMnyango wezokuhlwawa KwaZulu-Natal. Ughubha iwe-BA iyaphakwa izayathwakha ukucabange ukuphazamisa ngokweMthetho ngoba leprojekthi ithhinta lemisebenzi elandelayo elabaliwe kwimphethoqubo ye EIA:

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Ukuzo listhe eminye iliningwe e mayimhlanile projekthi, nokubhala a njengomuntu Onershisisekelo onoma Othithe sika (Interested & Affected Party (I&AP)), siseko u forgiveness walelithelo ogenzani, uqaphathu

Inombolo ye Nkomba yakwa CSIR:

Ms Boalwa Mqokeli
P.O. Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2963
Email: bmqokeli@csir.co.za

Isithombo 1. Isithombo opho uMs. Singh ehlondolo ukubalo isikhathetha Emfuleni uMzimkhulu, kwandwo osendela noPulazi (IsiZulu Site notice) Seafield 17474 no Ambleside No. 2624, oPort Shepstone, KwaZulu-Natal.
Appendix C2: Written notices issued as required in terms of the regulations

Letter sent (26/09/16) to I&APs as part of Project Announcement

CSIR Specialist Services
PO Box 320
Stellenbosch
7599
South Africa
Tel: +27 21 886 2432
Fax: +27 21 886 2693
Email: bmkqokeli@csir.co.za

23 September 2016

Dear Interested and/or Affected Party,

PROJECT ANNOUNCEMENT

BASIC ASSESSMENT FOR MS SINGH’S PROPOSED SAND MINING PROJECT OVER 5 HECTARES SECTION OF THE UMZIMKHULU RIVER, OVER REMAINDER OF FARM SEAFIELD NO. 17474 AND REM OF AMBLESIDE NO. 2624 SITUATED IN THE PORT SHEPSTONE AREA, KWAZULU-NATAL

CSIR REFERENCE NO: CSIR/RU/EMS/8/2016/0002/A

The National Department of Environmental Affairs (DEA) and the Council for Scientific and Industrial Research (CSIR) have initiated the Special Needs and Skills Development Programme, whereby small-medium micro-enterprises and community trusts who are lacking financial means are provided with pro-bono environmental services to decrease the burden of the cost associated with starting a business. Ms Singh’s Sand Mining Project has been identified as an eligible client for this service and is proposing to mine sand from the river bed over an approximate section of the Umzimkulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in Port Shepstone, KwaZulu-Natal.

In terms of Government Notice Regulations (GNR) 983, 984 and 985 of the National Environmental Management Act (Act 107 of 1998) published in Government Gazette 38228 on 4 December 2014, Environmental Authorisation from the Competent Authority, in this case the KwaZulu-Natal Department of Mineral Resources (DMR), is required prior to the undertaking of any activity triggered within GNR 983, 984 and/or 985. The CSIR, as the independent Environmental Assessment Practitioner (EAP), will be managing the Basic Assessment and Public Participation Process for this proposed project.

In line with the Environmental Impact Assessment requirements of 4 December 2014, Interested and Affected Parties (I&APs) must be notified and are requested to register for this project in order to receive future correspondence on this project and/or provide comments on issues of concern that will be considered during the Basic Assessment process. Please find enclosed with this letter a Background Information Document (BID) and a Comment and Registration Form. You have until 26 October 2016 to register and submit your comments for this project. To register and submit comments for the project please complete the Registration Form. Use the CSIR Reference Number above together with your full name, contact details (preferred method of notification, e.g., full postal or email address), fax/phone number(s) and an indication of any direct business, financial, personal or other interest you have in the application to the contact person listed below.

From this point onwards, all communication and documents will be in English. Should you require further information in another language, please do not hesitate to contact the CSIR and we will assist.

Yours sincerely,

Ms. Babalwa Mqokeli (Project Manager)
Postal address: PO Box 320, Stellenbosch, 7599, South Africa
Tel: 021 888 2432
Fax: 021 888 2693
E-mail: bmkqokeli@csir.co.za
Website: http://www.csir.co.za/ems/specialneeds/

Board members: Prof T. Majola (Chairperson), Adv G. Badea, Ms P. Buiten, Dr P. Goyns, Dr A. Labell, Dr R. Masango, Ms M. Maseko, Mr J. Ntsihlenzhe, Ms A. Noah, Prof M. Phakeng, Dr S. Sibisi (CEO)

www.csir.co.za
Email sent (26/09/16) to I&APs as part of Project Announcement

From: Babalwa Mookeli  
To: babalwa.mookeli@csir.co.za  
Subject: Notification of Release of BID for Basic Assessment for the Proposed Sand Mining Project on Umzimkulu River, Port Shepstone, KwaZulu-Natal

Good day,

You are hereby notified about the release of the Background Information Document (BID) regarding a Basic Assessment for Ms Singh's proposed sand mining project over a 5 hectares section of the Umzimkulu River, over Remainder of Farm No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal. Please find attached the BID, which has been released for 30-day review, and the Registration/Comment Form. Please return the form on or before 26 October 2016.

Should the contents of this project not pertain to you, kindly forward the documents to the person in your department that is affected. Additionally, please forward their contact details to the CSIR Project Manager or ask the affected party to contact the CSIR Project Manager. Should you wish to be registered or de-registered from receiving any further information during the Basic Assessment and Public Participation Process, kindly contact the CSIR Project Manager.

Contact via: Ms. Babalwa Mookeli

Email: bmookeli@csir.co.za  
Tel: 021 888 2432  
Fax: 021 888 2593  
Postal: PO Box 320  
Stellenbosch  
7599  
South Africa

Regards,
Babalwa Mookeli  
CSIR - Environmental Management Services  
021 888 2432
**Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal**

**Proof email delivery sent on 26 September 2016**

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Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

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**Postal List for mail sent 26/09/16: Project Announcement documents (BID, Letter dated 23 September 2016, and Registration/Comment Form)**

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<td>Ncamisile Mtshali Private Bag X54307 Durban 4000</td>
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<td>Neo Leburu PO Box 1018 Durban 4000</td>
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Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

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Appendix C3: Proof of newspaper advertisements

Newspaper advertisement published in the South Coast Herald Newspaper on 23 September 2016
Notice of an Environmental Basic Assessment:
Ms Singh Sand Mining Project, Umzimkhulu River near Port Shepstone, KwaZulu-Natal.

CSIR Reference No: CSIR/IU/EMS/IR/2016/0002/A

Notice is given of a Basic Assessment (BA) process being undertaken on behalf of Ms Singh (the Project Applicant) for the proposed project to mine sand in an area of approximately 5 hectares on the Umzimkhulu River. The proposed project is located on land adjacent to the remainder of the Farm Seafield No. 1747 and remainder of Ambleside No. 2624, near Port Shepstone in KwaZulu-Natal.

In terms of the NEMA EIA Regulations published in Government Notice Regulation (GNR) 983 and 985 on 4 December 2014 Government Gazette 38282, a BA process is required as the project triggers the following listed activities: GNR 983 Activities 19(i) & 21 and GNR 985 Activity 12(b)v.

The Council for Scientific and Industrial Research (CSIR) is the Environmental Assessment Practitioner (EAP) who will be managing the process.

You are invited to register as an Interested and/or Affected Party (I&AP) and/or to provide any written comments on the BA process. To obtain further information on the project and/or to register as an I&AP, please provide your full name, full postal address, phone numbers, email address and state your area of interest and/or concern to: Ms. Babatwa Mgokeli, CSIR, PO Box 320, Stellenbosch 7599, Phone: (021) 888 2432, Fax: (021) 888 2693 or Email: bmpgokeli@csir.co.za. Please contact the indicated person within 30 days of this notification.

CSIR

our future through science
Appendix C4: Communications to and from interested and affected parties

(In response to Project Announcement documents)

1.

---

**1.**

Good day,

Please be advised that this particular project falls within the geographical boundaries of the Ugu District Municipality, and therefore under their area of jurisdiction in terms of the provision of comment/s. I have accordingly forwarded your correspondence to the relevant official [cc'd into this correspondence] for their attention. Kindly forward all further correspondence relevant to this project to her.

Regards,

Kraigen Govindasamy
Senior Environmental Officer
Department of Economic Development, Tourism and Environmental Affairs,
Umzimkulu District Office

Postal Address: Private Bag X07, Cascades, Pietermaritzburg, 3202
Physical Address: 8 Warwick Road
Tel: (033) 347 1820
Fax: (033) 347 1826
Email: kraigen.govindasamy@kznedtea.gov.za

---

**2.**

Good day,

There may be an error with the official’s email address. You may liaise with her telephonically on 0329229408. You may also forward the correspondence to Mr. Sabelo Ngobobo: sabelo.ngobobo@kznedtea.gov.za

Best regards,

Kraigen Govindasamy
Good day,

You are hereby notified about the release of the Background Information Document (BID) regarding a Basic Assessment for Mr. Singh’s proposed sand mining project over 5 hectares section of the uMzimkhulu River, over Remainder of Farm No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal. Please find attached the BID, which has been released for 30-day review, and the Registration/ Comment Form. Please return the form on or before 26 October 2010.

Should the contents of this project not pertain to you, kindly forward the documents to the person in your department that is affected. Additionally, please forward their contact details to the CSIR Project Manager or ask the affected party to contact the CSIR Project Manager. Should you wish to be registered or de-registered from receiving any further information during the Basic Assessment and Public Participation Process, kindly contact the CSIR Project Manager. Correspondence in this regard should preferably be written, i.e. Email, Fax or Letter.

Contact via: Mr. Babalwa Mgokolli
Tel: 021 888 2432
Fax: 021 888 2093
Postal: PO Box 320
Stellenbosch
7599
South Africa

Regards,
Babalwa Mgokolli
CSIR - Environmental Management Services
021 888 2432
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

Basic Assessment for the proposed Sand Mining Project
(UMzimkhulu River, Port Shepstone area in KwaZulu-Natal)
22 September 2016
CSIR Reference Number: CSIR/3/E/M/S/R/2016/0002/A

COMMENT AND REGISTRATION FORM

Name: Philip Christiansen
ID No: 5312215005084
Telephone: 0837952351
Fax:
Organisation: UGU District Municipality
Email: Philip.Christiansen@ugu.gov.za
Position: Senior Environmental Health Practitioner
Postal address: P O Box 35
Physical address: 33 Marine Drive, Oslo Beach Port Shepstone
4240

Please indicate if you would like to register as an Interested and Affected Party (I&AP). Registration is required in order to receive further correspondence during the Basic Assessment Process. Please tick the appropriate box.

YES

NO

Please indicate if you have any interest (business, financial, personal or other) in the application for Environmental Authorisation:

Regulatory Authority

Please describe any issues or concerns you may have regarding the proposed project, which you think should be considered during the Basic Assessment Process.

There is a need to provide adequate toilet facilities on site, as well as piped portable water supply. The toilets need to be properly flushed. Facilities need to be provided for refuse removal. There must be sufficient shower and locker facilities for all staff employed on the premises. All precautions need to be taken to ensure minimum environmental damage.

Please provide details of any other individuals or organisations that should be registered as I&APs.


Mngeni Conservancy
Wessa-South Coast-Paddy Noman-039 8863528

Please complete this Comment and Registration Form and submit it to:

Ms. Babalwa Mqokeli
P O Box 320,
stellenbosch, 7599
Tel: 021 888 2432
Fax: 021 888 2693
E-mail: bmqokeli@csir.co.za
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

3.

Good afternoon madam,

Kindly find the attached letter.

Kind regards,

[Signature]

Department of Agriculture, Forestry and Fisheries
Directorate - Forestry Regulating and Support
Designation: Senior
Tel: 033 369 7130
Web: www.daff.gov.za
E-mail: [Contact Information]

[Logo: agriculture, forestry & fisheries]

[Message and CBT acknowledged...]

Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal
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4.

Dear Ms Mgokweli,

Two of my clients currently mine sand from the Umzimkulu River near Port Shepstone.

Please include me as an interested and affected party and provide me with a plan showing the proposed mining area.

Kind Regards

D.S. Wortmann (PLS 1161)
Professional Land Surveyor
HNK Geomatics
P O Box 223 Margate 4275
Tel. 039 312 0880
Fax. 039 317 2405
www.hnkgeomatics.co.za

---

Good morning Mr Wortmann,

Apologies for the delayed response.

Thank you for your comment, I have added you to the project's database. Kindly find the attached map location of the proposed sand mining area.

Please let me know if you require further information.

Kind Regards,

Babaliwa

>>> "Dieter Wortmann" <hnkgeomatics.co.za> 30/09/2015 08:32 >>>

Good Morning

Please can you acknowledge this email.

Kind Regards

D.S. Wortmann (PLS 1161)
Professional Land Surveyor
HNK Geomatics
P O Box 223 Margate 4275
Tel. 039 312 0880
Fax. 039 317 2405
www.hnkgeomatics.co.za
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5.

---

Good morning,

May I please request the KML file for the above proposed activity. DAFF would like to use the information to do a desktop analysis prior commenting.

Regards,
Karen

From: Babalwa Mpokeli <bmpokeli@csir.co.za>
Sent: 26 September 2016 10:22 AM
Subject: Notification of Release of BID for Basic Assessment for the Proposed Sand Mining Project on uMzimkhulu River, Port Shepstone, KwaZulu-Natal

Good day,

You are hereby notified about the release of the Background Information Document (BID) regarding a Basic Assessment for Ms Singh’s proposed sand mining project over 5 hectares section of the Umzimkhulu River, over Remainder of Farm No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal. Please find attached the BID, which has been released for 30-day review, and the Registration/Comment Form. Please return the form on or before 26 October 2016.

Should the contents of this project not pertain to you, kindly forward the documents to the person in your department that is affected. Additionally, please forward their contact details to the CSIR Project Manager or ask the affected party to contact the CSIR Project Manager. Should you wish to be registered or de-registered from receiving any further information during the Basic Assessment and Public Participation Process, kindly contact the CSIR Project Manager. Correspondence in this regard should preferably be written. i.e. email, fax or letter.

Contact via: Ms. Babalwa Mpokeli
Email: bmpokeli@csir.co.za
Tel: 021 888 2432
Fax: 021 888 2093

---

Good day Karen,

I received your missed call, and have tried getting back to you with no luck.

Kindly find the attached file, and please let me know if you require further information.

Many thanks,

Babla
6.

6.1

Good morning madam,

DAFF has removed the Background Information Document for Ms Singh’s proposed mining project. Could you kindly include a vegetation study on your BAR and forward it to the DAFF offices in Pietermaritzburg. Address: 6th Floor; 115 Langalibalele Street, Pietermaritzburg; Old Mutual Building.

Kind regards,

[Signature]

[Name]

Department of Agriculture, Forestry and Fisheries

Directorate: Forestry Regulations and Support

Designation: intern

Tel: 833 227 7720

Web: www.daff.gov.za

E-mail: sivuyisile@daff.gov.za

6.2

Good morning Mr. ZW

As per our telephonic conversation, I received the attached comment from DAFF regarding a request for a Vegetation Study for the proposed study. However, the proposed activities include pumping sand from the river and as a result the vegetation will be cleared as there is an existing road to the site. The site has also been used previously for sand mining. I would like to enquire whether a Vegetation Study is still required by the Department.

Kindly also find the attached Background Information Document that was released to announce the proposed project.

Best regards,

[Signature]
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

6.3

Hi Friday or Monday is fine for me.

From: Babalwa Mpolwane
Sent: 03 May 2017 12:29 PM
To: NokuthulaZ
Cc: reporting@daff.gov.za
Subject: Re: Enquiry on Comments Received from DAFF Re: Ms Singh’s Proposed Sand Mining Project

Good day,

Unfortunately, I won’t be able to come for the site visit as I am based in Stellenbosch, the Project Applicant (and in this email) may however be available to meet with you for the site visit. Please let us know which date and time suits you and we can arrange from there.

Best regards,

Babalwa

Hi Nokuthula,

I have received your correspondence and would like to have a site inspection as I can do my comment, if its fine with you we can set a day and go there.

From: Babalwa Mpolwane
Sent: 06 May 2017 10:18 AM
To: NokuthulaZ
Subject: Enquiry on Comments Received from DAFF Re: Ms Singh’s Proposed Sand Mining Project

Good day Ms Mpolwane

Kindly receive the attached comments for the proposed Sand Mining Project.

Regards,

Anthea Nyakaza

Department of Agriculture, Forestry and Fisheries

Tel: 033 392 7773
Fax: 033 342 8793
E-mail: anthea.nyakaza@daff.gov.za

From: Anthea Nyakaza
Sent: 11 May 2017 09:09 AM
To: Babalwa Mpolwane
Subject: Message from Anthea Nyakaza to Babalwa Mpolwane

Message: 0623418
CS370051...
The Department of Agriculture, Forestry and Fisheries (DAFF) appreciates the opportunity given to review and comment on the Background Information Document (BID) for the above-mentioned project. Through the sub-directorate Forestry Regulations and Support is the authority mandated to implement the National Forest Act, (Act No. 84 of 1998) by regulating the use of natural forests and protected tree species in terms of the said Act.

With regards to the BID received on the 2nd May 2017 and the site inspection conducted on the 6th May 2017, the proposed site consists of alien invasive plant species and had previously mining activities which was evident from the site. There are no natural forests and/or protected trees that were identified within the proposed development footprint that will be affected in terms of section 7 and 15 the Natural Forests Act, 1990 (Act 84 of 1998). Therefore, DAFF has no objection towards the proposed project. However, the following mitigation measure should be considered:
- The pristine patch of natural coastal forest that falls outside the project footprint area on the northern bank of the river should be clearly demarcated as a no-go area during all phases of construction.
- EDC should ensure that staff is trained accordingly to ensure no destruction of this natural forest patch during all phases of the project.
- The temporary stockpile and Toilet area should be constructed on open areas or where there is a presence of alien invasive plant species.

This letter does not exempt you from considering other environmental legislations. Should any further information be required, please do not hesitate to contact this office.

Yours faithfully,
Ms. N Zikhali

Forestry Regulations & Support
KZN
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

7.

---

Good afternoon

Kind Regards

[Signatures and contact details]

Please find the attached form.

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**Attention:**

This message and any attachments. This message and any attachments may be confidential and may only be read by the recipient(s) intended. Thus, any use, copying, or distribution of this message is strictly prohibited. If you are not the intended recipient, please notify us immediately and destroy any copies.
Basic Assessment for the proposed Sand Mining Project
(Umzimkhulu River, Port Shepstone area in KwaZulu-Natal)
23 September 2016
CSIR Reference Number: CSIR/UEMS/R/2016/0023A

# Comment and Registration Form

<table>
<thead>
<tr>
<th>Name:</th>
<th>Liziwa Jiba</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID no:</td>
<td>8805280539091</td>
</tr>
<tr>
<td>Position:</td>
<td>Environmental Office</td>
</tr>
<tr>
<td>Physical address:</td>
<td>10 Connor St, Port Shepstone 4240</td>
</tr>
<tr>
<td>Postal address:</td>
<td>P.O. Box 5, Port Shepstone 4240</td>
</tr>
<tr>
<td>Telephone:</td>
<td>039 688 2271</td>
</tr>
<tr>
<td>Email:</td>
<td><a href="mailto:liziwa.jiba@home.gov.za">liziwa.jiba@home.gov.za</a></td>
</tr>
</tbody>
</table>

Please indicate if you would like to register as an interested and Affected Party (I&AP). Registration is required in order to receive further correspondence during the Basic Assessment Process. Please tick the appropriate box.

- [ ] Yes
- [x] No

Please indicate if you have any interest (business, financial, personal or other) in the application for Environmental Authorisation:

- [ ] Yes
- [x] No

Please describe any issues or concerns you may have regarding the proposed project, which you think should be considered during the Basic Assessment Process:

- Loss of sand, which is already a problem.
- Destruction of habitat, and many other ecological and water quality issues.

Please provide details of any other individuals or organisations that should be registered as I&APs:

[Blank space for further details]

[Box for CSIR contact information]

Ms. Babalwa Mpokeli
P.O. Box 320, Stellenbosch, 7599
Tel: 021 888 2422
Fax: 021 888 2603
E-mail: bmpokeli@csir.co.za

Board members: Prof T. Majek (Chairperson), Adv G. Badaka, Mr P. Baleni, Dr P. Goya, Dr A. Lushall.
Dr P. Lushall, Mr N. Maroko, Ms N. Mdlalase, Mr B. Maphakgwa, Prof. Phillips, Dr C. Shikl.).
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

8.
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

9.

Good Day

Please receive the attached comments and note that an original copy will be posted to you shortly.

Regards

Ntombozi Madlwane

DISCLAIMER: This message and any attachments are confidential and intended solely for the addressee. If you have received this message in error, please notify the system manager/sender. Any unauthorized use, alteration or dissemination is prohibited. The Department of Water and Sanitation further accepts no liability whatsoever for any loss, whether it be direct, indirect or consequential, arising from this email, nor for any consequence of its use or storage.
Dear Madam,

BACKGROUND INFORMATION DOCUMENT FOR THE PROPOSED SAND MINING PROJECT (UMZIMKHULU RIVER, PORTSHEPSTONE AREA IN KWAZULU NATAL)

Reference is made to the above-mentioned document received by this Office on 08 November 2016.

This Department would like to apologize in the delay to respond. It must be noted that this Office only received a copy on 08 November 2016. However, this Department would like these to be addressed in the Basic Assessment Report:

1. The management of solid waste and hazardous waste material generated during the mining phase of the project.
3. Wastewater and sewage treatment and/or management including the type of toilet facilities to be provided for workers.
4. Erosion control measures to be implemented.
5. Environmental Management Programme for the mining phase of the project.
6. Spill contingency plan for the mining phase of the project.
7. Please note that any activity occurring within a 500 meter (m) radius from the boundary of any wetland requires a Water Use Licence in terms of Section 21 (c) and (i) — i.e. “impeding or diverting the flow of water in a watercourse” and “altering the bed, banks, course or characteristics of a watercourse” respectively in terms of the National Water Act, 1998 (Act No 36 of 1998) (NWA).
8. A Wetland Delineation Study and a Functional Assessment must be carried out in accordance with the following document ‘A Practical Field Procedure for Identification and
9. The river, stream, and associated tributaries must be treated as sensitive environment areas. Caution must be exercised when developing near any watercourse. Please note that the Applicant will require an authorisation from the Department for any activity within the riparian habitat or 1:100 year floodline, whichever is the greatest distance.

10. The Applicant must note that river crossing structures such as bridges and causeways constitutes a Section 21 (c) and/or Section 21 (i) water uses and must be authorised under the provisions of the NWA.

11. It is the responsibility of the Applicant to identify all water uses applicable to his undertakings in terms of Section 21 of the NWA and ensure that all applicable water uses are authorised as such. The Applicant must consult with this Department if clarity is required with regard to water uses and water use authorisation. These water uses are listed in Table 1.

### Table 1: Water uses requiring authorisation

<table>
<thead>
<tr>
<th>Section 21</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>taking water from a water resource;</td>
</tr>
<tr>
<td>(b)</td>
<td>storing water;</td>
</tr>
<tr>
<td>(c)</td>
<td>impeding or diverting the flow of water in a watercourse;</td>
</tr>
<tr>
<td>(d)</td>
<td>engaging in a stream flow reduction activity (currently only commercial afferestation);</td>
</tr>
<tr>
<td>(e)</td>
<td>engaging in a controlled activity – activities which impact detrimentally on a water resource (activities identified in section 37 (1) or declared as such under section 38 (1)) namely:</td>
</tr>
<tr>
<td></td>
<td>- irrigation of any land with waste or water containing waste which is generated through an industrial activity or a waterwork;</td>
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<tr>
<td></td>
<td>- an activity aimed at the modification of atmospheric precipitation;</td>
</tr>
<tr>
<td></td>
<td>- a power generation activity which alters the flow regime of a water resource; or</td>
</tr>
<tr>
<td></td>
<td>- intentional recharge of an aquifer with any waste or water containing waste</td>
</tr>
<tr>
<td>(f)</td>
<td>discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;</td>
</tr>
<tr>
<td>(g)</td>
<td>disposing of waste or water containing waste in a manner which may detrimentally impact on a water resource;</td>
</tr>
<tr>
<td>(h)</td>
<td>disposing in any manner of water which contains waste from, or has been heated in, any industrial or power generation process;</td>
</tr>
<tr>
<td>(i)</td>
<td>altering the bed, banks, course or characteristics of a watercourse;</td>
</tr>
<tr>
<td>(j)</td>
<td>removing, discharging or disposing of water found underground if it is necessary for the efficient continuation if an activity or for the safety of people; and</td>
</tr>
<tr>
<td>(k)</td>
<td>using water for recreational purposes</td>
</tr>
</tbody>
</table>

12. If one or more of the water uses as per the NWA is proposed or currently occurring on a property requires a water use licence, then by default all other water use activities taking place on that property, irrespective if it would be regulated by a GA, would require to apply for a water use licence.
13. The onus is on the Applicant to identify all the water uses activity to be undertaken in relation to the proposed project and ensure that authorisation is obtained prior to commencing with the activities. Ms Zama Hadebe of this Department’s Water Use Authorisation Section must be contacted (031 336 2700) for a pre-application meeting to determine the type of authorisations required and the requirements thereof.

This Department awaits a copy of the Basic Assessment Report for further comments.

Please do not hesitate to call this Office should you have any concerns or queries.

Yours faithfully,

for Acting CEO: Pongola-Umzimkulu Proto CMA

Page 3 of 3
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal
(In response to Draft Basic Assessment)

11.

10 Corner Street
P.O. Box 5
Port Shepstone, 4240
Telephone: 036 888 2000
Fax: 036 882 0327

The Game charger of South Coast development
Your Ref: KZN38/5/1/3/1/210507MP
15 August 2017

CSIR- Sabelwa Mqokeii
P O Box 320
Stellenbosch
7599
Tel: 0216862432

Dear Sir/Madam

Re: Basic Assessment Report- proposed sand mining project over an approximate 5 hectares section of the Umzimkhulu river, over remainder of farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal.

Reference is made to the above-mentioned document.

The Sector, Environmental Management has no objections towards the proposed project. The section trusts that all the necessary recommendations by the relevant authorities and specialists will be followed through in order to ensure compliance and maximum mitigation of all negative impacts on the environment.

For further queries please contact, Ms. L.Jiba 0398822271, Lizwiwa.jiba@mrm.gov.za or Ms. F Mhlongo 0398822277, Fezile.mhlongo@mrm.gov.za

Regards,
Ms. L. Jiba

[Signature]
Environmental Officer
Ray Nkonyeni Municipality
Department of Development Planning Services
Based on the information provided on this DBAR, the proposed activity will have no impacts on trees or natural forests protected under the National Forests Act, Act No. 84 of 1998. Therefore, comments dated 11 May 2017 from the Department of Agriculture, Forestry and Fisheries (DAFF) still apply and should strictly be adhered to. These comments do not exempt you from considering other environmental legislations. Should there be any additional information required, please do not hesitate to contact this office.

Yours faithfully

S. Modise

Forestry Regulations & Support – KZN
Re: DRAFT BASIC ASSESSMENT REPORT FOR MINING PERMIT APPLICATION ON REMAINDER OF FARM SEAFIELD NO. 17474 AND REM OF AMBLESIDE NO. 2624 SITUATED ON UMZIMKULU RIVER, PORT SHEPSTONE, WITHIN RAY NKONYENI LOCAL MUNICIPALITY, UGU DISTRICT, DC 21.

The Draft Basic Assessment Report (hereinafter referred to as “BAR”) compiled for Ms. S. Singh which was submitted to the KZN Department of Economic Development, Tourism and Environmental Affairs on 27 July 2017 for the above mentioned project has reference.

The (hereinafter referred to as “the Department”) has reviewed the above mentioned draft BAR and hereby has the following comments:

1. According to the Environmental Assessment Practitioner (EAP), the total area available for the mining activity is 5 hectares including the stockpiling area and is along the Umzimkulu River within the Ugu Magisterial District. The method consists of mining of ± 100m² of river sand per day from the river bed using a mechanical pump.

2. The Draft Basic Assessment Report has been reviewed and the following must be addressed:
   I. A thorough assessment of the direct, indirect and cumulative impacts of this proposed sand mining operation in relation to the existing sand mining operations located up-stream and downstream of the Umzimkulu River.
   II. It is noted that the development has the potential to trigger the following listed activities as well, which

   "Attainment of a Radically Transformed, inclusive and Sustainable Economic Growth for KwaZulu-Natal"
have not been applied for nor assessed, activities 19 and 27 of listing Notice 1. Please note that it is the responsibility of the EAP to determine all listed activities that the proposed development will trigger.

4. It is the applicant’s responsibility to comply with any other statutory requirements that may be applicable to the carrying out of the activity.

Please do not hesitate to contact this Department, should you have any queries regarding this correspondence.

Yours faithfully

For: Ms. P. Ncapayi  
Head of Department: 
KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs  
Signed by: Ms Melissa Packree  
Designation: Assistant Manager- EIA  
Date: 18 Aug 2017
Attention: Ms Bababalwa Msokeli

Dear Madam:

RE: DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED SAND MINING PROJECT FOR MS SINGH OVER AN APPROXIMATE 5 HECTARES SECTION OF THE UMZIMKHULU RIVER, OVER REMAINDER OF FARM SEAFIELD NO. 17474 AND REM OF AMBLESIDE NO. 2624 SITUATED IN THE PORT SHEPSTONE AREA, KWAZULU NATAL.

Reference is made to the above-mentioned document received by this Office on 04 August 2017.

This Department has the following comments with regards to the proposed mining project:

(1) Water Use Authorisations and Water Resources

(1.1) Page 27 of the Report states that the proposed mining area is within the UMzimkulu River bed. This Department would like to bring to the attention of the Applicant that River crossing structures such as bridges and causeways constitute Section 21 (c) and/or Section 21 (f) water uses, i.e. “impeding or diverting the flow of water in a watercourse,” and “altering the bed, banks, course or characteristics of a watercourse,” respectively, must be authorised under the provisions of the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

(1.2) This Department would like to bring to the attention of the Applicant that any pollution control dam, attenuation pond, box cut, stockpile, settling ponds, waste dumps and mining voids are identified as Section 21 (g) water use, i.e. disposing of waste or water containing waste in a manner which may detrimentally impact on a water resource; and must be authorised as such in terms of the National Water Act, 1998 (Act No. 36 of 1998) (NWA).

(1.3) The Applicant will require an authorisation from this Department for any activity within the riparian habitat or 1:100 year floodline, whichever is the greatest distance.

(1.4) Page 29 of the Report indicates the presence of wetlands on site. Please note that any activity within a 500m radius from the boundary of a wetland requires a water use licence in terms of Section 21 (c) and (i) of the NWA. Should an activity be identified as a possible Section 21(i) water use, the Applicant must delineate the watercourse and riparian habitat using the Departmental guideline, “A practical field procedure for identification and delineation of wetlands and riparian areas.”
A wetland delineation study and functionality assessment must be carried out for any wetland occurring on site.

Management and Rehabilitation plan after mining must be forwarded to this Department.

Please note that no mining should take place on the banks of any river, stream, dam, pan or lake without the necessary authorization in terms of Section 21 (c) and (i) of the NWA.

The Report does not indicate the source of water for the proposed activity. The Applicant must note that taking water from a water resource is a water use in terms of Section 21 (a) of the NWA and must be authorised as such.

The Applicant would need to apply for a Section 21(g) water use Authorization if the Applicant wishes to use water containing waste for the purposes of dust suppression.

The Applicant must note that according to GN 704, Regulation 4(a): Restriction of locality “No person in control of a mine or activity may locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year floodline or within a horizontal distance of 100 meters from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on waterlogged ground, or on ground likely to become water logged, undermined, unstable or cracked.” The mining activity must adhere to the above with regard to watercourses. The Applicant must apply for an exemption from GN 704, Regulation 4(a) for the activity and supply proof to this Department that the activity will not impact on the water resource. Mitigation measures must also be included. The supporting documentation must be in the M4.0 series format.

Please note that no person may use water other than as permitted under the NWA. Should you engage in any water use without the necessary water use authorisation it will be regarded as an unlawful water use and you will be guilty of an offence and liable for a fine or imprisonment as stipulated in Section 151 of the NWA.

If one or more of the water uses as per the NWA is proposed or currently occurring on a property requires a water use licence, then by default all other water use activities taking place on that property, irrespective if it would be regulated by a GA, would require to apply for a water use licence.

A pre-Water Use Licence Application meeting is recommended during which technical and administration requirements as well as the type of authorisation required will be discussed. Please contact Ms Zama Hadebe of the Water Use Authorisation Unit on 031 336 2767/2700.

It is the responsibility of the Applicant to identify all water uses applicable to the mining project in terms of Section 21 of the NWA and ensure that all applicable water uses are authorised as such. The Applicant must consult with this Department if clarity is required with regard to water uses and water use authorisations. These water uses are listed in Table 1.
Table 1: Water Uses as per Section 21 of the NWA

| S21(a) | taking water from a water resource; |
| S21(b) | storing water; |
| S21(c) | impeding or diverting the flow of water in a watercourse; |
| S21(d) | engaging in a stream flow reduction activity (currently only commercial afforestation); |
| S21(e) | engaging in a controlled activity – activities which impact detrimentally on a water resource (activities identified in s37(1) or declared as such under s38(1)) namely:  
  - irrigation of any land with waste or water containing waste which is generated through an industrial activity or a waterwork;  
  - an activity aimed at the modification of atmospheric precipitation;  
  - a power generation activity which alters the flow regime of a water resource; or  
  - intentional recharge of an aquifer with any waste or water containing waste |
| S21(f) | discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; |
| S21(g) | disposing of waste or water containing waste in a manner which may detrimentally impact on a water resource; |
| S21(h) | disposing in any manner of water which contains waste from, or has been heated in, any industrial or power generation process; |
| S21(i) | altering the bed, banks, course or characteristics of a watercourse; |
| S21(j) | removing, discharging or disposing of water found underground if it is necessary for the efficient continuation if an activity or for the safety of people; and |
| S21(k) | using water for recreational purposes |

(2) Solid Waste Management

(2.1) All waste material generated must be disposed of at a licenced/permited landfill site that is authorised to accept such waste. Safe disposal certificates must be kept on record.

(2.2) Should private contractors be used, all solid waste must be disposed of at a licenced/permited landfill site, and proof of this must be made available to this Department when required.

(2.3) Such waste must be placed in skips stored in a designated storage/collection area prior to being safely disposed of and must not cause any surface and groundwater pollution or pose any health hazards.

(2.4) All contaminated material and hazardous waste material must be disposed of at a licenced/permited landfill site. The only 2 low hazardous landfill sites in the KwaZulu Natal province are the Shongweni and KwaDukuza landfill Sites.

(3) Sewage and Wastewater Management

(3.1) Washing, refuelling, maintaining of vehicles or the transfer of hazardous substances must be conducted within a bunded area. All drainage arising from the bunded area must be treated as a water containing waste and disposed of safely.

(3.2) The use of temporary, chemical toilet facilities must not cause any pollution to water sources as well as pose a health hazard, and must be located out of the 1:100 year floodline of a watercourse.
(3.3) No form of secondary pollution should arise from the disposal of sewage and refuse. The contractor must be clearly briefed on the method of disposal of such waste and compliance must be ensured/monitored. Any pollution problems arising from the above project is to be addressed immediately by the Applicant.

(4) Stormwater Management

(4.1) It is imperative that there is proper management of storm water on site. A Stormwater Management Plan must also be prepared in accordance with the "Best Practice Guidelines for Water Resource Protection in the South African Mining Industry" (G Series: G1 - DWAF, 2006). The Stormwater Management Plan must be approved by the relevant local Municipality.

(4.2) The Engineer or Contractor must ensure that only clean stormwater/runoff enters the environment.

(4.3) Drainage must be controlled to ensure that runoff on site does not culminate in off-site pollution, flooding or result in any damage to properties downstream of any storm water discharge.

(5) Erosion Control

(5.1) Potential sources of sediment must be minimised from the outset. This means limiting the extent (area) and duration (time period) of land disturbance to the minimum needed, and protecting surfaces once they are exposed.

(5.2) Erosion control measures must be put in place to minimise erosion along the proposed mining area and must be implemented in areas sensitive to erosion such as near water supply points, edges of slopes, etc. These measures could include the use of sand bags, retention or replacement of vegetation. Extra precautions must be taken in areas where the soils are deemed highly erodible.

(6) Incident Management

(6.1) The Applicant must submit a Spill Contingency Plan which must indicate the following steps:

6.1.1 Stop the source of the spill;
6.1.2 Contain the spill;
6.1.3 All significant spills must be reported to this Department and other relevant authorities;
6.1.4 Remove the spilled product for treatment or authorised disposal;
6.1.5 Determine if there is any soil, groundwater or other environmental impact;
6.1.6 If necessary, remedial action must be taken in consultation with this Department, Department of Mineral Resources and the Department of Environmental Affairs; and
6.1.7 Incident must be documented.

(7) General

(7.1) Sections (19), (20), (21), (22) and 26(1) (g) of the NWA must be complied with. These Sections relate to water usage, pollution control and prevention and mining product storage.

(7.2) The proposed mining operation must not contravene Government Notice 704 (4 June 1999, Volume 408, No. 20119) regarding the ‘Regulations on use of water for mining and related activities aimed at the protection of water resources’ in terms of the NWA.

(7.3) Sufficient funds must be made available for the complete rehabilitation of the mining area after the cessation of the mining activities.
(7.4) A written agreement between the mineral right owner and the landowner must be obtained with regard to who will be responsible for the rehabilitation of the mining site.

(7.5) The responsibilities and conditions in the Draft Environmental Management Programme (EMPr) titled, ‘Basic Assessment For The Proposed Sand Mining Project Over An Approximate 5 Hectares Section Of The UMsizimkhulu River, Over Remainder Of Farm Seafield No. 17474 and Rem Of Ambleside No. 2624 Situated In The Port Shepstone Area, KwaZulu-Natal’ are noted. Compliance to the final approved EMPr must be audited regularly by the designated Environmental Control Officer (ECO).

(7.6) The contents of the Report titled: “Aquatic Ecology Assessment For The Proposed Sand Mining Project,” dated June 2017 attached as Appendix D (Specialist Report) is noted. This Report must form part of Water Use Licence Application.

(7.7) Notwithstanding the above, the responsibility rests with the Applicant to identify any source or potential source of pollution from his undertaking and to take appropriate measures to prevent any pollution of the environment. Failure to comply with the requirements of the National Water Act (Act 36 of 1998) could lead to legal action being instituted against the Applicant.

This reply does not grant any exemption from the requirements of any applicable Act, Ordinance, Regulation or Bylaw.

Please do not hesitate to contact this Office should you have any concerns, comments or queries.

Yours faithfully

[Signature]

for ACTING CEO: PONGOLA TO UMsizimkhulu PROTO CMA
TN/tn 14467 14527
Ms Singh’s proposed Sand Mining Project

Our Ref: SAH16/10367

Enquiries: Benadel Pawandwa
Tel: 033 394 6543
Email: benadelp@amafatmb.co.za

Date: Monday August 28, 2017

Final Comment

In terms of Section 38(8) of the National Heritage Resources Act (Act 25 of 1999) and the KwaZulu-Natal Heritage Act (Act 4 of 2008)

Attention: Sohafa Singh

3 Parklane Road
Marburg Ridge
Port Shepstone

Proposed sand mining project over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal.

Thank you for submitting the Heritage Impact Assessment Report in support of this development proposal. The specialist concluded that the development is not likely to impact on any significant resources as “the only heritage material that could possibly be impacted would be relatively recent isolated sub-fossils trapped in the Holocene and younger surficial sands targeted for mining. This material is of very low significance.” It is also indicated that a very small possibility does exist that unmarked pre-colonial graves could be uncovered during excavation of the sand storage pit.

Amafa therefore has no objection to the development within the parameter of prescribed recommendations stipulated in the report by Jaco van der Walt. You are also required to adhere to the below-mentioned standard conditions:

Conditions:

1. Amafa should be contacted if any heritage objects are identified during earthmoving activities and all development should cease until further notice.
2. No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from Amafa.
3. No activities are allowed within 50m of a site, which contains rock art.
4. Sources of all natural materials (including topsoil, sands, natural gravels, crushed stone, asphalt, etc.) must be obtained in a sustainable manner and in compliance with the heritage legislation.

Failure to comply with the requirements of the National Heritage Resources Act and the KwaZulu Natal Heritage Resources Act could lead to legal action being instituted against the applicant.

This decision is valid for a period of two years.

Should you have any further queries, please contact the designated official using the case number quoted above in the case header.

Yours faithfully

Amafa AkwaZulu-Natal
Heritage KwaZulu-Natal
Erfenis KwaZulu-Natal
Ms Singh's proposed Sand Mining Project

Our Ref: SAH16/10367

Date: Monday August 28, 2017

Page No: 2

Bernadet Pawandiwa
Senior Heritage Officer
Amafikazi Heritage KwaZulu Natal

Annie van de Venter Radford
Deputy Director: Research, Professional Services and Compliance
Amafikazi Heritage KwaZulu Natal

ADMIN:
Direct URL to case: http://www.sahra.org.za/node/375265

Terms & Conditions:

1. This approval does not exonerate the applicant from obtaining local authority approval or any other necessary approval for proposed work.
2. If any heritage resources, including graves or human remains, are encountered they must be reported to Amafikazi immediately.
3. Amafikazi reserves the right to request additional information as required.
16.

**Comments - Draft Basic Report for Ms Singh's Proposed Sand Mining Project Over 5 Hectares Section of Umzimkhulu River, Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 Situated in Ugu District Municipality**

1. If you have applied for a water use licence please provide proof of such application.
2. Under your site description section please give clarity as to how far would be the proposed sand mining operation from the bridge and the N2 Highway.
3. In the list of the state organs and departments that you have consulted, you have omitted KZN Ezemvelo Wild Life.
4. Please provide a Regulation 2.2 plan that has co-ordinates and a conceptual plan layout.

Yours faithfully

[Signature]

REGIONAL MANAGER
MINERAL REGULATION
KWAZULU NATAL
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

**Appendix C5: Comments and Responses Report**

*Please note that the comments are taken verbatim from the comments provided by Interested and Affected Parties

Comments received following the project announcement on 26 September 2016 (prior to the release of the Draft Basic Assessment Report)

<table>
<thead>
<tr>
<th>Interested and Affected Parties</th>
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<th>Comments/Issues raised</th>
<th>EAPs response to issues as mandated by the applicant</th>
<th>Section and paragraph reference in this Report where the issues and/or responses were incorporated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kraigen Govindsamy</td>
<td>26/09/2016</td>
<td>- Please be advised that this particular project falls within the geographical boundaries of the Ugu District Municipality, and therefore under their area of jurisdiction in terms of the provision of comment/s. I have accordingly forwarded your correspondence to the relevant official (cc’d into this correspondence) for their attention. Kindly forward all further correspondence relevant to this project to her. - There may be an error with the official’s email address. You may liaise with her telephonically on 0829219406. You may also forward the correspondence to Mr. Sabelo Ngcobo: <a href="mailto:sabelo.ngcobo@kznedtea.gov.za">sabelo.ngcobo@kznedtea.gov.za</a> .</td>
<td>- Thank you for your assistance in this regard, the information regarding the project was forwarded to Mr Ngcobo.</td>
<td>Correspondence to Mr Ngcobo is included in Appendix C4.1(b).</td>
</tr>
</tbody>
</table>
### Interested and Affected Parties

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Date Comments Received</th>
<th>Issues raised</th>
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<th>Section and paragraph reference in this Report where the issues and/or responses were incorporated</th>
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</thead>
<tbody>
<tr>
<td>Philip Christiansen</td>
<td>UGU District Municipality</td>
<td>27/09/2016</td>
<td>- There is a need to provide adequate toilet facilities on site, as well as piped portable water supply. The toilets need to be proper flushed cisterns. Facilities need to be provided for refuse removal. There must be sufficient shower and locker facilities for all staff employed on the premises. All precautions need to be taken to ensure minimum environmental damage.</td>
<td>- Thank you for the comments provided. The proposed project will make use of a portable chemical toilet which will be placed away from the river to avoid any contamination. Waste bins will be provided on site for general waste, and will be removed from site regularly. Shower and locker facilities are not considered for the proposed project as the only activity to be undertaken on site is sand mining. Workers will be transported to and from site, and it is thus expected that they will not need to shower on site. The temporary nature of the proposed project layout aims to reduce impacts associated with erecting structures on site and stripping down those structures post-mining activities. Precaution will be undertaken to avoid and/or minimise impacts that are detrimental to the environment. An Aquatic Ecology facilities and structures proposed in association with the proposed project are included in Section d(ii) of this Draft Basic Assessment Report (BAR). Management of impacts, as well as mitigation measures recommended for the proposed project are addressed in Section (viii) of this Draft BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project.</td>
<td></td>
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</table>
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkulu River, over Remainder of Farm Seafield No. 17474 and Rem of Amble side No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

<table>
<thead>
<tr>
<th>Name</th>
<th>Department/Company</th>
<th>Date</th>
<th>Comments</th>
<th>Response</th>
<th>Correspondence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ayanda Mnyungula</td>
<td>KZN Department of Agriculture, Forestry &amp; Fisheries</td>
<td>28/09/2016</td>
<td>This letter serves as a notice of receipt for the above mentioned document(s) received on the 26th of September 2016. Should any further information be required, please do not hesitate to contact this office.</td>
<td>Thank you for the comment, it is noted.</td>
<td>N/A</td>
</tr>
<tr>
<td>Dieter Wortmann</td>
<td>HNK Geomatics</td>
<td>28/09/2016</td>
<td>Two of my clients currently mine sand from Umzimkulu River near Port Shepstone. Please include me as an interested and affected party and provide me with a plan showing the proposed mining area.</td>
<td>Thank you for the comment, it is noted. Mr Wortmann was added to the project database, and the map was sent.</td>
<td>Kindly refer to Appendix C4.4 for the proof of correspondence.</td>
</tr>
<tr>
<td>Karen M</td>
<td>Department of Agriculture, Forestry and Fisheries</td>
<td>10/10/2016</td>
<td>May I please request the KML file for the above proposed activity. DAFF would like to use the information to do a desktop analysis prior commenting.</td>
<td>Thank you for the comment. The requested file was sent to the Department.</td>
<td>Kindly refer to Appendix C4.5 for the proof of correspondence.</td>
</tr>
<tr>
<td>Nomvuyo Nkotha</td>
<td>Department of Agriculture, Forestry and Fisheries</td>
<td>14/10/2016</td>
<td>DAFF has received the Background Information Document for Ms Singh’s proposed mining project. Could you kindly include a vegetation study on your BAR and forward it to the DAFF in Pietermaritzburg. Address: 6th Floor; 185 Langalibalele street; Pietermaritzburg; Old mutual building.</td>
<td>Thank you for the provided comment and/or feedback with reference to the proposed development. Response addressed to Ms N Zikhali: As per our telephonic</td>
<td>N/A</td>
</tr>
</tbody>
</table>
| Nokuthula Zikhali | 11/05/2017 | With regards to the BID received on the 3rd May 2017 and the site inspection conducted on the 5th May 2017, the proposed site consists of alien invasive plant species and had previously mining activities which was evident from the site. There are no natural forests and/or protected trees that were identified within the proposed development footprint that will be affected in terms of Section 7 and 15 the Natural Forests Act, 1998 (Act 84 of 1998). Therefore, DAFF has no objection towards the proposed project. However, the following mitigation measures should be considered:
- The pristine patch of natural coastal forest that falls outside the project footprint area on the northern bank conversation, I received the attached comment from DAFF regarding a request for a Vegetation Study for the proposed study. However the proposed activities include pumping sand from the river and as a result no vegetation will be cleared. In addition, there is an existing access road to the site, so no clearing will take to construct a new road. The site has also been used previously for sand mining. I would like to enquire whether a Vegetation Study is still required by the Department.
| Kindly refer to Appendix C4.6.2 for the proof of correspondence. | Ms Zikhala did a site inspection on the proposed site.
- Thank you for the provided feedback and recommendations
These are included and addressed in the Mitigation Measures section of the EMPr which forms part of this Draft BAR.
| Management of impacts, as well as mitigation measures recommended for the proposed project are addressed in Section (viii) of this Draft BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project.
of the river should be clearly demarcated as a no-go area during all phases of construction.
- ECO should ensure that staff is trained accordingly to ensure no destruction of this natural forest patch during all phases of the project.
- The temporary stockpile and Toilet area should be constructed on open areas or where there is a presence of alien invasive plant species.

<table>
<thead>
<tr>
<th>Liziswa Jiba</th>
<th>Ray Nkonyeni Municipality</th>
<th>20/10/2016</th>
<th>Loss of sand which is already a problem. Destruction of habitat and many other ecological and water quality issues.</th>
</tr>
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<tbody>
<tr>
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<td></td>
<td>Thank you for the comment. Sand extraction will be limited to the dry season and extraction will not exceed the annual accumulation rate, that is monitoring and mitigation measures as proposed in the EMPr should be implemented to ensure sand extracted is replenished naturally by upstream transport and does not exceed the recruitment rate.</td>
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<td>An Aquatic Ecology Assessment has been undertaken with regards to the proposed project, a report was produced thereof which details of the impacts associated with the project and mitigation measure to reduce negative impacts on the environment.</td>
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</table>

Kindly refer to Appendix D for the Specialist Report and the EMPr section of this Draft BAR.
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<td>Bernadet Pawandiwa</td>
<td>21/11/2016</td>
<td>Thank you for submitting this application for comment in terms of NEMA. The application has been considered and it has been established that the site falls in a generally sensitive zone associated with human activity relating to the stone age and historical era. The fossil sensitivity map places this development in an area of moderate paleontological sensitivity. A Heritage Impact Assessment is therefore required. This should have an archaeological component and a paleontological component. The developer is therefore required to appoint specialists in this field to conduct a field-based archaeological study that looks at both cultural remains and a historical study as well as a desktop study covering the fossil sensitivity. The Study should cover: • Identification of all heritage resources in the development area and its surroundings -50m • Assessment of the impact of the development on such heritage • Evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from</td>
<td>Thank you for the comments provided. Comment is noted. A heritage analysis was undertaken for the proposed development, assessing both the archeology and paleontology, including a brief discussion on other aspects of heritage. A Heritage Impact Assessment Study, including the information pertaining to the Heritage Impact Assessment Exemption has been included in Appendix D of this report. • A Heritage Impact Assessment study was carried out in this regard, assessing heritage resources in the vicinity of the study area. • An assessment of the potential impacts to</td>
<td>Kindly refer to Appendix D of this Report. Kindly refer to the supporting HIA report attached as Appendix D. Kindly refer to Section (viii) of this BAR, as well as in the</td>
</tr>
</tbody>
</table>
the development

- Results of consultation with communities affected by the proposed development and other interested and affected parties regarding the impact of the development on heritage resources.
- Consideration of alternatives if heritage resources are affected by the development.
- Mitigation plans for any adverse effects during and after completion of the project.
- Table of all heritage resources identified. This should show Heritage resource type, description, location, significance and reasons for this rating.

Please download our list of Heritage Practitioners from our website [www.heritagekzn.co.za](http://www.heritagekzn.co.za).

heritage resources that might occur through the proposed development was conducted.
- Proof of correspondence sent to registered I&APs and stakeholders during the Project Initiation and Draft Basic Assessment Phases is included in Appendix C of this Final BA Report. The issues raised and comments received from I&APs and key departments were captured in the Issues and Responses Trail and addressed in this finalised BA Report, where required and as applicable (this Section and Appendix C5 & C6 of the BA Report, i.e. this. The comments raised by stakeholders, I&APs and key departments were captured in the Issues and Responses Trail and addressed in this finalised BA Report, where required and as applicable (this Section and Appendix C5 & C6 of the BA Report, i.e. this). The comments raised by stakeholders, I&APs and key departments were captured in the Issues and Responses Trail and addressed in this finalised BA Report, where required and as applicable (this Section and Appendix C5 & C6 of the BA Report, i.e. this).

- The HIA study concluded that there are no significant heritage resources present on the site and significant impacts are thus not expected.
- The applicable mitigation measures are included in this report and the supporting HIA report attached.

Environmental Management Programme (EMPr) of the proposed project. Kindly refer to Appendix C of this Final BAR.

Kindly refer to the supporting HIA report attached as Appendix D.

Kindly refer to Section (viii) of this BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project.
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| Ms RJ Madibe                  | 22/11/2016             | This Department would like these to be addressed in the Basic Assessment Report:  
1. The management of solid waste and hazardous waste material generated during the mining phase of the project.  
3. Wastewater and sewage treatment and/or management including the type of toilet facilities.  
4. Erosion control measures to be implemented.  
5. Environmental Management Programme for the mining phase of the project.  
6. Spill contingency plan for the mining phase of the project.  
7. Please note that any activity occurring within a 500 meter (m) radius from the boundary of any wetland requires a Water Use Licence in terms of Section | Thank you to the Department for the comments provided.  
Response to the Department comments:  
1. Mitigation measures for Waste Management have been included in the EMPr section of this report.  
2. Mitigation measures for stormwater management have been included in the EMPr section of this Report.  
Recommendations for stormwater management will be considered by the Applicant during the design, construction and operation phases, as applicable and where possible.  
3 & 4. Key monitoring and mitigation measures have been included in the EMPr section of this Report, inclusive of |
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkhulu River, over Remainder of Farm Seafield No. 17474 and Rem of Ambleisde No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

21 (c) and (i) – i.e. “impeding or diverting the flow of water in a watercourse” and “altering the bed, banks, course or characteristics of a watercourse” respectively in terms of the National Water Act, 1998 (Act No 36 of 1998) (NWA).

8. A Wetland Delineation Study and a Functional Assessment must be carried out in accordance with the following document “A Practical Field Procedure for Identification and Delineation of Wetlands and Riparian Areas” for all wetlands occurring onsite and in close proximity to the site (refer to Point 7).

9. The river, stream, and associated tributaries must be treated as sensitive environment areas. Caution must be exercised when developing near any watercourse. Please note that the Applicant will require an authorisation from the Department for any activity within the riparian habitat or 1: 100 year floodline, whichever is the greatest distance.

10. The Applicant must note that river crossing structures such as bridges and causeways constitutes a Section 21 (c) and/or Section 21 (i) water uses and must be authorised under the provisions of the NWA.

11. It is the responsibility of the Applicant recommendations from the specialist study undertaken and precautionary/monitoring measures to avoid and/or minimise impacts.

5. An EMPr with detailed mitigation measures that must be adhered to during the mining activities is included in this Report.

6. Spill prevention measures have been included in the EMPr of this Report.

7. Comment noted and complied with. The Applicant has made contact with the Department with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm whether an application for a Licence is required. Proof of correspondence is included in Appendix C4.9 of this Report.

8. Comment noted and complied with. An Aquatic Ecology Assessment has been undertaken with regards to the proposed project.

9. Comment noted and complied with.
to identify all water uses applicable to his undertakings in terms of Section 21 of the NWA and ensure that all applicable water uses are authorised as such. The Applicant must consult with this Department if clarity is required with regard to water uses and water use authorisation. These water uses are listed in Table 1 (*Included in Appendix C.8*).

12. If one or more of the water uses as per the NWA is proposed or currently occurring on a property requires a water use licence, then by default all other water use activities taking place on that property, irrespective if it would be regulated by a GA, would require to apply for a water use licence.

13. The onus is on the Applicant to identify all the water uses activity to be undertaken in relation to the proposed project and ensure that authorisation is obtained prior to commencing with the activities. Ms Zama Hadebe of this Department’s Water Use Authorisation Section must be contacted (031 336 2700) for a pre-application meeting to determine the type of authorisations required and the requirements thereof.

This Department awaits a copy of the Basic Assessment Report for further comments.
**Appendix C6: Comments from I&APs following the release of the Draft Basic Assessment (BA) Report on 28 July 2017.**

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</thead>
<tbody>
<tr>
<td>Ms Liziswa Jiba</td>
<td>15/08/2017</td>
<td>The Section; Environmental Management has no objections towards the proposed project. The section trusts that all the necessary recommendations by the relevant authorities and specialists will be followed through in order to ensure compliance and maximum mitigation of all negative impacts on the environment</td>
<td>Thank you for the comments provided. The EMPr of this proposed project must form part of the contractual agreement and be adhered to by both the contractors/workers and the applicant.</td>
<td>Management of impacts, as well as mitigation measures recommended for the proposed project are addressed in <strong>Section (viii)</strong> of this BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project.</td>
</tr>
<tr>
<td>Ms Seokwang Modise</td>
<td>15/08/2017</td>
<td>Based on the information provided on this DBAR, the proposed activity will have no impacts on trees or natural forests protected under the National Forests Act, Act No. 84 of 1998. Therefore, comments dated 11 May 2017 from the Department of Agriculture, Forestry and Fisheries (DAFF) still apply and should strictly be adhered to. These comments do not exempt you from considering other environmental legislations. Should there be any additional information required, please do not hesitate to contact this office.</td>
<td>Thank you for the comment provided, it is noted.</td>
<td>N/A</td>
</tr>
<tr>
<td>Interested and Affected Parties</td>
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<td>Comments Received</td>
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<td>EAPs response to issues as mandated by the applicant</td>
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| Ms P. Ncapayi                 | 18/08/2017 | - | 1. According to the Environmental Assessment Practitioner (EAP), the total area available for the mining activity is 5 hectares including the stockpiling area and is along the Umzimkulu River within the Ugu Magisterial District. The method consists of mining of ±100 m$^3$ of river sand per day from the river bed using a mechanical pump.  
2. The Draft Basic Assessment Report has been reviewed and the following must be addressed: i. A thorough assessment of the direct, indirect and cumulative impacts of this proposed sand mining operation in relation to the existing sand mining operations located up-stream and downstream of the uMzimkulu River.  
3. It is noted that the development has the potential to trigger the following listed activities as well, which have not been applied for nor assessed, activities 19 and 27 of listing Notice 1. Please note that it is the responsibility of the EAP to determine all listed activities that the proposed development will trigger.  
4. It is the applicant’s responsibility to comply with any other statutory requirements that may be applicable to the carrying out of the activity. | Thank you for the comments provided by the Department  
1. Comment is noted and correct.  
2. Comment noted and complied with. As recommended by the Department, direct, indirect and cumulative impacts of the proposed sand mining operation in relation to the existing sand mining operations located up-stream and downstream of the uMzimkulu River have been assessed and included in Section (viii) of this Final BAR.  
3. Comment is noted; the following listed Activity has been included and assessed as part of this application: Activity 19. Please see Section d)ii) for a provisional list of activities identified for the proposed Sand mining operation. Activity 27 has not been included as part of the identified listed activities as the proposed sand mining activities do not include the clearing of indigenous vegetation of an area size of ≥1ha. | 2. Management of impacts, as well as mitigation measures recommended for the proposed project are addressed in Section (viii) of this Final BAR, as well as in the Aquatic Ecology Assessment included as Appendix D.  
3. Kindly refer to Section d)ii) and d)ii) of this Report for a list of activities identified, as well as the revised details of the area to be cleared. |

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
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<tbody>
<tr>
<td>Ms P. Ncapayi</td>
<td>KZN Department of Economic Development, Tourism and Environmental Affairs</td>
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</tbody>
</table>
### Interested and Affected Parties

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</thead>
<tbody>
<tr>
<td>Mr T.G Ntlhanakoe</td>
<td>Department of Water &amp; Sanitation</td>
<td>25/08/2017</td>
<td>This Department has the following comments with regards to the proposed mining project:</td>
<td>Thank you to the Department for the comments provided.</td>
<td>4. Comment is correct and noted.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><em>(1) Water Use Authorisations and Water Resources</em></td>
<td>Response to the Department comments:</td>
<td><em>(1.1) Kindly refer to Appendix C4.9 of this Report for proof of correspondence, as well as Appendix D for the wetland Study included as part of the Aquatic Ecology Assessment.</em></td>
</tr>
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<td>*(1.1) Page 27 of the Report states that the proposed mining area is within the UMzimkhulu River bed. This Department would like to bring to the attention of the Applicant that River crossing structures such as bridges and causeways constitutes a Section 21 (c) and/or Section 21 (i) water uses, i.e. “impeding or diverting the flow of water in a watercourse” and “altering the bed, banks, course or characteristics of a watercourse,” respectively,“ must be authorised under the provisions of the National Water Act, 1998 (Act No 36 of 1998) (NWA).</td>
<td>*(1.1) Comment noted and complied with. The Applicant has made contact with the Department with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm whether an application for a Licence is required. Proof of correspondence is included in Appendix C4.9 of this Report. A wetland study was undertaken and attached as part of this Report and the application for a Water Use Licence is in process, as with the pre-application meeting conducted with the Department</td>
<td><em>(1.2) Comment is correct and Management of</em></td>
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<td>*(1.2) This Department would like to bring to the attention of the Applicant that any pollution control dam, attenuation pond, box cut, stockpile,</td>
<td><em>(1.2) Comment is correct and Management of</em></td>
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</table>
settling ponds, waste dumps and mining voids are identified as Section 21 (g) water use, *i.e.* disposing of waste or water containing waste in a manner which may detrimentally impact on a water resource; and must be authorised as such in terms of the National Water Act, 1998 (Act No 36 of 1998) (NWA).

(1.3) The Applicant will require an authorisation from this Department for any activity within the riparian habitat or 1:100 year floodline, whichever is the greatest distance.

(1.4) Page 29 of the Report indicates the presence of wetlands on site. Please note that any activity within a 50m radius from the boundary of a wetland requires a water use licence in terms of Section 21 (c) and (i) of the NWA. Should an activity be identified as a possible Section 21(i) water use, the Applicant must delineate the watercourse and riparian habitat using the Departmental guideline, “A practical field procedure for identification and delineation of wetlands and riparian areas”.

(1.5) A wetland delineation study and functionality assessment must be carried out for any wetland occurring on site.

(1.6) Management and Rehabilitation plan after mining must be forwarded to this Department.

noted. Kindly see Response (1.1) above with regards to Authorisation. Mitigation measures for Waste Management and Recommendations for stormwater management have been included in the EMPr section of this report, and will be considered by the Applicant during the design, construction and operation phases, as applicable and where possible.

(1.3) Comment is correct and noted. Kindly see Response (1.1) above with regards to Authorisation.

(1.4) Comment noted and complied with. A Specialist study was undertaken as part of this assessment, kindly refer to the Aquatic Ecology Assessment Report included as Appendix D.

(1.5) A wetland delineation study and functionality assessment was undertaken as part of this Basic Assessment.

(1.6) Comment noted and will be complied with.

impacts, as well as mitigation measures recommended for the proposed project are addressed in Section (viii) of this Final BAR, as well as in the Environmental Management Programme (EMPr) of the proposed project and the Aquatic Ecology Assessment included as Appendix D.

(1.3) Kindly refer to Response (1.1) in this comments and responses table with regards to Authorisation.

(1.4) Kindly refer to Appendix D for the wetland Study included as part of the Aquatic Ecology Assessment.

(1.5) Kindly refer to Appendix D for the wetland Study included as part of the Aquatic Ecology Assessment.

(1.6) N/A
<p>| 1.7 | Please note that no mining should take place on the banks of any river, stream, dam, pan or lake without the necessary authorization in terms of Section 21 (c) and (i) of the NWA. |
| 1.8 | The Report does not indicate the source of water for the proposed activity. The Applicant must note that taking water from a water resource is a water use in terms of Section 21 (a) of the NWA and must be authorised as such. |
| 1.9 | The Applicant would need to apply for a Section 21(g) water use Authorization if the Applicant wishes to use water containing waste for the purposes of dust suppression. |
| 1.10 | The Applicant must note that according to GN 704, Regulation 4(a): Restriction of locality &quot;No person in control of a mine or activity may locate or place any residue deposit, dam, reservoir, together with any associated structure or any other facility within the 1:100 year floodline or within a horizontal distance of 100 meters from any watercourse or estuary, borehole or well, excluding boreholes or wells drilled specifically to monitor the pollution of groundwater, or on water-logged ground, or on ground likely to become water-logged, undermined, unstable or cracked.&quot; The mining activity must adhere to the above with regard to watercourses. The Applicant must |
|   |   | apply for an exemption from GN 704, Regulation 4(a) for the activity and supply proof to this Department that the activity will not impact on the water resource. Mitigation measures must also be included. The supporting documentation must be in the M40 series format. |
|   |   | (1.11) Please note that no person may use water other than as permitted under the NWA. Should you engage in any water use without the necessary water use authorisation it will be regarded as an unlawful water use and you will be guilty of an offence and liable for a fine or imprisonment as stipulated in Section 151 of the NWA. |
|   |   | (1.12) If one or more of the water uses as per the NWA is proposed or currently occurring on a property requires a water use licence, then by default all other water use activities taking place on that property, irrespective if it would be regulated by a GA, would require to apply for a water use licence. |
|   |   | (1.13) A pre-Water Use Licence Application meeting is recommended during which technical and administration requirements as well as the type of authorisation required will be discussed. Please contact Ms Zama Hadebe of the Water Use Authorisation Unit on 031 336 2767/2700. |
|   |   | (1.11) Comment noted and will be complied with. |
|   |   | (1.12) Comment noted and will be complied with. |
|   |   | (1.13) Comment noted and complied with. The Applicant has made contact with the Department with regards to the application process for a Water Use Licence. In response to this, a wetland study was required to confirm whether an application for a Licence is required. A |
|   |   | (1.11) N/A |
|   |   | (1.12) N/A |
|   |   | (1.13) Proof of correspondence is included in Appendix C4.9 of this Report. |</p>
<table>
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</thead>
<tbody>
<tr>
<td>(1.14) It is the responsibility of the Applicant to identify all water uses applicable to the mining project in terms of Section 21 of the NWA and ensure that all applicable water uses are authorised as such. The Applicant must consult with this Department if clarity is required with regard to water uses and water use authorisations. These water uses are listed in Table 1. (Table is in the proof of correspondence included in Appendix C4.13)</td>
<td>follow-up meeting is in process following to the submission of the wetland study as part of the Draft Basic Assessment Report</td>
<td>(1.14) Comment noted.</td>
<td>(1.14) N/A</td>
</tr>
<tr>
<td>(2) Solid Waste Management</td>
<td>2. Solid Waste Management</td>
<td>(2.1) Mitigation measures for Waste Management have been included in Section (viii) of this Final BAR, and the EMPR section of this report.</td>
<td>(2.2) Kindly refer to Section (viii) of this Final BAR, and the EMPR section of this report.</td>
</tr>
<tr>
<td>(2.1) All waste material generated must be disposed of at a licenced/permited landfill site that is authorised to accept such waste. Safe disposal certificates must be kept on record.</td>
<td>(2.1) Comment noted and will be complied with. The EMPR of this proposed project must form part of the contractual agreement and be adhered to by both the contractors and the applicant.</td>
<td>(2.2) Comment noted and will be complied with. Mitigation</td>
<td></td>
</tr>
<tr>
<td>(2.2) Should private contractors be used, all solid waste must be disposed of at a licenced/permited landfill site, and proof of this must be made available to this Department when required.</td>
<td></td>
<td>(2.2) Comment noted and will be complied with. Mitigation</td>
<td></td>
</tr>
<tr>
<td>(2.3) Such waste must be placed in skips stored in a designated storage/collection area prior to being</td>
<td></td>
<td>(2.3) Comment noted and will be complied with. Mitigation</td>
<td></td>
</tr>
</tbody>
</table>

Kindly refer to Section (viii) of this Final BAR, and the EMPR section of this report.
safely disposed of and must not cause any surface and groundwater pollution or pose any health hazards.

(2.4) All contaminated material and hazardous waste material must be disposed of at a licenced/permited landfill site. The only 2 low hazardous landfill sites in the KwaZulu Natal province are the Shongweni and KwaDukuza landfill Sites.

(3) Sewage and Wastewater Management

(3.1) Washing, refuelling, maintaining of vehicles or the transfer of hazardous substances must be conducted within a bunded area. All drainage arising from the bunded area must be treated as a water containing waste and disposed of safely.

(3.2) The use of temporary, chemical toilet facilities must not cause any pollution to water sources as well as pose a health hazard, and must be located out of the 1:100 year floodline of a watercourse.

(3.3) No form of secondary pollution should arise from the disposal of sewage and refuse. The contractor must be clearly briefed on the method of disposal of such waste and measures for waste storage and management have been included in Section (viii) of this Final BAR, and the EMPR section of this report.

(2.4) Comment noted and will be complied with. Thank you to the Department for the provided information.

(3) Sewage and Wastewater Management

(3.1) Key monitoring and mitigation measures have been included in the EMPR section of this Report, inclusive of recommendations from the specialist study undertaken and precautionary/monitoring measures to avoid and/or minimise impacts.

(3.2) Recommendations for The toilet facility will be considered by the Applicant and implemented during the design, construction and operation phases. Spill prevention measures have been included in the EMPR of this Report.

(3.3) An EMPR with detailed mitigation measures, as well as

(3) Kindly refer to Section (viii) of this Final BAR, and the EMPR section of this report.
compliance must be ensured/monitored. Any pollution problems arising from the above project is to be addressed immediately by the Applicant.

**4) Stormwater Management**

4.1 It is imperative that there is proper management of storm water on site. A Stormwater Management Plan must also be prepared in accordance with the “Best Practice Guidelines for Water Resource Protection in the South African Mining Industry” (G Series: G1 - DWAF, 2008). The Stormwater Management Plan must be approved by the relevant local Municipality.

4.2 The Engineer or Contractor must ensure that only clean stormwater/runoff enters the environment.

4.3 Drainage must be controlled to ensure that runoff on site does not culminate in off-site pollution, flooding or result in any damage to properties downstream of any storm water discharge.

**5) Erosion Control**

the description for compliance that must be adhered to during the mining activities is included in this Report and Section (iv) of the EMPr.

(4.1) Comment noted and will be complied with. Mitigation measures for stormwater management have been included in the EMPr section of this Report

(4.2) Comment noted and will be complied with.

(4.3) Recommendations for stormwater management will be considered by the Applicant during the design, construction and operation phases, as applicable and where possible.

(4.4) Kindly refer to Section (viii) of this Final BAR, and the EMPr section of this report.
<p>| | | |</p>
<table>
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<tr>
<td><strong>(5.1)</strong></td>
<td>Potential sources of sediment must be minimised from the outset. This means limiting the extent (area) and duration (time period) of land disturbance to the minimum needed, and protecting surfaces once they are exposed.</td>
<td><strong>(5.1)</strong></td>
</tr>
<tr>
<td><strong>(5.2)</strong></td>
<td>Erosion control measures must be put in place to minimise erosion along the proposed mining area and must be implemented in areas sensitive to erosion such as near water supply points, edges of slopes, etc. These measures could include the use of sand bags, retention or replacement of vegetation. Extra precautions must be taken in areas where the soils are deemed highly erodible.</td>
<td><strong>(5.2)</strong></td>
</tr>
<tr>
<td><strong>(6)</strong> Incident Management</td>
<td>The Applicant must submit a Spill Contingency Plan which must indicate the following steps:</td>
<td><strong>(6)</strong> Incident Management</td>
</tr>
<tr>
<td></td>
<td>6.1.1 Stop the source of the spill;</td>
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<td>6.1.2 Contain the spill;</td>
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<td>6.1.3 All significant spills must be reported to this Department and other relevant authorities;</td>
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<tr>
<td><strong>(6)</strong> Kindly refer to Section (viii) of this Final BAR, and the EMPr section of this report.</td>
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</tbody>
</table>
6.1.4 Remove the spilled product for treatment or authorised disposal;

6.1.5 Determine if there is any soil, groundwater or other environmental impact;

6.1.6 If necessary, remedial action must be taken in consultation with this Department, Department of Mineral Resources and the Department of Environmental Affairs; and

6.1.7 Incident must be documented.

(7) General

(7.1) Sections (19), (20), (21), (22) and 26(1) (9) of the NWA must be complied with. These Sections relate to water usage, pollution control and prevention and mining product storage.

(7.2) The proposed mining operation must not contravene Government Notice 704 (4 June 1999, Volume 408, No. 20119) regarding the ‘Regulations on use of water for mining and related activities aimed at the protection of water resources’ in terms of the NWA.

(7.3) Sufficient funds must be made available for the complete rehabilitation of the mining area after

(7) General

Comments noted and will be complied with.

(7) N/A
the cessation of the mining activities.

(7.4) A written agreement between the mineral right owner and the landowner must be obtained with regard to who will be responsible for the rehabilitation of the mining site.

(7.5) The responsibilities and conditions in the Draft Environmental Management Programme (EMPr) titled, ‘Basic Assessment For The Proposed Sand Mining Project Over An Approximate 5 Hectares Section Of The Umzimkulu River, Over Remainder Of Farm Seafield No. 17474 And Rem Of Ambleside No. 2624 Situated In The Port Shepstone Area, KwaZulu-Natal” are noted. Compliance to the final approved EMPr must be audited regularly by the designated Environmental Control Officer (ECO).

(7.6) The contents of the Report titled: “Aquatic Ecology Assessment For The Proposed Sand Mining Project,” dated June 2017 attached as Appendix D (Specialist Report) is noted. This Report must form part of Water Use Licence Application.

(7.7) Notwithstanding the above, the responsibility rests with the Applicant to identify any source or potential source of pollution from his
undertaking and to take appropriate measures to prevent any pollution of the environment. Failure to comply with the requirements of the National Water Act (Act 36 of 1998) could lead to legal action being instituted against the Applicant.

This reply does not grant any exemption from the requirements of any applicable Act, Ordinance, Regulation or Bylaw.

| Bernadet Pawandiwa | Amafa Heritage KZN | 28/08/2017 | Thank you for submitting the Heritage Impact Assessment Report in support of this development proposal. The specialist concluded that the development is not likely to impact on any significant resources as "the only heritage material that could possibly be impacted would be relatively recent isolated sub-fossils trapped in the Holocene and younger surficial sands targeted for mining. This material is of very low significance." it is also indicated that a very small possibility does exist that unmarked pre-colonial graves could be uncovered during excavation of the sand storage pit.

- Amafa therefore has no objection to the development within the parameter of prescribed recommendations stipulated in the report by Jaco van der Walt .You are also required to adhere to the below-mentioned standard conditions:

Conditions:
- 1. Amafa should be contacted if any heritage objects are identified

| N/A | Thank you for the comments provided. Comment is noted and correct. | Comment is acknowledged. 1. Comment is noted and will be complied with. |
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzimkulu River, over Remainder of Farm Seafield No. 17474 and Rem of Amblecside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

1. If you have applied for a water use licence please provide proof of such application.
   - This decision is **valid for a period of two years.**

2. Kindly refer to Appendix C4.9 of this Report for proof of correspondence

| Sizo Mkhize  | Department of Mineral Resources | 30/08/2017 | 1. The Applicant has made contact with the Department with regards to the application |

- Failure to comply with the requirements of the National Heritage Resources Act and the KwaZulu Natal Heritage Resources Act could lead to legal action being instituted against the applicant.
- This decision is **valid for a period of two years.**

- Thank you to the Department for the comments provided.
  - Comment is noted.
  - Comment is noted.
  - Comment is noted.
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<tr>
<td>2. Under your site description section please give clarity as to how far is the proposed sand mining operation from the bridge and the N2 Highway.</td>
<td>2. Comment noted and the recommendation is revised in the site description.</td>
<td>2. Kindly refer to the revised site description in Section b) of this Final BAR.</td>
<td></td>
</tr>
<tr>
<td>3. In the list of the state organs and departments that you have consulted, you have omitted KZN Ezemvelo Wild Life.</td>
<td>3. Ezemvelo KZN Wildlife was included in the list of consulted stakeholders. Kindly refer to Appendix C8 with the contacted person being Nerissa Pillay in the list.</td>
<td>3. Kindly refer to Appendix C8</td>
<td></td>
</tr>
<tr>
<td>4. Please provide a Regulation 2.2 plan that has co-ordinates and a conceptual layout.</td>
<td>4. Regulation 2.2 plan and layout has been included in Appendix B as Map B1.1 and Map B2, respectively.</td>
<td>4. Kindly refer to Appendix B</td>
<td></td>
</tr>
</tbody>
</table>

In response to this, a wetland study was required to confirm whether an application for a Licence is required. Proof of correspondence is included in Appendix C4.9 of this Report. A wetland study was undertaken and attached as part of this Report and the application for a Water Use Licence is in process, as with the pre-application meeting conducted with the Department. Proof of application will be submitted to the Department as an Addendum to the Report as soon as it is available.
**Appendix C7:** Comments from I&APs on amendments to the BA Report - N/A at this stage of the BA process.

**Appendix C8:** Copy of the register of I&APs

<table>
<thead>
<tr>
<th>Company/organization</th>
<th>Name</th>
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</thead>
<tbody>
<tr>
<td>Department of Environmental Affairs</td>
<td>Mmatlala Rabothata</td>
</tr>
<tr>
<td>Department of Environmental Affairs</td>
<td>Sibusisiwe Hlela</td>
</tr>
<tr>
<td>Department of Environmental Affairs</td>
<td>Takalani Nemarude</td>
</tr>
<tr>
<td>Department of Rural Development and Land Reform</td>
<td>Bonginkosi Zulu</td>
</tr>
<tr>
<td>Department of Agriculture, Forestry and Fisheries</td>
<td>Mashudu Marubini</td>
</tr>
<tr>
<td>National Department of Mineral Resources</td>
<td>Kgauta Mokoena</td>
</tr>
<tr>
<td>National Department of Water Affairs</td>
<td>Ms Ndileka K mohapi</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>National Department of Water Affairs</td>
<td>Namisha Muthraparsad</td>
</tr>
<tr>
<td>National Department of Mineral Resources</td>
<td>Khayalethu Matrose</td>
</tr>
<tr>
<td>National Department of Trade and Industry</td>
<td>Maoto Molefane</td>
</tr>
<tr>
<td>Department of Economic Development, Tourism and Environmental Affairs- HOD</td>
<td>Carol Coetzee</td>
</tr>
<tr>
<td>Department of Economic Development, Tourism and Environmental Affairs</td>
<td>Reka Kallicharan</td>
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<tr>
<td>Department of Economic Development, Tourism and Environmental Affairs</td>
<td>Kraigen Govindasamy</td>
</tr>
<tr>
<td>Department of Economic Development, Tourism and Environmental Affairs</td>
<td>Sabelo Ngcobo</td>
</tr>
<tr>
<td>Department of Economic Development, Tourism and Environmental Affairs</td>
<td>Melissa Puckree</td>
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</tbody>
</table>
Final Basic Assessment Report – Proposed Sand Mining Project for Ms Singh over an approximate 5 hectares section of the Umzikhublu River, over Remainder of Farm Seafiel No. 17474 and Rem of Ambleside No. 2624 situated in the Port Shepstone area, KwaZulu-Natal

<p>| Department of Economic Development, Tourism and Environmental Affairs: South Region KZN | Mavis Padayachee |
| Department of Mineral Resources | Sandile Njapha |
| Department of Mineral Resources | Karoon Moodley |
| Department of Mineral Resources | Zama Zulu |
| Department of Mineral Resources | Ncamisile Mtshali |
| Department of Agriculture, Forestry and Fisheries – KZN | Karen Moodley |
| Department of Agriculture, Forestry and Fisheries – KZN | Thembile Dlungwana |
| Department of Agriculture, Forestry and Fisheries – KZN | Jeffrey Maivha |
| Department of Agriculture, Forestry and Fisheries – KZN | Seokwang Modise |</p>
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<tr>
<th>Department of Rural Development and Land Reform – KZN</th>
<th>Babhekile Mpisane</th>
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<td>Khethakuthula Nzimande</td>
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<tr>
<td>Department of Transport – KZN</td>
<td>Mrs Reddy</td>
</tr>
<tr>
<td>Department of Water Affairs – KZN</td>
<td>Colleen Moonsamy</td>
</tr>
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<td>Department of Water Affairs – KZN</td>
<td>Neo Leburu</td>
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<td>Department of Co-operative Governance and Traditional Affairs: Urban &amp; Rural Development</td>
<td>Mr Makenete Maduna</td>
</tr>
<tr>
<td>Department of Co-operative Governance and Traditional Affairs: Local Economic Development</td>
<td>Mrs Barbara Mgutshini</td>
</tr>
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<td>Ugu District Municipality: Environmental Health and Local Economic Development</td>
<td>Sipho Khuzwayo</td>
</tr>
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<td>Ugu District Municipality: Environmental Services</td>
<td>Noloyiso Walingo</td>
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<td>Ugu District Municipality: Local Economic Development</td>
<td>Mandla Mkhungo</td>
</tr>
<tr>
<td>Ugu District Municipality: Environmental Health</td>
<td>Vella Gramony</td>
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<td>Ugu District Municipality: Water Resource Management</td>
<td>Thuli Mwelase</td>
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<td>Ugu District Municipality: Environmental Health</td>
<td>Philip Christiansen</td>
</tr>
<tr>
<td>Ray Nkonyeni Municipality</td>
<td>Liziswa Jiba</td>
</tr>
<tr>
<td>Ray Nkonyeni Municipality Ward 17</td>
<td>A Rajaram</td>
</tr>
<tr>
<td>Ray Nkonyeni Municipality Manager</td>
<td>Mr Sbu Phili</td>
</tr>
<tr>
<td>Illovo Sugar Limited-Umzimkulu Mill (Manager)</td>
<td>Vis Pillay</td>
</tr>
<tr>
<td>Eskom</td>
<td>John Geeringh</td>
</tr>
<tr>
<td>Ezemvelo KZN Wildlife</td>
<td>Nerissa Pillay</td>
</tr>
<tr>
<td>Zululand Chamber of Commerce and Industry</td>
<td>Thula Mkhwanazi</td>
</tr>
<tr>
<td>Organisation</td>
<td>Representative</td>
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<td>----------------------------------------------------------</td>
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<tr>
<td>Zululand Environmental Alliance</td>
<td>Debbie Smith</td>
</tr>
<tr>
<td>WWF – SA (Land Programme Manager)</td>
<td>Natasha Wilson</td>
</tr>
<tr>
<td>South African Heritage Resources Agency (SAHRA)</td>
<td>Marie South</td>
</tr>
<tr>
<td>South African National Biodiversity Institute (SANBI) – Invasive plants</td>
<td>Michael Cheek</td>
</tr>
<tr>
<td>AMAFA KZN</td>
<td>Bernadet Pawandiwa</td>
</tr>
<tr>
<td>HNK Geomatics</td>
<td>Dieter Wortmann</td>
</tr>
<tr>
<td>Mbango Conservancy</td>
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<tr>
<td>WESSA-South Coast</td>
<td>Paddy Norman</td>
</tr>
</tbody>
</table>
APPENDIX D

Specialist Reports

Contents

- Aquatic Ecology Assessment
- Heritage Impact Assessment Study
I, Marco Alexandre, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have any vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:  

Name of company: Ecotone Freshwater Consultants  
Professional Registration: Pr. Sci. Nat. (400079/13) Aquatic Science & Zoology  
Date: June 2017
### ABBREVIATIONS AND ACRONYMS:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>%PTV</td>
<td>Percentage Pollution Tolerant Valves</td>
</tr>
<tr>
<td>ASPT</td>
<td>Average Score per Taxa</td>
</tr>
<tr>
<td>BDI</td>
<td>Biological Diatom Index</td>
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<tr>
<td>DWS</td>
<td>Department of Water and Sanitation</td>
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<tr>
<td>EC</td>
<td>Electrical Conductivity</td>
</tr>
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<td>EI</td>
<td>Ecological Importance</td>
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<tr>
<td>EIS</td>
<td>Ecological Importance and Sensitivity</td>
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<td>Ecological Sensitivity</td>
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<td>Freshwater Ecosystem Priority Areas</td>
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<td>Fish Response Assessment Index</td>
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<td>FROC</td>
<td>Frequency of Occurrence</td>
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<td>GSMd</td>
<td>Gravel-Sand-Mu</td>
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<td>Invertebrate Habitat Assessment System</td>
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<td>Resource Directed Measures</td>
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<td>SASS5</td>
<td>South African Scoring System (version 5)</td>
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<td>SOOC</td>
<td>Stones-Out-Of-Current</td>
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<td>Temperature</td>
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<td>TWQR</td>
<td>Target Water Quality Range</td>
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<td>VEG</td>
<td>Vegetation</td>
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<td>VEGRAI</td>
<td>Vegetation Response Assessment Index</td>
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<td>WMA</td>
<td>Water Management Area</td>
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CHAPTER 1. AQUATIC ECOLOGY  1-1

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CHAPTER 1. AQUATIC ECOLOGY

1.1 INTRODUCTION

Ecotone Freshwater Consultants CC (Ecotone) was appointed by the CSIR to undertake an aquatic ecology assessment for the associated reach of the Umzimkulu River, Port Shepstone, KwaZulu-Natal. This project is for the proposed establishment of a small scale (5ha) sand mining operation on the Umzimkulu River. The project will be located on portion No. 17474 of the farm Seafield and portion No. 2624 on the farm Ambleside Port Shepstone, Kwa-Zulu Natal. The method consists of the mining of +/-100m³ of river sand per day from the riverbed using a mechanical pump and left to dry +/- 20m from the riverbank. This aquatic specialist report informs the Environmental Impact Assessment (EIA) and identifies potential impacts relevant to the aquatic ecosystem resources. This report also provides a baseline for the aquatic ecosystem components before the commencement of the proposed sand mining activities.

1.1.1 Scope of work and terms of references

The study aimed to provide baseline aquatic ecological data and to characterise the sensitivity of the receiving Umzimkulu River. The following methodologies were applied:

- A literature review about the direct study area and providing a summary of the desktop Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) associated with sub-quaternary catchment.
- In situ water quality: pH, Electrical Conductivity (EC), Total Dissolved Solids (TDS), Dissolved Oxygen (DO) and temperature.
- An instream and riparian habitat assessment. The habitat assessment identified the main habitat units available for breeding, feeding, and refuge for aquatic macroinvertebrates and fish.
- A diatom community assessment (Taylor, 2007).
- An assessment of the aquatic macroinvertebrate and fish community structures expected and observed within the study area.
- An assessment of riparian functionality for the areas of the marginal zone associated with the study area.
- A hydrological classification and delineation of the water resource in line with the relevant legislation and requirements.
- The instream and riparian ecological characterisation informed a risk-based impact assessment, and suitable mitigation measures for identified impacts were provided.
MONITORING REQUIREMENTS

Monitoring requirements relevant to the water resource quality and quantity are provided to inform the Environmental Management Programme Report (EMPR).

1.1.2 Study Approach

A specialist aquatic and riparian assessment were undertaken during the June 2017 survey to ascertain the baseline condition of the receiving environment by determining the PES and EIS of the associated reach of the Umzimkulu River. An instream and riparian characterisation was achieved by assessing the aspects mentioned in Section 1.1.1. The main aim of this assessment was to ascertain the potential impacts of the proposed sand mining activities on the receiving freshwater ecology and to recommend adequate mitigation measures and management actions to prevent/reduce potential negative impacts on the receiving aquatic environment.

1.1.3 Information Sources

A desktop review was undertaken to determine applicable information about the greater catchment, ecoregions, nature of the drainage systems and overall catchment utilisation. Reference was made to the following desktop information to determine the preferred alternative:

- National Spatial Biodiversity Assessment (NSBA - Nel et al., 2004).
- Department of Water and Sanitation (DWS - DWS, 2014).
- National Freshwater Ecosystem Priority Areas (NFEPA - Nel et al., 2011).
- Chief Directorate – Surveys and Mapping (1: 50 000).
- Biodiversity GIS (SANBI & CSIR, 2012).

1.1.4 Assumptions and Limitations

- General - The spatial and temporal extents of Ecotone’s services are described in the proposal and are subject to restrictions and limitations. A total assessment of all probable scenarios or circumstances that may exist on the study site was not undertaken. No assumptions should be made unless opinions are specifically indicated and provided. Data presented in this document may not elucidate all possible conditions that may exist.
- Aquatic Macroinvertebrates - The reach of the Umzimkulu River was characterized by deep homogenous flow with limited habitat available for the colonization of aquatic macroinvertebrates. The system is therefore not suitable for the application of the SASS5 methodology. The SASS5 methodology was designed for wadeable rivers/streams. However, the protocols and methodology were used to standardise sampling.
- **Fish** - The fish sampled during the field assessment are likely an underrepresentation of the actual fish assemblages. The efficacy of fish sampled was impeded by sampling conditions, access and time. No conclusion were drawn from the sampled fish community in relation to the expected fish community and the overall sensitivity, applied within the impact assessment, was based on the environmental preferences and tolerances of the expected fish assemblages.

- **Riparian Delineation** - A large extent of the study area has been transformed in terms of the soil profile, vegetation, and geomorphology, which to a large extent, diminishes the effective use of hydromorphic indicators to determine the riparian boundaries associated with the river. Any comments related to the riparian extent are of low/moderate confidence and should be interpreted with caution. Portions of the study area have been disturbed by soil and vegetation removal, infilling and agricultural activities (mainly sugarcane production).

- **Hydrogeomorphic classification** – The initial terms of reference suggested a freshwater system, on subsequent investigation the resource was classified as estuarine. This assessment includes elements of an estuarine health assessment but excludes a detailed assessment of micro-fauna. However, the assessment does include response metrics on different trophic levels, diatoms (primary) aquatic macroinvertebrates (secondary) and fish (secondary and tertiary. Although the assessment refrains from categorically classifying the water resource into an overall ecological class, enough detail on the respective ecological components is provided to inform the impact assessment. The implementation of the recommended mitigation measures will protect the resource quality.
1.2 METHODOLOGY

1.2.1 Literature Review and Desktop Study

A desktop study was undertaken to determine applicable information with regards to the greater catchment area, associated Ecoregions, nature of the drainage systems and overall catchment utilisation. References from the National Spatial Biodiversity Assessment (NSBA - Nel et al., 2004), the Department of Water and Sanitation (DWS, 2014), the National Freshwater Ecosystem Priority Areas (NFEPA - Nel et al., 2011) and SANBI BGIS (http://bgis.sanbi.org) were used to collect information on the aquatic ecosystems located in adjacent to the study area. The PES and EIS tables from DWS (2014) were used to ascertain desktop PES and EIS categories for the study area.

1.2.2 Field Survey and Site Selection

The field survey was undertaken during June 2017 where a comprehensive assessment of the Umzimkulu River up- and downstream of the proposed sand mining activities was done (Table 1-1; Figure 1-1).

Table 1-1: Coordinates for sites assessed on the Umzimkulu River, up- and downstream of the proposed sand mining activities

<table>
<thead>
<tr>
<th>Sites</th>
<th>Description</th>
<th>Latitude</th>
<th>Longitude</th>
</tr>
</thead>
<tbody>
<tr>
<td>UZ-U</td>
<td>Upstream of the proposed sand mining operations.</td>
<td>-30.719335</td>
<td>30.430465</td>
</tr>
<tr>
<td>UZ-D</td>
<td>Downstream of the proposed sand mining operations.</td>
<td>-30.717078</td>
<td>30.436589</td>
</tr>
</tbody>
</table>
Figure 1-1: The study area associated with the proposed sand mining activities, Port Shepstone, KwaZulu-Natal (Chief Directorate – Surveys and Mapping; DWAF, 1995; DWAF (2004) Nel et al., 2004).
1.2.3 In situ Water Quality

In situ, physicochemical variables were measured during the aquatic survey using a pre-calibrated multi-parameter water quality meter (*Table 1-2*).

### Table 1-2: In situ water quality parameters measured

<table>
<thead>
<tr>
<th>In situ parameters</th>
<th>Abbreviation</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH</td>
<td>[H⁺ ions]</td>
</tr>
<tr>
<td>Temperature</td>
<td>Temp</td>
<td>°C</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>EC</td>
<td>µS·cm⁻¹</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>TDS</td>
<td>ppm</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>DO</td>
<td>Mg/l</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>DO</td>
<td>%</td>
</tr>
</tbody>
</table>

1.2.4 Diatoms

Diatom laboratory procedures were carried out according to the methodology described by Taylor *et al.* (2005). Diatom samples were prepared for microscopy by using the hot hydrochloric acid and potassium permanganate method. Approximately 300 to 400 diatom valves were identified and counted to produce semi-quantitative data for analysis. Prygiel *et al.* (2002) found that diatom counts of 300 valves and above were necessary to make correct environmental inferences. The taxonomic guide by Taylor *et al.* (2007) was consulted for identification purposes. Where necessary, Krammer & Lange-Bertalot (1986, 1988, 1991a, b) were used for identification and confirmation of species identification. Environmental preferences were inferred from Taylor *et al.* (2007) and various other literature sources as indicated in the discussion section to describe the environmental water quality at each site.

Two indices, namely the Specific Pollution Sensitivity Index (SPSI; CEMAGREF, 1982) and the Biological Diatom Index (BDI; Lenoir & Coste, 1996) were used in the diatom assessment. The SPSI has been extensively tested in a broad geographical region and integrates the impacts from organic material, electrolytes, pH, and nutrients. In addition, the Percentage of Pollution Tolerant Valves (%PTV; Kelly & Whitton, 1995) was used to indicate organic pollution. All calculations were computed using OMNIDIA ver. 4.2 program (Lecointe *et al*., 1993).

The limit values and associated ecological water quality classes adapted from Eloranta & Soininen (2002) were used for interpretation of the SPSI and BDI scores (*Table 1-3*). The SPI and BDI indices are based on a score of between 0 – 20, where a score of 20 indicates no pollution and a score of zero indicates an increasing level of pollution or eutrophication. The %PTV has a maximum score of 100, where a score above 0 indicates no organic pollution and a score of 100 indicates definite and severe organic pollution (*Table 1-4*).
Table 1-3: Class values used for the SPSI and BDI indices in the evaluation of water quality (adapted from Eloranta & Soininen, 2002)

<table>
<thead>
<tr>
<th>Index Score</th>
<th>Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;17</td>
<td>High quality</td>
</tr>
<tr>
<td>13 to 17</td>
<td>Good quality</td>
</tr>
<tr>
<td>9 to 13</td>
<td>Moderate quality</td>
</tr>
<tr>
<td>5 to 9</td>
<td>Poor quality</td>
</tr>
<tr>
<td>&lt;5</td>
<td>Bad quality</td>
</tr>
</tbody>
</table>

Table 1-4: Interpretation of the %PTV scores (adapted from Kelly, 1998)

<table>
<thead>
<tr>
<th>%PTV</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>Site free from organic pollution.</td>
</tr>
<tr>
<td>21 to 40</td>
<td>There is some evidence of organic pollution.</td>
</tr>
<tr>
<td>41 to 60</td>
<td>Organic pollution is likely to contribute significantly to eutrophication.</td>
</tr>
<tr>
<td>&gt;61</td>
<td>The site is heavily contaminated with organic pollution.</td>
</tr>
</tbody>
</table>

1.2.5 Aquatic Macroinvertebrates Assessment

1.2.5.1 Aquatic Macroinvertebrate Habitat

The IHAS (McMillan, 1998) provides a quantitative and comparable description of habitat availability for the aquatic invertebrates sampled. The IHAS was developed to assist with the interpretation of SASS5 scores, particularly in respect of variability in the number and quality of biotopes available for sampling. The ultimate goal of IHAS is to adequately reflect the quantity, quality, and diversity of biotopes available for colonisation by invertebrates. Only section 1 of the IHAS was employed during this project. Section 1 focuses on sampling biotopes and assesses the quantity and quality of the stones-in-current (SIC), vegetation (VEG) and other biotopes (including stones-out-of-current (SOOC) and gravel, sand and mud (GSM). The quality of each biotope, in terms of potential habitat for invertebrates, is expressed as a score. The scores for each biotope are then summed up to give a total Habitat Score (Table 1-5).

Table 1-5: IHAS ratings and categories (McMillan, 1998)

<table>
<thead>
<tr>
<th>IHAS score %</th>
<th>Description</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;80</td>
<td>Habitat is considered to be more than adequate and able to support a diverse invertebrate fauna.</td>
<td>Good</td>
</tr>
<tr>
<td>&lt;80&gt;70</td>
<td>Habitat is considered to be adequate and able to support invertebrate fauna.</td>
<td>Adequate</td>
</tr>
<tr>
<td>&lt;70</td>
<td>Habitat is considered to be limited and unable to support diverse invertebrate fauna.</td>
<td>Poor</td>
</tr>
</tbody>
</table>
1.2.5.2 Aquatic Macroinvertebrate Community Assemblage

Aquatic macroinvertebrates were collected using the sampling protocol of the SASS5 method (Dickens & Graham, 2002). The protocol is divided amongst three biotopes, namely VEG, SIC, and GSM. Samples were collected in an invertebrate net with a pore size of 1000 microns on a 30cm x 30cm frame by kick sampling of SIC and GSM, and sweeping of VEG for a standardised time or area. The deep-water sampling was limited to the VEG biotope as other biotopes were not available for sampling. Samples were preserved as a composite sample and transported to the laboratory for sorting, enumeration, and identification. Macroinvertebrates were identified to family level using relative reference guides (Dickens & Graham, 2002; Gerber & Gabriel, 2002). The SASS5 indices were not calculated due to the nature of the system (deep homogenous flow with limited habitat diversity). Instead, inferences were made from sensitivities of present macroinvertebrates.

In addition to the IHAS, the frequency distribution of different habitat units were also ascertained (Table 1-6 and Table 1-7).

Table 1-6: Habitat types and their descriptions included in the November 2015 aquatic ecology assessment

<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overhanging Vegetation</td>
<td>Marginal riparian zone, canopy-forming just above the surface of the water</td>
</tr>
<tr>
<td>Aquatic Vegetation</td>
<td>Aquatic macrophytes</td>
</tr>
<tr>
<td>Undercut banks and root wads</td>
<td>Marginal zone cover provided by cavities within the bank and inter-rood wad spaces</td>
</tr>
<tr>
<td>Bedrock</td>
<td>&gt;1.5m</td>
</tr>
<tr>
<td>Boulders</td>
<td>&gt;256mm</td>
</tr>
<tr>
<td>Cobbles</td>
<td>&gt;64-256mm</td>
</tr>
<tr>
<td>Pebbles</td>
<td>&gt;4-64mm</td>
</tr>
<tr>
<td>Gravel</td>
<td>&gt;2.4mm</td>
</tr>
<tr>
<td>Sand</td>
<td>&gt;0.05-2mm</td>
</tr>
<tr>
<td>Mud</td>
<td>&gt;0.002-0.0m</td>
</tr>
</tbody>
</table>

Table 1-7: Hydraulic habitat types and their definitions

<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>Depth (m)</th>
<th>Velocity (m s(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fast Deep (FD)</td>
<td>&gt;0.3</td>
<td>&gt;0.3</td>
</tr>
<tr>
<td>Fast Intermediate (FI)</td>
<td>&gt;0.2 ; ≤0.3</td>
<td>&gt;0.3</td>
</tr>
<tr>
<td>Fast Shallow (FS)</td>
<td>&gt;0.1 ; ≤0.2</td>
<td>&gt;0.3</td>
</tr>
<tr>
<td>Fast Very Shallow (FVS)</td>
<td>≤ 0.1</td>
<td>&gt;0.3</td>
</tr>
<tr>
<td>Slow Deep (SD)</td>
<td>&gt;0.5</td>
<td>≤0.3</td>
</tr>
<tr>
<td>Slow Shallow (SS)</td>
<td>≤ 0.5</td>
<td>≤0.3</td>
</tr>
<tr>
<td>Slow Very Shallow (SVS)</td>
<td>≤ 0.1</td>
<td>≤0.3</td>
</tr>
</tbody>
</table>
1.2.6 Fish Assessment

1.2.6.1 Fish Habitat

The fish habitat assessment was adopted from Kleynhans (2007). The frequency of different habitat units were expressed based on the number of occurrences measured for the area assessed. The different habitat units and their descriptions are provided in Table 1-5 and Table 1-7.

1.2.6.2 Fish Sampling

Fish assessment methodology was undertaken according to Kleynhans (2007). Fish were sampled at respective sites by means cast netting (approximately 30 casts per river segment). Where it was possible, three river segments were sampled per site. Notes were made of velocity depth classes sampled, and conclusions were made within these flow limitations.

1.2.6.3 Fish Community Assemblage Assessment

Reference conditions for fish were constructed using expert opinion and data from the sub-quaternary PES tables (DWS, 2014), Kleynhans (2007) and the Frequency of Occurrence (FROC) tables (Kleynhans et al., 2007b), Skelton (2001) and the SAIAB database. The expected species list only includes species sampled within nearby sub-quaternary reaches. It is likely that the sampling effort was insufficient to make reliable conclusions on any differences between the observed fish assemblages and the expected fish assemblages. For this reason, the sensitivities (preferences and tolerances) of the expected fish assemblages informed the impact assessment.

1.2.7 Vegetation Assessment

A desktop study was undertaken to reconstruct the reference (natural) conditions of sites in the study area by making use of relevant literature (Van Wyk & Malan, 1997; Bromilow, 2001; Gerber et al., 2004; Van Oudtshoorn, 2006; Mucina & Rutherford, 2006), aerial photos and topographical maps (Figure 1-1 and Figure 1-10). The following was undertaken during the site assessment:

- An overview of the site conditions was derived by transecting the site to understand the vegetation variability.
- Particular attention was paid to flow, geomorphology, substrate, elevation, vegetation structure and species, and the implications of each of these on the vegetation.
- Surrounding and upstream land-uses and impacts on the vegetation were observed and noted.
- A plant species list noting key/indicator/dominant/or easily identifiable species was made, along with noting the vegetation type (Table 1-8). Attention was also paid to the soil cover.
- Plant material of selected plants was collected to confirm identification.
### Table 1-8: Classification of wetland plant types

<table>
<thead>
<tr>
<th>Type</th>
<th>Colour Coding</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obligate Wetland Species</td>
<td></td>
<td>van Ginkel et al., 2011</td>
</tr>
<tr>
<td>Facultative</td>
<td></td>
<td>van Ginkel et al., 2011</td>
</tr>
<tr>
<td>Opportunistic/Facultative Wetland Species</td>
<td></td>
<td>van Ginkel et al., 2011</td>
</tr>
<tr>
<td>Damp and swampy areas/near water and along watercourses/seasonally inundated areas</td>
<td></td>
<td>Van Oudtshoorn, 2006; Van Wyk &amp; Malan, 1997</td>
</tr>
<tr>
<td>Moist Grassland</td>
<td></td>
<td>Van Wyk &amp; Malan, 1997</td>
</tr>
<tr>
<td>Emergent, broad-leafed</td>
<td></td>
<td>Gerber et al., 2004</td>
</tr>
<tr>
<td>Aquatic herb</td>
<td></td>
<td>Gerber et al., 2004</td>
</tr>
<tr>
<td>Woody species</td>
<td></td>
<td>Van Wyk &amp; Van Wyk, 1997</td>
</tr>
</tbody>
</table>

Information was assessed, and tables were generated that describe the study area in terms of species, abundance, cover and exotic species. These were compiled to compare the current and reference states of the sites.

### 1.2.8 Delineation

A mixture of vegetation and geomorphic indicators were used to identify the limits of the riparian zone (please refer to Section 1.1.4). These included:

- Topography associated with the watercourse, which included the presence of the macro channel bank and in-channel features.
- Vegetation change in terms of species composition and structure (physiognomy).
- Presence of alluvial soils and deposited material, including flow debris.

The lateral boundary (estuarine boundary) was based on the National Estuaries spatial data sets (SANBI & CSIR, 2012). This assessment considered all permanent coastal water bodies that are sporadically linked to the sea as potentially estuarine systems. The lateral extent of the estuary was based in the 5m contour line (SANBI & CSIR, 2012).

### 1.2.9 Impact Assessment

#### Methodology of Impact Assessment

According to the DEA IEM Series guideline on "Impact Significance" (2002), there are a number of quantitative and qualitative methods that can be used to identify the significance of impacts resulting from a development. The process of determining impact significance should ideally involve a process of determining the acceptability of a predicted impact to society. Making this process explicit and open to public comment and input would be an improvement of the EIA/BA process. The CSIR’s approach to determining significance is generally as follows:
Use of expert opinion by the specialists ("professional judgment"), based on their experience, a site visit and analysis, and use of existing guidelines and strategic planning documents and conservation mapping (e.g. SANBI Biodiversity databases);

- Review of specialist assessment by all stakeholders including authorities such as nature conservation officials, as part of the report review process (i.e. if a nature conservation official disagreed with the significance rating, then we could negotiate the rating); and

- Our approach is more a qualitative approach - we do not have a formal matrix calculation of significance as is sometimes done.

**Specialist Criteria for the Impact Assessment**

The following methodology has been provided by the CSIR to the specialist who conducted the Ecological assessment, for incorporation into their specialist assessment. The assessment of impact significance is based on the following conventions:

**Nature of Impact** - this reviews the type of effect that a proposed activity will have on the environment and should include “what will be affected and how?”

**Spatial Extent** - this should indicate whether the impact will be:

- Site-specific;
- Local (<2 km from site);
- Regional (within 30km of site); or
- National.

**Duration** - The timeframe during which (lifetime of) the impact will be experienced:

- Temporary (less than 1 year);
- Short term (1 to 6 years);
- Medium term (6 to 15 years);
- Long term (the impact will cease after the operational life of the activity); or
- Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).

**Intensity** - it should be established whether the impact is destructive or innocuous and should be described as either:

- High (severe alteration of natural systems, patterns or processes such that they temporarily or permanently cease);
- Medium (notable alteration of natural systems, patterns or processes; where the environment continues to function but in a modified manner); or
- Low (negligible or no alteration of natural systems, patterns or processes); can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making.
Probability - this considers the likelihood of the impact occurring and should be described as:

- Improbable (little or no chance of occurring);
- Probable (<50% chance of occurring);
- Highly probable (50 – 90% chance of occurring); or
- Definite (>90% chance of occurring).

Reversibility - this considers the degree to which the adverse environmental impacts are reversible or irreversible. For example, an impact will be described as low should the impact have little chance of being rectified to correct environmental impacts. On the other hand, an impact such as the nuisance factor caused by noise impacts from wind turbines can be considered to be highly reversible at the end of the project lifespan. The assessment of the reversibility of potential impacts is based on the following terms:

- High - impacts on the environment at the end of the operational life cycle are highly reversible;
- Moderate - impacts on the environment at the end of the operational life cycle are reasonably reversible;
- Low - impacts on the environment at the end of the operational life cycle are slightly reversible; or
- Non-reversible - impacts on the environment at the end of the operational life cycle are not reversible and are consequently permanent.

Irreplaceability - this reviews the extent to which an environmental resource is replaceable or irreplaceable. For example, if the proposed project will be undertaken on land that is already transformed and degraded, this will yield a low irreplaceability score; however, should a proposed development destroy unique wetland systems, for example, these may be considered irreplaceable and thus be described as high. The assessment of the degree to which the impact causes irreplaceable loss of resources is based on the following terms:

- High irreplaceability of resources (this is the least favourable assessment for the environment);
- Moderate irreplaceability of resources;
- Low irreplaceability of resources; or
- Resources are replaceable (this is the most favourable assessment for the environment).

The status of the impacts and degree of confidence with respect to the assessment of the significance is stated as follows:

Status of the impact: A description as to whether the impact will be:

- Positive (environment overall benefits from impact);
- Negative (environment overall adversely affected); or
- Neutral (environment overall not affected).
**Degree of confidence in predictions:** The degree of confidence in the predictions, based on the availability of information and specialist knowledge. This should be assessed as:

- High;
- Medium; or
- Low.

Based on the above considerations, the specialist provides an overall evaluation of the **significance** of the potential impact, which should be described as follows:

- **Low to very low:** the impact may result in minor alterations of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated;
- **Medium:** the impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated; or
- **High:** Where it could have a “no-go” implication for the project unless mitigation or re-design is practically achievable (Figure 1-2).

![Figure 1-2: Guide to assessing risk/impact significance as a result of consequence and probability.](image)

Furthermore, the following must be considered:

- Impacts should be described both before and after the proposed mitigation, and management measures have been implemented.
- All impacts should be evaluated for the construction, operation and decommissioning phases of the project, where relevant.
The impact evaluation should take into consideration the cumulative effects associated with this and other facilities which are either developed or in the process of being developed in the region, if relevant.

**Management Actions:**

- Where negative impacts are identified, mitigatory measures will be identified to avoid or reduce negative impacts. Where no mitigatory measures are possible this will be stated.
- Where positive impacts are identified, augmentation measures will be identified to potentially enhance these.
- Quantifiable standards for measuring and monitoring mitigatory measures and enhancements will be set. This will include a programme for monitoring and reviewing the recommendations to ensure their ongoing effectiveness.

**Monitoring:**

Specialists should recommend monitoring requirements to assess the effectiveness of mitigation actions, indicating what actions are required, by whom, and the timing and frequency thereof.

**Cumulative Impact:**

Consideration is given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts are evaluated with an assessment of similar developments already in the environment. Such impacts will be either positive or negative and will be graded as being of negligible, low, medium or high impact.

**Mitigation:**

The objective of mitigation is to firstly avoid and minimise impacts where possible and where these cannot be completely avoided, to compensate for the negative impacts of the development on the receiving environment and to maximise revegetation and rehabilitation of disturbed areas. For each impact identified, appropriate mitigation measures to reduce or otherwise avoid the potentially negative impacts are suggested. All impacts are assessed without mitigation and with the mitigation measures as suggested.
1.3 PROJECT DESCRIPTION

Ms. Singh proposes the mining of sand from the sandbars and river bed over an approximate section of 5ha. The proposed mining site is situated in and around the Umzimkulu River on the KwaZulu-Natal Hibiscus Coast, located near the N2 freeway in Port Shepstone. The South African mining industry has its origin in small-scale mining activities, with these operations offering much-needed employment opportunities and entrepreneurship, as well as contributing to local economies. The proposed project will provide good quality sand to the local building industry for use in the construction of roads and buildings. The mining operation would contribute towards the wider socio-economic development of the area in the form of job opportunities and service delivery by promoting infrastructural development. Below is a discussion of the proposed construction activities during the construction, operation and decommission phase:

- The mining project will be located on portions of farms Seafield No. 17474 and Ambleside No. 2624, Port Shepstone, KwaZulu Natal. The method consists of the mining of +/-100m³ of river sand per day from the riverbed using a mechanical pump and left to dry +/- 20m from the riverbank.

- **Construction phase** - The main road in Batstones Drift will be used to access the site, where there is an existing road leading to the mining area. Site infrastructure will include a chemical toilet and waste bin, and no buildings will be erected on site. Equipment and/or plant will include a Loader and truck for the transportation of sand material and a vehicle for staff transport. Therefore, no infrastructure associated with the mining site will require breaking down or demolishing at closure. The areas used for facilities or equipment will be rehabilitated by maintaining the general topography of the area, ensuring that there are no remnants of the structures.

- **Operational phase** - The proposed project will include the mining of sand from the river bed of a 5ha section of the Umzimkulu River. Sand will be removed together with the water using a pump system, where sand will be temporarily piled into a pit on the bank. The sand remains in the pit, and the water flows back into the river. Disturbance of the riparian zone will be avoided to ensure that the river bank is not disturbed and the river is not diverted. The loader or tip-truck will haul the sand for removal from the stockpile area.

- **Decommissioning phase** - Closure and rehabilitation of the stockpile area will be undertaken when the project ceases operation. At the end of the project life cycle, a thick soil layer of approximately 333mm will be spread across the disturbed areas; thereafter the soil will be ripped, fertilised and re-vegetated. Post-closure monitoring will assist in determining the success of the rehabilitation and also identify whether any additional measures need to be taken to ensure the area is restored to a reasonable and acceptable condition. The area where sand was mined will be rehabilitated naturally during the rainy season where flood waters will deposit more sand across the mined area.
1.4 DESCRIPTION OF THE AFFECTED ENVIRONMENT: AQUATIC ECOLOGY

1.4.1 River Characterization

General information including river characterization, overall PES and EIS categories, and conservation status are provided in Table 1-9. The quaternary catchment associated with the study area is T52M within the Mvoti to Umzimkulu Water Management Area (WMA). The study area is located within the riparian area of the Umzimkulu River, approximate 4.5km before it flows into the Indian Ocean. The reach of the Umzimkulu River and its associated riparian zone fall within a Freshwater Ecosystem Priority Area (FEPA - Figure 1-3) and has been classified as a river FEPA with a B category, inferring a Largely Natural state. Systems falling within a FEPA were identified as being in a Good condition (A or B ecological category) and therefore need to be maintained in order to contribute to the biodiversity of the area and support sustainable use of water resources (Nel et al., 2011).

The Estuarine wetland unit and the Indian Ocean Coastal Belt Floodplain Wetland unit bordering the northwest and southern end of the study area (Figure 1-4) carries an NFEPA Wetland ID Rank of six, which is the lowest in the ranking matrix and does not hold a set of criteria for selecting wetland to achieve targets. In terms of conservation priorities, the study area has been identified as an area earmarked for conservation in terms of the Freshwater Systematic Conservation Plan (C-PLAN) of KwaZulu-Natal (EKZNW, 2007). With regards to the Terrestrial Systematic, the eastern portion of the study area is located with a “100% Transformed” area while the remainder of the area is associated with a “Critical Biodiversity Area 3” (Figure 1-5) and “important species are still located within them and should be accounted for in the EIA process” (EKZNW, 2010).

Table 1-9: Summary of the literature review and desktop study for the aquatic system associated with the upstream study area

<table>
<thead>
<tr>
<th>General Site Information</th>
<th>Descriptor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Management Area</td>
<td>Mvoti to Umzimkulu</td>
</tr>
<tr>
<td>Associated system/s</td>
<td>Umzimkulu</td>
</tr>
<tr>
<td>Ecoregion 1</td>
<td>Northeastern coastal belt</td>
</tr>
<tr>
<td>Quaternary Catchment</td>
<td>T52M</td>
</tr>
<tr>
<td>Vegetation type</td>
<td>Subtropical Costal Lagoons / KwaZulu Natal Coastal Belt</td>
</tr>
<tr>
<td>Order</td>
<td>4</td>
</tr>
<tr>
<td>Hydrological Class</td>
<td>Perennial</td>
</tr>
<tr>
<td>River Signature (Nel et al., 2004)</td>
<td>South-eastern coastal hinterland 2</td>
</tr>
<tr>
<td>Threat Status (Nel et al., 2004)</td>
<td>Vulnerable</td>
</tr>
<tr>
<td>NFEPA Areas (Nel et al., 2011)</td>
<td>FEPA</td>
</tr>
<tr>
<td>Freshwater Systematic Conservation Plan (EKZNW, 2007).</td>
<td>Earmarked for conservation</td>
</tr>
<tr>
<td>Terrestrial Systematic Conservation Plan (EKZNW, 2010).</td>
<td>100% Transformed / Critical Biodiversity Area 3</td>
</tr>
</tbody>
</table>
Figure 1.3: Map indicating the study area in relation to the River NFEPAs (DWAF, 1995; Nel et al., 2004; Nel et al., 2011).
Figure 1-4: Map indicating the study area in relation to the NFEPA wetland types. Data source: Chief Directorate – Surveys and Mapping DWAF, 1995; Nel et al., 2004; Nel et al., 2011.
Figure 1-5: Map highlighting provincial freshwater conservation priorities for the study area based on the Freshwater Systematic Conservation Plan for KwaZulu-Natal (EKZNW, 2007).
Figure 1-6: Map highlighting provincial terrestrial conservation priorities for the study area based on the Freshwater Systematic Conservation Plan for KwaZulu-Natal (EKZNW, 2010).
### 1.4.2 Catchment Drivers of Ecological Change

Major land use impacts as ascertained by the SQR analysis by DWS (2014) are indicated in Table 1-10. The upstream catchments are in a relatively un-impacted state with only small and moderate impacts identified. With regards to the immediate catchment, the main impacts area associated with vegetation clearing, agricultural activities (sugarcane), existing sand mining operation and the encroachment of exotic vegetation. These existing impacts are discussed in further detail in the upcoming sections.

<table>
<thead>
<tr>
<th>Sub-Quaternary Reach</th>
<th>T52J-05276</th>
<th>T52K-05467</th>
</tr>
</thead>
<tbody>
<tr>
<td>System</td>
<td>Umzimkulu River</td>
<td>Mzimkhulwana River</td>
</tr>
<tr>
<td>Critical Impacts</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Serious Impacts</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Large Impacts</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Moderate Impacts</td>
<td>None</td>
<td>Agricultural lands</td>
</tr>
<tr>
<td>Small Impacts</td>
<td>Forestry and sugarcane, abstraction (run-of-river/increased flows), mining activities, town development, agricultural lands, bed modification, erosion (banks, riparian zone), sedimentation and exotic vegetation.</td>
<td>Abstraction of water for regional water supply, Inundation from dams, mining activities, town development, bed modification, river crossings (low water bridges/weirs) and nutrients.</td>
</tr>
</tbody>
</table>

### 1.4.3 Desktop Ecological Integrity

The desktop PES categories for the surrounding study area are indicated in Table 1-11 (DWS, 2014). No SQR information is available for the Umzimkulu River adjacent to the study area (SQR: T52M-05547). However, data were available for SQRs located directly upstream on the Umzimkulu River (SQR: T52J-05276) and Mzimkhulwana River (SQR: T52K-05467) (Figure 1-7). The upper SQR of the Umzimkulu River fell within an overall B Category, inferring a Largely Natural state with only a few modifications. However, the ecosystem functions are essentially unchanged. Overall the flow regime has been only slightly modified, and pollution is mainly limited to sedimentation, and only a small change in natural habitats may have taken place. There are a range of driving variables responsible for the changes observed in ecological integrity in this reach (Table 1-11). Both the SQRs reflected an overall Very High EI and ES score. Justification for these scores are provided in Table 1-12.
### Table 1-11: PES categories for the different SQRs associated with the study area (DWS, 2014)

<table>
<thead>
<tr>
<th>Sub-quaternary Reaches</th>
<th>T52J-05276</th>
<th>T52K-05467</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instream Habitat Continuity Modification</td>
<td>None</td>
<td>Small</td>
</tr>
<tr>
<td>Riparian/Wetland Zone Continuity Modification</td>
<td>Small</td>
<td>Small</td>
</tr>
<tr>
<td>Potential Instream Habitat Modifying Activities</td>
<td>Small</td>
<td>Small</td>
</tr>
<tr>
<td>Riparian-Wetland Zone Modification</td>
<td>Small</td>
<td>Moderate</td>
</tr>
<tr>
<td>Potential Flow Modifying Activities</td>
<td>Small</td>
<td>Moderate</td>
</tr>
<tr>
<td>Potential Physico-Chemical Modifying Activities</td>
<td>Small</td>
<td>Small</td>
</tr>
<tr>
<td>PES</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>EI</td>
<td>Very High</td>
<td>Very High</td>
</tr>
<tr>
<td>ES</td>
<td>Very High</td>
<td>High</td>
</tr>
</tbody>
</table>
Figure 1-7: Map indicating the SQR and quaternary catchments associated with the study area. Data Source: Chief Directorate – Surveys and Mapping; DWAF, 1995; Nel et al., 2004; DWS, 2014.

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## Table 1-12: Summary of the criteria used to determine the EI and ES per SQR (DWS, 2014)

<table>
<thead>
<tr>
<th>Descriptor</th>
<th>T52J-05276</th>
<th>T52K-05467</th>
<th>Descriptor</th>
<th>T52J-05276</th>
<th>T52K-05467</th>
<th>Descriptor</th>
<th>T52J-05276</th>
<th>T52K-05467</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of fish species estimated per SQR</td>
<td>12.00</td>
<td>5.0</td>
<td>Number of invertebrate taxa estimated per SQR</td>
<td>63.00</td>
<td>64.00</td>
<td>Fish: physicochemical sensitivity</td>
<td>Very high</td>
<td>High</td>
</tr>
<tr>
<td>Fish: average confidence</td>
<td>4.50</td>
<td>2.2</td>
<td>Invertebrate - average confidence</td>
<td>4.14</td>
<td>4.34</td>
<td>Fish: no-flow sensitivity</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Fish representation per secondary: class</td>
<td>Very high</td>
<td>Moderate</td>
<td>Invertebrate representation per secondary: class</td>
<td>Very high</td>
<td>Very high</td>
<td>Invertebrate: physicochemical sensitivity</td>
<td>Very high</td>
<td>Very high</td>
</tr>
<tr>
<td>Fish rarity per secondary: class</td>
<td>Very high</td>
<td>Very high</td>
<td>Invertebrate rarity per secondary: class</td>
<td>Very high</td>
<td>Very high</td>
<td>Invertebrate: velocity sensitivity</td>
<td>Very high</td>
<td>Very high</td>
</tr>
<tr>
<td>Riparian/wetland-instream vertebrates (excl. fish) rating</td>
<td>Very high</td>
<td>High</td>
<td>Riparian/wetland-instream vertebrates (excl. fish) rating</td>
<td>Very high</td>
<td>High</td>
<td>Riparian/wetland-instream vertebrates (excl. fish) intolerance water level/flow changes</td>
<td>Very high</td>
<td>High</td>
</tr>
<tr>
<td>Riparian-wetland natural VEG rating based on % natural VEG in 500m</td>
<td>Very high</td>
<td>Very high</td>
<td>Habitat diversity class</td>
<td>Moderate</td>
<td>Moderate</td>
<td>Stream size sensitivity to modified flow/water level changes</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Riparian-wetland natural VEG importance based on expert rating</td>
<td>Very high</td>
<td>High</td>
<td>Habitat Size (Length) Class</td>
<td>Very high</td>
<td>Very high</td>
<td>Riparian/wetland VEG intolerance to water level changes</td>
<td>Very high</td>
<td>High</td>
</tr>
</tbody>
</table>

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1.4.4 Study Area Description

The study area is located on the Umzimkulu River, nearby the N2 freeway in Port Shepstone, approximately 4.5km before it flows into the Indian Ocean. The associated river reach of the Umzimkulu is characterized by fast-deep homogenous flow, over mud and silt (Figure 1-8). The riparian fringe on the left bank is dominated by exotic vegetation and is severely impacted by vegetation clearing as a result of existing sand mining and sugarcane farming (Figure 1-9). The right bank is less impacted and characterized by a steep rocky slope, dominated by a woody component.

![Figure 1-8: Associated reach of the Umzimkulu River.](image)

The surrounding catchment is impacted by agriculture, urban and industrial development. Areal imagery provided in Figure 1-10, illustrates how catchment utilization in the direct catchment has changed since 2005. In 2005 the sugarcane fields dominated the catchments to the north, and the extent has remained relatively constant throughout (Figure 1-10). However, sand mining activities have encroached on the riparian zone, and by 2010, extensive clearing have taken place on the northern banks of the study area (Figure 1-10). Vegetation clearing as a result of mining activities has encroached westwards in recent years (Figure 1-10). The river appears to experience sediment plumes during the wet season as illustrated in 2012, 2015 and 2016 (Figure 1-10). Sediment-laden runoff from the upslope catchment, suggests latent land management problems associated with poor soil management and possibly overgrazing.
Figure 1-9: Clearing activities taking place within the study area.
Figure 1-10: Historical aerial images of the study area dating from August 2005 to August 2016.
1.4.5 In situ Water Quality

The in situ water quality results measured for the two sites assessed UZ1 (upstream) and UZ2 (downstream) are summarised in Table 1-13. Both monitoring points reflected circum-neutral and well-oxygenated waters. The large variation in EC is consistent with the salt mixing zone experienced with upslope freshwater flowing into the salty estuarine water. All of the in situ variables are within the normal range for estuarine systems.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Abb.</th>
<th>Unit</th>
<th>UZ1</th>
<th>UZ2</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>pH</td>
<td>[H⁺ ions]</td>
<td>7.8</td>
<td>7.7</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>EC</td>
<td>µS·cm⁻¹</td>
<td>3170</td>
<td>7501</td>
</tr>
<tr>
<td>Total Dissolved Solids</td>
<td>TDS</td>
<td>ppm</td>
<td>1530</td>
<td>3585</td>
</tr>
<tr>
<td>Dissolved Oxygen</td>
<td>DO</td>
<td>mg/l</td>
<td>7.3</td>
<td>7.1</td>
</tr>
<tr>
<td>Dissolved Oxygen %</td>
<td>DO</td>
<td>%</td>
<td>75.9</td>
<td>76.5</td>
</tr>
<tr>
<td>Temperature</td>
<td>Temp.</td>
<td>°C</td>
<td>16.66</td>
<td>16.97</td>
</tr>
<tr>
<td>Time</td>
<td>T</td>
<td>24h</td>
<td>11.29</td>
<td>10.30</td>
</tr>
</tbody>
</table>

1.4.6 Diatom Assessment

The ecological classification for water quality according to Van Dam et al. (1994) and Taylor et al. (2007) is recorded in (Table 1-14). The diatom assemblages mainly comprised of species with a preference for fresh brackish (<500µS/cm), alkaline (pH > 7) waters and eutrophic conditions. Sites CSIR1 comprised of a diatom assemblage that was N-autotrophic tolerant, indicating a tolerance of elevated concentrations of organically bound nitrogen. The oxygen saturation requirements were high (>75%) and the pollution level was moderately polluted (β-mesosaprobic).

<table>
<thead>
<tr>
<th>Site</th>
<th>pH</th>
<th>Salinity</th>
<th>Nitrogen uptake</th>
<th>Oxygen Requirements</th>
<th>Saprobity</th>
<th>Trophic State</th>
</tr>
</thead>
<tbody>
<tr>
<td>UZ</td>
<td>Alkaline</td>
<td>Fresh brackish</td>
<td>N-Autotrophic tolerant</td>
<td>High</td>
<td>β-mesosaprobic</td>
<td>Eutrophic</td>
</tr>
</tbody>
</table>

A total of 35 diatom species were recorded at the two sampling locations (Table 1-1 and Table 1-15). The dominant diatom species recorded at this site, included Achnanthidium minutissimum, Nitzschia palea, Navicula symmetrca and Navicula antonii. These species are indicative of eutrophic to hypereutrophic, brackish waters and are usually good indicators of anthropogenically impacted waters. It is important to note that A. minutissimum is usually associated with well oxygenated, clean, fresh waters (Taylor et al., 2007); however, this taxon has also been found in nutrient rich waters with
Higher pH (Round, 1993) and at sites contaminated with acid mine drainage precipitates and heavy metals associated with mining effluent (Deniseger et al., 1986; Genter et al., 1987; Ivorra et al., 1999; Medley & Clements 1998; Gold et al., 2002, 2003; Cattaneo et al., 2004; Ferreira da Silva et al., 2009). The subdominant species, included N. veneta, Comphonema parvulum, N. rostellata and Tryblionella calida which pointed to eutrophic, electrolyte-rich to brackish water. These species are also tolerant to polluted conditions and are often found in industrially impacted waters (Table 1-15). According to the diatom community this site appears to be impacted by some form of pollution potentially originating from the surrounding catchment. The %PTV score was relatively low indicating that there was no serious impact related to organic pollution and the overall water quality was considered Moderate (Table 1-16).

Table 1-15: Diatom Index scores calculated for the Umzimkulu River, June 2017

<table>
<thead>
<tr>
<th>Sites</th>
<th>%PTV</th>
<th>SPI</th>
<th>BDI</th>
<th>Ecological Water Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>UZ</td>
<td>15.6</td>
<td>10.1</td>
<td>10.2</td>
<td>Moderate</td>
</tr>
</tbody>
</table>

Table 1-16: Diatom species and their abundances for the Umzimkulu River, June 2017

<table>
<thead>
<tr>
<th>Taxa</th>
<th>UZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Achnanthes standeri Cholnoky</td>
<td>8</td>
</tr>
<tr>
<td>Achnanthes subaffinis Cholnoky</td>
<td>20</td>
</tr>
<tr>
<td>Achnanthidium crassum (Hustedt) Potapova &amp; Ponader</td>
<td>15</td>
</tr>
<tr>
<td>Achnanthes eutrophila Lange-Bertalot</td>
<td>13</td>
</tr>
<tr>
<td>Achnanthidium minutissimum (Kützing) Czarnecki</td>
<td>33</td>
</tr>
<tr>
<td>Amphora veneta Kützing</td>
<td>2</td>
</tr>
<tr>
<td>Cocconeis placentula Ehrenberg var. placentula</td>
<td>8</td>
</tr>
<tr>
<td>Craticula buderi (Hustedt) Lange-Bertalot</td>
<td>20</td>
</tr>
<tr>
<td>Cymatopleura solea (Brebisson) W. Smith var. apiculata (W.Smith) Ralfs</td>
<td>3</td>
</tr>
<tr>
<td>Encyonema minutum (Hilse in Rabh.) D.G. Mann</td>
<td>5</td>
</tr>
<tr>
<td>Encyonopsis leei Krammer var. sinensis Metzeltin &amp; Krammer</td>
<td>3</td>
</tr>
<tr>
<td>Eolimna subminuscula (Manguin) Moser Lange-Bertalot &amp; Metzeltin</td>
<td>2</td>
</tr>
<tr>
<td>Fragilaria capucina Desmazières var. capucina</td>
<td>2</td>
</tr>
<tr>
<td>Fragilaria ungeriana Grunow</td>
<td>3</td>
</tr>
<tr>
<td>Comphonema minutum (Ag.) Agardh f. minutum</td>
<td>2</td>
</tr>
<tr>
<td>Comphonema parvulum (Kützing)</td>
<td>24</td>
</tr>
<tr>
<td>Luticola goeppertiana (Bleisch in Rabenhorst) D.G. Mann</td>
<td>6</td>
</tr>
<tr>
<td>Navicula antonii Lange-Bertalot</td>
<td>35</td>
</tr>
<tr>
<td>Navicula capitatoradiata Germain</td>
<td>20</td>
</tr>
<tr>
<td>Navicula erifuga Lange-Bertalot</td>
<td>8</td>
</tr>
<tr>
<td>Navicula gregaria Donkin</td>
<td>3</td>
</tr>
</tbody>
</table>

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Aquatic Ecology Assessment, pg 1-24
The diatom findings are summarised below:

- The diatom assemblage was comprised of species characteristic of alkaline, fresh-brackish waters and eutrophic conditions. The pollution levels were considered to be moderately polluted, indicating that there may be some form of pollution entering the system.

- Based on diatom community analyses, the dominant species indicated eutrophic to hypereutrophic, brackish conditions and impacted waters.

- The level of organic pollution at this site was low and the ecological water quality at this site was considered Moderate. The impacts reflected in the diatom community may be attributed to the surrounding catchment.

1.4.7 Aquatic Macroinvertebrate Assessment

Habitat availability (quality and quantity) is an important part of an ecosystem as it forms a template for the biotic communities. If the habitat availability is low, it will influence the biotic assemblages. When the habitat diversity is high and un-impacted, the biotic community structures tend to be in a relatively good condition. Habitat availability and diversity are major determinants in the overall community structure of aquatic macroinvertebrates. For this reason, it is important to evaluate habitat quality and quantity when applying biomonitoring methodologies and assessing ecosystem health. The river reach obtained a very low score, indicating Poor habitat availability for
Aquatic macroinvertebrate communities are affected by both physical and chemical factors and therefore are commonly used as biological indicators of water quality. They can be used to identify impaired water quality and indicate improvement. The main aspects with regard to the aquatic macroinvertebrate assemblages are briefly discussed below:

- Overall, all the study area showed a very low species diversity and richness with only 5 macroinvertebrate taxa sampled (Table 1-18). However, the macroinvertebrate community did reflect taxa with a moderate and very low tolerance to pollution (Table 1-18).
- As discussed above the habitat within the river reach was considered to be limited and unable to support diverse macroinvertebrate fauna. Furthermore, the high salt loads measured at the site (refer to Section 1.4.5) may also be contributing to the low species diversity.

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Sensitivity</th>
<th>KR1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amphipoda</td>
<td>13</td>
<td>A</td>
</tr>
<tr>
<td>Atyidae</td>
<td>8</td>
<td>B</td>
</tr>
<tr>
<td>Naucoridae*</td>
<td>7</td>
<td>A</td>
</tr>
<tr>
<td>Oligochaeta</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Potamonautidae*</td>
<td>3</td>
<td>A</td>
</tr>
</tbody>
</table>

Number of Taxa 5

<table>
<thead>
<tr>
<th>Taxa</th>
<th>Sensitivity</th>
<th>KR1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly tolerant to pollution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Moderately tolerant to pollution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very Low Tolerance to pollution</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 1-17: IHAS scores of sites during the June 2017 assessment

<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>UZ-U / UZ-D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stones in current</td>
<td>0</td>
</tr>
<tr>
<td>Vegetation</td>
<td>12</td>
</tr>
<tr>
<td>Other habitat</td>
<td>11</td>
</tr>
<tr>
<td>Total IHAS %</td>
<td>31.08</td>
</tr>
<tr>
<td>Class</td>
<td>Poor</td>
</tr>
</tbody>
</table>
1.4.8 Fish Assessment

Along with diatoms and aquatic macroinvertebrates, fish represent overlapping or different trophic levels associated with the estuarine ecology and remains an important part of the water resource quality. The study area provide suitable habitat for approximately 11 families represented by 14 genera and 16 indigenous species (Table 1-19). Of the expected fish assemblage 13 species have an IUCN Red List conservation status as Least Concern (LC), while two species (Awaous aeneofuscus and Monodactylus argenteus) have not been assessed yet. One species Microphis fluviatilis is listed as Data Deficient (DD) and one species (Oreochromis mossambicus) is listed as Near Threatened (NT). The NT status of O mossambicus relate to rapidly spreading hybridisation with O. niloticus (Swartz, 2007).

In general, the expected fish assemblage is a combination of freshwater and estuarine species. The lower trophic levels (and this higher abundances) are occupied by more euryhaline species such as O. mossambicus and some of the coastal migrants Monodactylus argenteus, Myxus capensis and Acanthopagrus berda. The study area is well within the salt mixing zone and the more dedicated freshwater species (Enteromius species, Labeobarbus natalensis and Glossogobius callidus) may likely only use the area during periods of high flow when the salt mixing zone is pushed closer to the estuarine mouth. It is important to note that the expected list have been adjusted based on the dominant habitat units, which consisted of slow deep flowing water associated substrate (sand and mud) and emergent marginal vegetation. The number of expected species with their specific habitat preferences are illustrated in Figure 1-11 A and B. Similarly, the tolerances of the expected species list to changes in water quality and conditions of no-flow are shown in Figure 1-12 A and B.

Table 1-19: Expected fish species list

<table>
<thead>
<tr>
<th>Family</th>
<th>Genus and Species</th>
<th>UICN Status</th>
<th>Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anguillidae</td>
<td>Anguilla marmorata Quoy &amp; Gaimard 1824</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anguilla mossambica Peters 1852</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Centrarchidae</td>
<td>Micropterus salmoides (Lacepède, 1802)</td>
<td>EX</td>
<td></td>
</tr>
<tr>
<td>Cichlidae</td>
<td>Oreochromis mossambicus (Peters, 1852)</td>
<td>NT</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Pseudocrenilabrus philander (Weber, 1897)</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Claridae</td>
<td>Clarias gariepinus (Burchell, 1822)</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Cyprinidae</td>
<td>Enteromius anoplus Weber, 1897</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enteromius gurneyi Günther, 1868</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Labeobarbus natalensis Castelnau, 1861</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Enteromius viviparus Weber, 1897</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cyprinus carpio Linnaeus, 1758</td>
<td>EX</td>
<td></td>
</tr>
<tr>
<td>Gobiidae</td>
<td>Awaous aeneofuscus (Peters 1852)</td>
<td>NE</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Glossogobius callidus Smith, 1937</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glossogobius giuris (Hamilton-Buchanan, 1822)</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Monodactylidae</td>
<td>Monodactylus argenteus (Linnaeus, 1758)</td>
<td>NE</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Monodactylus falciformis Lacepède, 1801</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Mugilidae</td>
<td>Myxus capensis (Valenciennes, 1836)</td>
<td>LC</td>
<td>13</td>
</tr>
<tr>
<td>Poeciliidae</td>
<td>Poecilia reticulata Peters, 1859</td>
<td>EX</td>
<td></td>
</tr>
</tbody>
</table>
ENVIRONMENTAL IMPACT ASSESSMENT
Draft EIA Report for Ms Singh’s Proposed Sand Mining Project
Port Shepstone, KwaZulu Natal

<table>
<thead>
<tr>
<th>Family</th>
<th>Genus and Species</th>
<th>UICN Status</th>
<th>Sampled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sparidae</td>
<td><em>Acanthopagrus berda</em> (Forsskål, 1775)</td>
<td>LC</td>
<td></td>
</tr>
<tr>
<td>Syngnathidae</td>
<td><em>Microphis fluviatilis</em> (Peters, 1852)</td>
<td>DD</td>
<td></td>
</tr>
</tbody>
</table>

LC=Least Concerned; EX= Exotic/Alien; NE= Not Assessed; NT= Near Threatened; DD= Data Deficient

Figure 1-11: Habitat preferences for fish expected to be associated with the study area.

Figure 1-12: Water quality and flow tolerances for fish expected to be associated with the study area (WQ= Water Quality).

### 1.4.9 Riparian Vegetation Assessment

#### Vegetation Reference Condition

The study area falls within the Indian Ocean Coastal Belt Bioregion within the KwaZulu-Natal Coastal Belt Vegetation Unit (Table 1-20). Vegetation characteristics and expected natural/reference states are briefly discussed below (Mucina & Rutherford, 2006):

- The KwaZulu-Natal Coastal Belt occurs in the KwaZulu-Natal Province, attitudes ranging from approximately 20–450 m. This vegetation type is characterized as a long, and in certain areas broad, coastal strip running along the KwaZulu-Natal coast. From the north, the vegetation...
unit ranges from close to Mtunzini, through Durban and Margate and ending before Port Edward, to the south.

- This vegetation type is listed as Endangered (Table 1-20) with approximately 50% of the vegetation unit transformed as a result of cultivation, urban sprawl and for road infrastructure, with only a very small portion statutorily conserved (Ngoye, Mbumbazi and Vernon Crookes Nature Reserves). The main exotics/aliens impacting on the vegetation unit include Chromolaena odorata, Lantana camara, Melia azedarach and Solanum mauritianum.

- Erosion within this vegetation unit is considered low to moderate.

- The KwaZulu-Natal Coastal Belt was characterized by dissected undulating coastal plains which seemingly used to be covered to a large extent with several types of subtropical coastal forest. However, at present the coastal belt is impacted by extensive sugarcane and timber plantations as well as coastal holiday resorts.

- Under reference (natural) conditions the non-marginal zone would have a high woody component trees and shrubs, with lower ground cover by grasses, whilst the marginal zone would be dominated by hydrophytic grasses, sedges, and reeds with a much smaller woody component expected.

<table>
<thead>
<tr>
<th>Vegetation Type</th>
<th>KwaZulu-Natal Coastal Belt</th>
<th>Waterbodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioregion</td>
<td>Indian Ocean Coastal Belt</td>
<td>Subtropical Coastal Lagoons</td>
</tr>
<tr>
<td>Status</td>
<td>Endangered</td>
<td>-</td>
</tr>
<tr>
<td>MAP (mm)</td>
<td>989</td>
<td>-</td>
</tr>
<tr>
<td>MAT (°C)</td>
<td>19.6</td>
<td>-</td>
</tr>
<tr>
<td>MFD</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td>MAPE</td>
<td>1659</td>
<td>-</td>
</tr>
</tbody>
</table>

**Vegetation Assessment**

The vegetation in the riparian areas on site consists of a combination of indigenous and alien species, as well as a combination of woody and non-woody species. The wetter areas on site are dominated by obligate riparian species, but alien and invasive species are present in several areas, especially in disturbed areas within the study area. See Table 1-21 for a detailed list of dominant species observed within the riparian zone during the June 2017 assessment. Indigenous vegetation cover is not very high on site, with several alien and invasive species present, as indicated in Table 1-21. The riparian vegetation composition has changed drastically when compared to the expected reference condition with a substantial decrease in the indigenous woody component (Table 1-22). The non-marginal zone has a lower cover and abundance due to the vegetation clear from sand mining activities and sugarcane fields (Figure 1-9).

Table 1-21: Species list of dominant plant species noted in the marginal and non-marginal riparian zones along the left bank of the Umzimkulu River, June 2017

<table>
<thead>
<tr>
<th>Plant species</th>
<th>Alien species/ Invasive class</th>
</tr>
</thead>
</table>

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Aquatic Ecology Assessment, pg 1-29
### Table 1-22: Table indicating the percentage abundance and cover of indigenous vegetation at the wetland sites assessed during the June 2017 survey

<table>
<thead>
<tr>
<th>Site</th>
<th>Survey</th>
<th>Woody</th>
<th>Non-woody</th>
<th>Exotic Invasion</th>
<th>Impacts on the Vegetation at the Site</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cover and Abundance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>% Abundance and Cover</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 1b</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 1a</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 1b</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 1b / Class 3 in urban areas</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 1b</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 1b</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 1b</td>
<td></td>
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<td>Class 1b</td>
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<td>Class 1b</td>
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<td>Class 1b</td>
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<td>Class 1b</td>
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<td>Class 1b</td>
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<td>Class 1b</td>
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<td>Class 1b</td>
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<td></td>
<td>Class 1b</td>
<td></td>
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<td>Class 1b</td>
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<td>Class 1b</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Class 1b</td>
<td></td>
</tr>
</tbody>
</table>

### Plant species

<table>
<thead>
<tr>
<th>INDIGENOUS</th>
<th>Alien species/Invasive class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aloe barberae</td>
<td>-</td>
</tr>
<tr>
<td>Cyperus esculentus</td>
<td>-</td>
</tr>
<tr>
<td>Cyperus sexangularis</td>
<td>-</td>
</tr>
<tr>
<td>Ficus sp.</td>
<td>-</td>
</tr>
<tr>
<td>Holothrix randii</td>
<td>-</td>
</tr>
<tr>
<td>Phragmites australis</td>
<td>-</td>
</tr>
<tr>
<td>Senecio inaequidens</td>
<td>-</td>
</tr>
<tr>
<td>Schoenoplectus sp.</td>
<td>-</td>
</tr>
<tr>
<td>Senecio inaequidens</td>
<td>-</td>
</tr>
<tr>
<td>Sida dragei</td>
<td>-</td>
</tr>
<tr>
<td>Vachellia sieberiana</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>EXOTICS</th>
<th>Alien species/Invasive class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Argemone mexicana</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Arundo Donax</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Acacia dealbata</td>
<td>Class 2</td>
</tr>
<tr>
<td>Bidens pilosa</td>
<td>-</td>
</tr>
<tr>
<td>Cardiospermum grandiflorum</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Canna indica</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Chromolaena odorata</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Conyza bonariensis</td>
<td>-</td>
</tr>
<tr>
<td>Ipomoea purpurea</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Lantana camara</td>
<td>Class 1a</td>
</tr>
<tr>
<td>Melia azedarach</td>
<td>Class 1b / Class 3 in urban areas</td>
</tr>
<tr>
<td>Pinus sp</td>
<td>-</td>
</tr>
<tr>
<td>Ricinus communis</td>
<td>Class 2</td>
</tr>
<tr>
<td>Saccharum sp</td>
<td>-</td>
</tr>
<tr>
<td>Senna didymobotrya</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Solanum mauritianum</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Sonchus wilmsii</td>
<td>-</td>
</tr>
<tr>
<td>Tithonia diversifolia</td>
<td>Class 1b</td>
</tr>
<tr>
<td>Tagetes minuta</td>
<td>-</td>
</tr>
<tr>
<td>Xanthium strumarum</td>
<td>Class 1b</td>
</tr>
</tbody>
</table>

Obligate
Facultative/Opportunistic
Facultative
Damp and swampy areas/near water and along watercourses/seasonally inundated areas
Woody Component
### % Abundance and Cover of Indigenous Vegetation

<table>
<thead>
<tr>
<th>Site</th>
<th>Survey</th>
<th>Woody</th>
<th>Non-woody</th>
<th>Exotic Invasion</th>
<th>Impacts on the Vegetation at the Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study Area</td>
<td>Present</td>
<td>10-20</td>
<td>20-30</td>
<td>70-80%</td>
<td>The surrounding catchment is severely impacted by the encroachment of exotic vegetation. Furthermore, extensive vegetation clearing has taken place as a result of sand mining activities and sugarcane fields.</td>
</tr>
<tr>
<td></td>
<td>Reference</td>
<td>80-90</td>
<td>10-20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 1-13: Vegetation units associated with the study area (Mucina & Rutherford, 2006).

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Aquatic Ecology Assessment, pg 1-32
1.4.10 Riparian and Estuarine Delineation

The riparian habitat is in a Largely to Critically modified ecosystem state. Riparian areas are usually highly functional areas, which offer a wide array of ecosystem goods and services in the form of flood attenuation and water quality improvement etc. The ground-truthed riparian zone is shown in Figure 1-14. Based on the mapping of the riparian zone, the current lateral extent of the riparian zone is approximately 80-90m on the left bank of the system. In general riparian zones are associated with the following ecological services:

- Reduction in the amount of surface runoff into the river habitat by increasing the available area for infiltration.
- Reduction in the likelihood of erosion by decreasing runoff velocities and flow concentration and dissipating energy.
- Removing sediments and associated pollutants from surface water runoff, by assimilating, detaining and detoxifying (transforming) nutrients and contaminants from upland sources, especially non-source point pollution.
- Help to maintain and provide foraging, breeding and dispersal habitat for aquatic, semi-aquatic and terrestrial species.
- Function as corridors between different habitat patches, including terrestrial and wetland areas.

However, the riparian zone in its current state would offer less functionality due to existing disturbances. A key part of managing activities within the riparian zone will be simulate some of the riparian services mentioned above, most notably erosion and sediment control.

The lateral estuarine boundary was based on the National Estuaries spatial data sets (SANBI & CSIR, 2012), which considers all permanent coastal water bodies that are sporadically linked to the sea as potentially estuarine systems (Figure 1-14).
Figure 1-14: Map indicating the delineated riparian zone on the left bank and the national estuaries boundary.
1.5 IDENTIFICATION OF KEY ISSUES AND POTENTIAL IMPACTS

1.5.1 Key Issues Identified

The potential instream and riparian ecology issues identified during this assessment include the following:

- Loss or change of instream habitat affecting instream biota;
- A decrease in water quality affecting instream biota;
- Loss or destruction of riparian habitat and;
- An increased in alien and invasive infestation due to disturbance within the riparian zone.

1.5.2 Identification of Potential Impacts

The potential impacts identified during the EIA assessment are:

1.5.2.1 Construction Phase

- Impact on the riparian zone.
- Impact on instream biota due to changes in water quality.
- Impact on instream habitat due to increase sediment associated with a loss in riparian cover.

1.5.2.2 Operational Phase

- Impact on instream habitat due to sediment extraction.
- Impact on water quality due to sediment extraction (increase in turbidity), runoff from sediment handling area on the banks, toxic sediment suspension and contamination from mining machinery.
- Impact on riparian habitat due to continual disturbances within sediment laydown area during operations.
- Impact on the riparian habitat due to the recruitment of alien and invasive species.

1.5.2.3 Decommissioning Phase

- Impact on instream habitat due to erosion and sedimentation from re-sloping and reinstating the disturbed riparian areas.
- Impact on the riparian habitat due to the recruitment of alien and invasive species.

1.5.2.4 Cumulative impacts

- Cumulative loss or change of instream habitat due to additional sand mining activity.
- Cumulative impact on instream biota due to changes in water quality associated with additional sand mining activity.
- Cumulative loss of fringing/riparian habitat within the Umzimkulu estuary.
Cumulative increase in alien and invasive species within the margins (riparian zone) of the estuary.

1.6 PERMIT REQUIREMENTS

The section below highlights some important legislation pertaining to wetlands and aquatic ecosystems, in general, on the property.

According to the National Water Act (NWA) (Act No. 36 of 1998), a water resource includes a watercourse, surface water, estuary, or aquifer.

In terms of the National Environmental Management: Integrated Coastal Management (NEM:ICM) (Act No. 36 of 2014), an estuary means a body of surface water-

(a) that is part of a watercourse, and that is permanently or periodically open to the sea;
(b) in which a rise and fall of the water level as a result of the tides is measurable at spring tides when the watercourse body of surface water is open to the sea; or
(c) in respect of which the salinity is measurably higher than fresh water as a result of the influence of the sea, and where there is a salinity gradient between the tidal reach and the mouth of the body of surface water.

The water resource extent in terms of an estuary is stipulated as follows:

- Downstream boundary: The estuary mouth, including the surf zone, seaward extent of the flood delta and/or transitional waters. This extension can be determined on salinity observations, variations observed in historical aerial photographs or satellite imagery.
- Upstream boundary: The extent of tidal influence, i.e. the point up to where tidal variation in water levels can still be detected or the extent of saline intrusion or the extent of backflooding during the closed mouth state whichever is furthest upstream.
- Lateral boundaries: The lateral boundaries should include all areas below the high tide mark, all estuarine vegetation (including mangroves, swamp forest, reeds/sedges and supratidal saltmarsh), and any floodplain areas below the upstream boundary as determined by the 1:100 flood line (for temporarily closed systems the mouth have to be closed for accurate flood line delineation). Where these boundaries have not been defined by scientific methods, they can be defined using the 5m topographical contour as indicative of the 5m above Mean Sea Level (MSL) along each bank. Note that the littoral active zones adjacent to an estuary can stretch beyond the 5m contour.
In 2010, the estuarine functional zone – encapsulating not only the estuary water body but also supporting physical and biological processes and habitats necessary for that estuarine function and health – was listed as Notice 3 (GN R 546) under the National Environmental Management Act (NEMA), Environmental Impact Assessment (EIA) Regulations (2010). This notice stipulates that estuaries (defined by the spatial delineation of the estuarine functional zone) are “sensitive areas” that require environmental authorisation before developments within this zone may proceed. These regulations are not backdated but are meant to curb inappropriate future development in the estuarine functional zone.

Section 21 of the NWA (Act No. 36 of 1998) covers the following activities, which might be applicable to the conceptual layout plan for the proposed development. Note that this assessment focused primarily on the water resource in relation to section 21:

- (c) – impeding or diverting the flow of water in a watercourse;
- (i) – altering the bed, banks, course or characteristics of a watercourse.

In Chapter 4 of the National Water Act (Act 36 of 1998), general principles for regulating water use are set out. Of specific relevance to sand mining operations, is section 21(c) and (i): impeding or diverting the flow in a watercourse or altering the bed, banks, course or characteristics of a watercourse. In general, a water use must be licensed unless it is listed in Schedule I is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a license.

According to section 29(1) of the Water Act (Act 36 of 1998), a responsible authority may attach conditions to every general authorisation or license.

Notice 509 of 2016, replaced the general authorisation in terms of section 39 of the National Water Act (1998), in respect of Section 21(c) and(i) which stipulates the regulated area of a watercourse as follows:

- The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of the river, spring, natural channel, lake or dam;
• in the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bend (subject to compliance to section 144 of the Act); or
• a 500m radius from the delineated boundary (extent) of any wetland or pan.

The environmental impact assessment regulations (2017) in terms of the NEMA (1998) under regulated activity 19 of GNR 327 requires environmental authorisation for the development of:

The infilling or depositing of any material of more than $10^3$ into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than $10^3$ from:

- (i) a watercourse;
- (ii) the seashore;
- (iii) the littoral active zone, an estuary or a distance of 100m inland of the high-water mark of the sea or estuary, whichever distance is the greater.

The environmental impact assessment regulations (2017) in terms of the NEMA (1998) under regulated activity 19 of GNR 324 requires environmental authorisation for the development of:

- Listed Activity 12: The clearance of an area of $300m^2$ or more of indigenous vegetation…(d vi) within the littoral active zone or 100m inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on in urban areas.

In terms of Section 19 of the NWA, a person who owns, controls, occupies or uses the land is responsible for the control and prevention of water resource pollution.

The Conservation of Agricultural Resources Act (CARA - Act No. 43 of 1983) was established for the conservation of the natural agricultural resources by the maintenance of the production potential of land, by:

- combating and preventing erosion;
- mitigating the weakening or destruction of the water sources;
- protecting natural vegetation; and
- combatting of weeds and invader plants.
According to REGULATION 16: Control of weeds and invader plants:

If invasive weeds (as specified in the Act) occur on any area (also specified) the land user shall, by any of the following means, control those weeds effectively:

- The weeds shall be uprooted, felled or cut off and shall be destroyed by burning or other suitable methods.
- The weeds shall be treated with an appropriately registered weed killer.
- The measures above shall be applied to the seeds, seedlings or regrowth of the weeds to prevent them from setting seed or propagating vegetatively.

1.7 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

1.7.1 Construction Phase

1.7.1.1 Potential impact 1: Impact on the riparian zone

During the construction phase, a sand laydown area will be established within the riparian zone. This may require some additional vegetation clearing within the riparian zone. The impact will be limited to the site boundaries with a temporary duration. The current state of the riparian zone is also impaired due to previous sand mining and sugarcane farming activity.

Mitigation measures inherent to the project design include:

- Only clear within permitted area.
- Protect the exposed banks from erosion and silt from entering the water.

Key mitigation measures proposed by the specialist include:

- Erosion and Sediment control management plan need to implement prior to the onset of pre-construction activity.
- Protect the exposed banks from erosion and silt from entering the water.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts on the riparian zone during the construction phase are predicted to be of a Low Negative Significance.
With the effective implementation of the **key mitigation measures** proposed by the specialist, the impacts on the riparian zone during the construction phase are predicted to be of a **Low Negative Significance**.

### 1.7.1.2 Potential impact 2: Impact on instream biota due to changes in water quality

Changes in water quality during the construction phase may be due to the following:

- An increase in silt loads due to uncontrolled runoff from disturbed riparian areas.
- Toxicant and hydrocarbon contamination from construction machinery.

High levels of silt entering the system can create an unstable and continually changing environment that becomes unsuitable for many aquatic organisms. The most likely effects of suspended sediments on fish include reduction in light penetration and of photosynthesis in micro- and macrophytes, resulting in reduced food availability and plant biomass; reduced visibility of pelagic food; reduced availability of benthic food due to smothering; clogging of gillrakers and gill filaments. An increase in hydrocarbon and other toxicants may result in chronic or acute toxicity to aquatic organisms.

The impact on instream biota due to changes in water quality will have a local extent and will be temporary (for the duration of the construction phase). The impact is negated to some extent by high background levels of silt (during the wet season).

Mitigation measures inherent to the project design include:

- Only clear within permitted area.
- Protect the exposed banks from erosion and silt from entering the water.
- Divert stormwater away from disturbed areas through the application of berms and vegetated buffer strips.

Key mitigation measures proposed by the specialist include:

- Maintain construction equipment outside the riparian area zone.
- Create and implement a hydrocarbon spill prevention plan.
- Prevent silt from entering the watercourse through the application of silt fences downslope of any disturbed areas (laydown area, sump, etc.).

**Without additional mitigation (i.e. with only the mitigation measures inherent to the project design)**, the impacts on instream biota due to changes in water quality, during the construction phase, are predicted to be of a **Low Negative Significance**.
With the effective implementation of the key mitigation measures proposed by the specialist, the impacts on instream biota due to changes in water quality, during the construction phase, are predicted to be of a Low Negative Significance. Mitigation measure focus on preventing and controlling contamination, thus decreasing the intensity and probability of the impact.

### 1.7.1.3 Potential Impact 3: Impact on instream habitat due to increase sediment associated with loss in riparian cover

The riparian zone includes stream banks, riparian vegetation, and vegetative cover. It serves as buffer to pollutants entering a stream from runoff, controls erosion, and provides habitat and nutrient input into the stream. Disturbance of the riparian zone during the construction phase can have multiple deleterious effects on instream habitat. Damaging any one of these elements can cause stream bank destabilisation, resulting in increased erosion and sediment. The riparian zone is currently disturbed, but it is still likely that construction activity will result in the removal of vegetation within the proposed footprint during construction. The impact will occur during the construction phase and will last until the sand mining stops. The extent of the impact is relatively limited.

Mitigation measures inherent to the project design include:

- Limit the extent of vegetation removal and bank disturbance.
- Protect the exposed banks from erosion and silt from entering the water.

Key mitigation measures proposed by the specialist include:

- Erosion and sediment control management plan need to be implemented prior to the onset of construction activity.

**Without additional mitigation (i.e. with only the mitigation measures inherent to the project design)**, the impacts on instream habitat due to increase sediment associated with loss in riparian cover, during the construction phase are predicted to be of a **Low Negative Significance**.

With the effective implementation of the key mitigation measures proposed by the specialist, the impacts on instream habitat due to increase sediment associated with loss in riparian cover, during the construction phase are predicted to be of a **Low Negative Significance**. Mitigation measure focus on preventing and controlling excessive contamination, thus decreasing the intensity and probability of the impact. Mitigation measures aim to avoid and minimise erosion and sedimentation by implementing suitable erosion control measures and to monitor the efficacy of erosion control measures.

### 1.7.2 Operational Phase

#### 1.7.2.1 Potential impact 4: Impact on instream habitat due to sediment extraction

Extraction of alluvial material from the streambed has a direct impact on the stream's physical habitat characteristics. These characteristics include channel geometry, bed elevation, substrate...
composition and stability, instream roughness elements, depth, velocity, turbidity, sediment transport, stream discharge and temperature. Altering these habitat characteristics can have deleterious impacts on the instream biota.

The detrimental effects to biota resulting from sand mining are caused by three main processes: (1) alteration of the flow patterns resulting from modification of the river bed, (2) an excess of suspended sediment and (3) damage to riparian vegetation and instream habitat. The disturbance activities can also disrupt the ecological continuum in many ways. Local channel changes can propagate impacts upstream or downstream and can trigger lateral changes. Alterations of the riparian zone can result in changes in channel conditions that can impact aquatic ecosystems in a similar way as some in-channel activities.

The interconnectedness of channels and riparian systems requires the simultaneous evaluation of potential disruptions of the riparian zone and channel activities. For example, sand mining involves the channel and boundary but requires land access and material storage that could affect riparian zones e.g. construction and access roads.

The potential impacts of sand extraction on instream and riparian habitat of riverine systems and the subsequent impact on riverine biota include:

- Extraction of bed material in excess of natural replenishment by upstream transport.
- Headcutting, erosion, increased velocities and concentrated flows can occur upstream of the extraction site due to a steepened river gradient. Gravel removal not only impacts the extraction site, but may also reduce gravel delivery to for example downstream fish spawning sites.
- Bed degradation changes the morphology of the channel.
- Altering channel hydraulics can result in velocity depth classes that may be differ from preferences and tolerances of the expected fish community.

Mitigation measures inherent to the project design include:

- Sediment extraction should be limited to the dry season period (March to November).
- The quantity of sand extracted should not exceed the annual accumulation rate. This will avoid extended impacts on channel morphology and instream habitat. The cumulative volume of sand extraction should not exceed the recruitment rate.

Key mitigation measures proposed by the specialist include:

- Closely monitor the sand extraction volumes and sediment recruitment rates. The active channel dimensions should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand.
- Control the annual timing and duration of sand abstraction.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts on instream habitat due to sand mining, during the operational phase are predicted to be of a Medium Negative Significance.
With the effective implementation of the **key mitigation measures** proposed by the specialist, the impacts on instream habitat due to sand mining, during the operational phase are predicted to be of a **Low Negative Significance**. Mitigation measure focus limiting the extraction volume in such a way as to allow sufficient annual sand recruitment during the wet season. This will prevent a permanent alteration to the channel morphology and habitat template.

### 1.7.2.2 Potential impact 5: Impact on water quality due to sediment extraction and due to runoff from sediment handling area within the riparian zone.

The water quality may be affected by the operation in the following ways:
- Localised sediment plumes during sediment extraction, which may suspend anoxic sediments, nutrients, and other toxins into the water.
- An increase in turbidity that may affect the trophic structure or influence predatory fish behaviour.
- Toxicant or hydrocarbon contamination from the pumping barge and construction equipment on the river bank.
- Increase turbidity from the disturbed riparian zone due to inefficient runoff control.

The duration of this impact may persist throughout the operational phase and the extent may be further than the immediate disturbance.

Mitigation measures inherent to the project design include:
- Storm water design should limit any uncontrolled runoff through disturbed areas on the bank.
- All areas downslope of disturbed areas should be sufficiently protected against erosion and sedimentation.

Key mitigation measures proposed by the specialist include:
- Design and implement an erosion and sediment control management plan.
- Monitor silt fences and erosion control measures (berms and vegetated buffer strips for efficacy and repair or augment insufficient measures).
- Monitor *in situ* water quality (including turbidity) upstream and downstream during abstraction activity. Downstream readings should not vary more than 15% with that of the upstream measurements for any duration. Monitoring should be done monthly during sand extraction.
- Maintain construction equipment outside the marginal (riparian area). Where this is not possible (for instance refuelling the barge) contamination of surface water with hydrocarbons should be prevented through spill prevention and management measures. These measures should be part of the hydrocarbon spill prevention and spill management plan.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts on water quality, during the operational phase, are predicted to be of a **Medium Negative Significance**.

With the effective implementation of the **key mitigation measures** proposed by the specialist, the impacts on water quality, during the operational phase, are predicted to be of a **Low Negative**
**Significance.** Mitigation measure focus on preventing and controlling any water contamination that may occur.

### 1.7.2.3 Potential Impact 6: Impact on riparian habitat due to continual disturbances within sand laydown area during operations

For the duration of the operational phase the riparian habitat will not be able to re-establish.

Mitigation measures inherent to the project design include:

- Strictly operate within permitted area.

Key mitigation measures proposed by specialist include:

- Control the area within which construction equipment are allowed to operate.
- Access roads should not encroach into riparian areas.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts on the riparian habitat, during the operational phase are predicted to be of a **Low Negative Significance**.

With the effective implementation of the key mitigation measures proposed by the specialist, the impacts on the riparian habitat, during the operational phase, are predicted to be of a **Low Negative Significance**. Mitigation measure focus on restricting the extent of riparian habitat disturbances.

### 1.7.2.4 Potential Impact 7: Impact on the riparian habitat due to the recruitment of alien and invasive species

Disturbed areas will be prone to the requirement of alien and invasive plants. This impact will be exacerbated by the high concentration of alien and invasive taxa present in and adjacent the study area. The proliferation of alien and invasive taxa is a threat to the natural diversity of the system and may in some instances decrease the capacity of the system to provide specific ecosystem services. The impact may extent further than the site and will occur until the riparian area has been rehabilitated.

Mitigation measures inherent to the project design include:

- Limit the extent of riparian disturbance to the absolute minimum.

Key mitigation measures proposed by the specialist include:

- Implement an alien and invasive plant management plan. The plan should include details of monitoring and removing or controlling the recruitment of alien and invasive species within the disturbed areas. Note that alien and invasive plant control will extent further than the footprint boundaries.
Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts on the riparian habitat due to the recruitment of alien and invasive species, during the operational phase, are predicted to be of a **Medium Negative Significance**.

With the effective implementation of the **key mitigation measures** proposed by the specialist, the impacts on the riparian habitat due to the recruitment of alien and invasive species, during the operational phase, are predicted to be of a **Low Negative Significance**. Mitigation measure focus on restricting the extent of riparian habitat disturbances and controlling alien and invasive recruitment.

### 1.7.3 Decommissioning Phase

#### 1.7.3.1 Potential impact 8: Erosion and sedimentation due to re-sloping and reinstating the bank topography

Bank reinstatement during mine closure or incorrect re-sloping of the bank topography me result in long term erosion and downslope sedimentation. It is possible that lateral headcuts may form in areas where the bank topography are not correctly reinstated. Erosion and sedimentation impacts due to incomplete or incorrect reinstatement may of long term.

Mitigation measures inherent to the project design include:

- Re-sloped and reinstated riparian areas should be armoured against surface runoff which me result in erosion and downslope sedimentation.

Key mitigation measures proposed by the specialist include:

- Erosion and sedimentation monitoring will have to occur until the re-sloped and reinstated bank areas have been stabilised.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the impacts associated with erosion and sedimentation due to re-sloping and reinstating the bank topography, during the decommissioning phase, are predicted to be of a **Medium Negative Significance**.

With the effective implementation of the **key mitigation measures** proposed by the specialist, the impacts associated with erosion and sedimentation due to re-sloping and reinstating the bank topography, during the decommissioning phase, are predicted to be of a **Low Negative Significance**. Mitigation measure focus on the correct reinstatement of the bank topography and the management of runoff from the reinstated area.

#### 1.7.3.2 Potential impact 9: Alien and invasive recruitment on reinstated areas

A long term impact may be the establishment of alien and invasive species within riparian areas that have been reinstated after mining. This impact will have a long duration and is very likely to occur.
long term establishment of alien and invasive species will influence the recovery of the riparian ecological integrity and may influence certain functions if the riparian zone (i.e. bank stabilisation, nutrient cycling, migration corridor etc.).

Mitigation measures inherent to the project design include:

- Design the reinstatement to re-establish indigenous flora within the disturbed area on the areas that have been sufficiently re-sloped and scarified to reflect the adjacent banks.

Key mitigation measures proposed by the specialist include:

- Plant indigenous riparian species (including suitable woody and non-woodies) within disturbed area.
- Monitor the establishment and recruitment of plants within the rehabilitated area.
- Monitor and control alien invasive species until the disturbed areas have successfully been recruited by indigenous riparian species.

**Without additional mitigation (i.e. with only the mitigation measures inherent to the project design),** the impacts associated with alien and invasive recruitment on reinstated areas, during the decommissioning phase, are predicted to be of a *Medium Negative Significance*.

With the effective implementation of the **key mitigation measures** proposed by the specialist, the impacts associated with alien and invasive recruitment on reinstated areas, during the decommissioning phase, are predicted to be of a *Low Negative Significance*. Mitigation measure focus managing alien and invasive recruitment during and after decommissioning.

### 1.7.4 Cumulative Impacts

#### 1.7.4.1 Cumulative impact 1: Cumulative loss or change of instream habitat due to additional sand mining activity

A number of sand mining operations exist in close proximity to the proposed operation. The cumulative impacts of these operation mirror the impacts noted in the sections above, although the significance of the cumulative impact, prior to mitigation, are higher. The first cumulative impact discussed here is the loss or transformation of instream habitat due to the existing mining activity and other land uses (sugarcane farming and road infrastructure). Refer to Section 1.7.2.1 for a description of this impact.

Key mitigation measures proposed by the specialist include:

- The cumulative rate of sand mining should not exceed the natural rate of sedimentation within the system.
• Closely monitor the sand extraction volumes and sediment recruitment rates for all sand mines in the reach. The active channel dimensions for the reach should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand.

• Control the annual timing and duration of sand abstraction throughout the system.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the cumulative impacts associated with instream habitat loss and alteration, are predicted to be of a High Negative Significance.

With the effective implementation of the key mitigation measures proposed by the specialist, the cumulative impacts associated with instream habitat loss and alteration are predicted to be of a Low Negative Significance.

1.7.4.2 Cumulative impact 2: Cumulative impact on instream biota due to changes in water quality associated with additional sand mining activity

The ways in which sand mining may impact on the water quality have been discussed in the sections above and are briefly listed here for ease of reference:

• Increase turbidity due to the disturbance of the channel bed during mining operations and due to runoff from disturbed riparian areas.

• Toxic sediment contamination, as anoxic sediment may act as a pollution sink. The contaminants may be suspended and made available during the mining process.

• Hydrocarbon and toxicant contamination from the sand mining equipment. The barge and pump is on the water and may be a source of pollution while the trucks and lifters handing the sand on the banks may also leak or spill hydrocarbons and toxins during operations.

Key mitigation measures proposed by specialist include:

• Prior to sand removal, a thorough review should be undertaken of potentially toxic sediment contaminants in or near the streambed where these types of operations are proposed or where bed sediments may be disturbed (upstream and downstream) by the operation.

• Turbidity levels should be monitored for the entire reach and not just for individual operations.

• Riparian areas should be reinstated through stabilisation and promotion of indigenous vegetation recruitment.

• Runoff from roads and sugarcane field should pass through a vegetated buffer strip prior to entering the active channel.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the cumulative impacts associated with changes in water quality, are predicted to be of a Medium Negative Significance.
With the effective implementation of the key mitigation measures proposed by the specialist, the cumulative impacts associated with changes in water quality are predicted to be of a Low Negative Significance.

1.7.4.3 Cumulative Impact 3: Cumulative loss of fringing/riparian habitat within the Umzimkulu Estuary.

The cumulative loss or degradation of the riparian zone due to movement of heavy equipment on the banks and sand laydown areas will further decrease the ecological integrity of the riparian zone and its associated ecosystem services.

Key mitigation measures proposed by specialist include:

- Regulate the extent of cumulative riparian disturbance through the authorisation process. This will primarily focus on limiting the disturbed areas to the absolute minimum and avoiding encroachment onto the riparian areas due to additional access.
- Provide conditions to include the rehabilitation of disturbed riparian areas during decommissioning.

Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the cumulative loss of fringing/riparian habitat within the Umzimkulu Estuary, are predicted to be of a High Negative Significance.

With the effective implementation of the key mitigation measures proposed by the specialist, the cumulative loss of fringing/riparian habitat within the Umzimkulu Estuary are predicted to be of a Low Negative Significance.

1.7.4.4 Cumulative Impact 4: Cumulative increase in alien and invasive species within the margins of the estuary

The cumulative disturbance of riparian features associated with the Umzimkulu Estuary due to expanding sand mining may further exacerbate the spread and alien and invasive plant species. This impact will be long term, is difficult to control and has a high likelihood of occurrence.

Key mitigation measures proposed by specialist include:

- Local and provincial conservation efforts should include catchment scale alien and invasive plant management plan. Priority area include the riparian zones and floodplain areas.
- Include alien and invasive management conditions within the conditions for regulated activities.
- Involve catchment management agencies and Non-Governmental Organisations in alien and invasive management planning.
- Adhere to the permit requirements.
- Support and collaborate with catchment scale alien and invasive plant management plans.
Without additional mitigation (i.e. with only the mitigation measures inherent to the project design), the cumulative of alien and invasive plants within the riparian zone, are predicted to be of a High Negative Significance.

With the effective implementation of the key mitigation measures proposed by the specialist, the cumulative of alien and invasive plants within the riparian zone are predicted to be of a Medium Negative Significance.

1.8 IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above a collated in Table 1.23 to Table 1.26.
### Table 1-23: Impact assessment summary table for the Construction Phase

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance (Without Mitigation)</th>
<th>Key Management Actions</th>
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<tbody>
<tr>
<td>Impact on the riparian zone.</td>
<td>Negative</td>
<td>Site</td>
<td>Temporary</td>
<td>Moderate</td>
<td>High</td>
<td>Definite</td>
<td>Low to very low</td>
<td>Erosion and Sediment control management plan need to be implemented prior to the onset of pre-construction activity</td>
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<td>Mitigation measures inherent to the project design:</td>
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<td>Low to very low</td>
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<td>• Only clear within permitted area.</td>
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<td>• Protect the exposed banks from erosion and silt from entering the water.</td>
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<tr>
<td>Impact on instream biota due to changes in water quality.</td>
<td>Negative</td>
<td>Local</td>
<td>Temporary</td>
<td>Moderate</td>
<td>Medium</td>
<td>Probable</td>
<td>Low to very low</td>
<td>Maintain construction equipment outside the marginal (riparian area).</td>
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<tr>
<td>Mitigation measures inherent to the project design:</td>
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<td></td>
<td>• Create and implement a hydrocarbon spill prevention plan.</td>
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<tr>
<td>• Only clear within permitted area.</td>
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<td>• Prevent silt from entering the water through the application of silt fences downslope of any disturbed areas (laydown area, sump, etc.).</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Nature Status | Extent | Duration | Reversibility | Intensity | Probability | Significance (Without Mitigation) | Key Management Actions | Significance With Mitigation | Confidence
---|---|---|---|---|---|---|---|---|---

**Impact on instream habitat due to increase sediment associated with loss in riparian cover.**

- Divert Stormwater away from disturbed areas through the application of berms and buffer strips.

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance (Without Mitigation)</th>
<th>Key Management Actions</th>
<th>Significance With Mitigation</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Protect the exposed banks from erosion and silt from entering the water.</td>
<td>Negative</td>
<td>Local</td>
<td>Temporary</td>
<td>Moderate</td>
<td>Low</td>
<td>Definite</td>
<td>Low to very low</td>
<td>Erosion and Sediment control management plan need to be implemented prior to the onset of pre-construction activity</td>
<td>Low to very low</td>
<td>High</td>
</tr>
</tbody>
</table>
### Table 1-24: Impact assessment summary table for the Operational Phase

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance</th>
<th>Key Management Actions</th>
<th>Significance With Mitigation</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on instream habitat due to sediment extraction.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Closely Monitor the sand abstraction volumes and sediment recruitment rates. The active channel dimensions should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand.</td>
<td>Low to very low</td>
<td>Medium</td>
</tr>
<tr>
<td>Mitigation measures inherent to the project design:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Control the annual timing and duration of sand abstraction.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sediment extraction should be limited to the dry season period (March to November).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>• The quantity of sand extracted should not exceed the annual accumulation rate. This will avoid extended impacts on channel morphology and instream habitat. Note that the cumulative volume of sand extraction should not exceed the recruitment rate.</td>
<td>Negative</td>
<td>Local</td>
<td>Medium term</td>
<td>Moderate</td>
<td>High</td>
<td>Definite</td>
<td>Medium</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature</td>
<td>Status</td>
<td>Extent</td>
<td>Duration</td>
<td>Reversibility</td>
<td>Intensity</td>
<td>Probability</td>
<td>Significance</td>
<td>Key Management Actions</td>
<td>Significance With Mitigation</td>
<td>Confidence</td>
</tr>
<tr>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td>----------</td>
<td>--------------</td>
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<td>-------------</td>
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<td>------------</td>
</tr>
<tr>
<td>Impact on water quality due to sediment extraction and due to runoff from sediment handling area within the riparian area. Water quality may also be affected by hydrocarbon contamination from the maintenance (including refueling) of the barge and sand handling equipment on the banks.</td>
<td>Negative</td>
<td>Local</td>
<td>Medium term</td>
<td>Low</td>
<td>High</td>
<td>Highly probable</td>
<td>Medium</td>
<td>Design and implement erosion sediment control management plan.</td>
<td>Low to very low</td>
<td>Medium</td>
</tr>
</tbody>
</table>

**Mitigation measures inherent to the project design:**

- Storm water design should limit any uncontrolled runoff through disturbed areas on the bank.
- All areas downslope of disturbed areas should be sufficiently protected against erosion and sedimentation.
### Impact on riparian habitat due to continual disturbances within sediment laydown area during operations.

**Mitigation measures inherent to the project design:**
- Strictly operate within permitted area.

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance</th>
<th>Key Management Actions</th>
<th>Significance With Mitigation</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on riparian habitat due to continual disturbances within sediment laydown area during operations.</td>
<td>Negative</td>
<td>Site</td>
<td>Medium term</td>
<td>Moderate</td>
<td>High</td>
<td>Definite</td>
<td>Low to very low</td>
<td>• Control the area within which construction equipment are allowed to operate.</td>
<td>Low to very low</td>
<td>High</td>
</tr>
</tbody>
</table>

### Impact on the riparian habitat due to the recruitment of alien and invasive species.

**Mitigation measures inherent to the project design:**
- Limit the extent of riparian disturbance to the absolute minimum.

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance</th>
<th>Key Management Actions</th>
<th>Significance With Mitigation</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on the riparian habitat due to the recruitment of alien and invasive species.</td>
<td>Negative</td>
<td>Local</td>
<td>Long term</td>
<td>High</td>
<td>High</td>
<td>Definite</td>
<td>Medium</td>
<td>• Implement an alien and invasive plant management plan. The plan should include details of monitoring and removing or controlling the recruitment of alien and invasive species within the disturbed areas. Note that alien and invasive plant control will extend further than the footprint boundaries.</td>
<td>Low to very low</td>
<td>High</td>
</tr>
</tbody>
</table>
### Table 1-25: Impact assessment summary table for the Decommissioning Phase

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance</th>
<th>Key Management Actions</th>
<th>Significance With Mitigation</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion and sedimentation due to sloping and reinstating the bank topography</td>
<td>Negative</td>
<td>Site</td>
<td>Long term</td>
<td>High</td>
<td>Low</td>
<td>Highly probable</td>
<td>Medium</td>
<td>• Erosion and sedimentation monitoring will have to occur until the sloped and reinstated bank areas have been stabilised.</td>
<td>Low to very low</td>
<td>High</td>
</tr>
<tr>
<td>Mitigation measures inherent to the project design:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Resloped and reinstated riparian areas should be armoured against surface runoff which may result in erosion and downslope sedimentation.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance</th>
<th>Key Management Actions</th>
<th>Significance With Mitigation</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alien and invasive recruitment on reinstated areas.</td>
<td>Negative</td>
<td>Local</td>
<td>Long term</td>
<td>Moderate</td>
<td>Medium</td>
<td>Definite</td>
<td>Medium</td>
<td>• Plant indigenous riparian species (including suitable woody and non-woodies) within disturbed area. • Monitor the establishment and recruitment of plants within the rehabilitated area. • Monitor and control alien invasive species until the disturbed areas have successfully been recruited by indigenous riparian species.</td>
<td>Low to very low</td>
<td>High</td>
</tr>
</tbody>
</table>

Mitigation measures inherent to the project design:
• Reinstatement will require re-establishing indigenous flora within the disturbed area on the areas that have been sufficiently re-sloped and scarified to reflect the adjacent banks.
Table 1-26: Impact assessment summary table for the Cumulative Impacts

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance</th>
<th>Key Management Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative loss or change of instream habitat due to additional sand mining activity.</td>
<td>Negative</td>
<td>Local</td>
<td>Long term</td>
<td>Moderate</td>
<td>High</td>
<td>Highly probable</td>
<td>High</td>
<td>• Closely monitor the sand extraction volumes and sediment recruitment rates for all sand mines in the reach. The active channel dimensions for the reach should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand.</td>
</tr>
<tr>
<td>Mitigation measures inherent to the project design:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Control the annual timing and duration of sand abstraction throughout the system.</td>
</tr>
<tr>
<td>• The cumulative rate of sand mining should not exceed the natural rate of sedimentation within the system.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Significance With Mitigation: Low to very low

Confidence: Medium
### Key Management Actions

- Riparian areas should be reinstated through stabilisation and promotion of indigenous vegetation recruitment.
- Runoff from roads and sugarcane field should pass through a vegetated buffer strip prior to entering the active channel.

### Mitigation Measures inherent to the project design:

- Management of runoff from disturbed riparian areas associated with existing mining activities, sugar cane farming, and road infrastructure.

- Riparian areas should be reinstated through stabilisation and promotion of indigenous vegetation recruitment.
- Runoff from roads and sugarcane field should pass through a vegetated buffer strip prior to entering the active channel.
### Nature
- Cumulative loss of fringing/riparian habitat within the UMzimkulu estuary.

**Mitigation measures inherent to the project design:**
- Regulate the extent of cumulative riparian disturbance through the authorisation process.
- Provide conditions to include the rehabilitation of disturbed riparian areas during decommissioning.

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance</th>
<th>Key Management Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative loss of fringing/riparian habitat within the UMzimkulu estuary.</td>
<td>Negative</td>
<td>Local</td>
<td>Long term</td>
<td>Moderate</td>
<td>High</td>
<td>Highly probable</td>
<td>High</td>
<td>• Adhere to the permit requirements.</td>
</tr>
</tbody>
</table>

**Significance With Mitigation:** Low to very low

**Confidence:** High

---

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Cumulative increase in alien and invasive species within the margins of the estuary.

**Mitigation measures inherent to the project design:**
- Catchment scale alien and invasive plant management plan should be implemented. Priority area include the riparian zones and floodplain areas.
- Include alien and invasive management conditions within the conditions for regulated activities.
- Involve catchment management agencies and Non-Governmental Organisations in alien and invasive management planning.

<table>
<thead>
<tr>
<th>Nature</th>
<th>Status</th>
<th>Extent</th>
<th>Duration</th>
<th>Reversibility</th>
<th>Intensity</th>
<th>Probability</th>
<th>Significance</th>
<th>Key Management Actions</th>
<th>Significance With Mitigation</th>
<th>Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative increase in alien and invasive species within the margins of the estuary.</td>
<td>Negative</td>
<td>Local</td>
<td>Long term</td>
<td>Low</td>
<td>High</td>
<td>Definite</td>
<td>High</td>
<td>• Adhere to the permit requirements. • Support and collaborate with catchment scale alien and invasive plant management plans.</td>
<td>Medium</td>
<td>Medium</td>
</tr>
</tbody>
</table>

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Aquatic Ecology Assessment, pg 1-60
1.9 CONCLUSION AND RECOMMENDATION

The proposed sand mining will take place within the upper reaches of the Umzimkulu Estuary. The aquatic macroinvertebrate and fish communities are consistent with reference conditions, while the diatom communities suggest some Moderate water quality impact on the system. The overall instream ecological integrity of the system is inferred as Largely Natural, but with a small loss in ecological integrity observed. The in situ water quality associated with the Estuary is considered good.

However, the riparian zone and floodplain areas reflect a large digression from reference conditions and falls into a Largely Modified state. The loss of ecological integrity within the riparian zone may be attributed to the physical disturbances within this zone and the subsequent influx of alien and invasive species.

According to the NWA (Act 36 of 1998), an estuary is regarded as a water resource and is defined, inter alia as part of the watercourse (NEM: ICM - Act No. 36 of 2014). Therefore, the proposed activities are regulated and will require authorisation as per the environmental impact regulation (2017) under NEMA (1998) and the NWA (Act 36 of 1998).

In addition to the inherent mitigation measures that form part of the project design, the key mitigation measures that have been proposed by the specialist and have been carried over into the EMP include:

Construction Phase:

- Limit the extent of additional disturbance within the riparian zone.
- Erosion and sediment control management should be implemented prior to the onset of any construction activity.
- Create and implement a hydrocarbon/toxicant spill management plan.
- Maintain construction equipment outside of the delineated riparian area.
- Prevent silt from entering the active channel through the application of silt fences and vegetated buffer strips downslope of disturbed areas.

Operational Phase:

- Monitor the volume of sand extraction and sand recruitment. Annual sand recruitments should not be less than the extraction rate. For this reason, mining should not occur during the wet season (December to March).
- The active channel dimensions (associated with the mining area) should be monitored annually after the wet season and prior to the onset of mining. Sand extraction should not result in a prolonged change in channel dimensions (slope and width).
- Erosion and sediment control should remain in place for the duration of operations. The efficacy of erosion and silt management measures should be monitored on a frequent basis.
- In situ, water quality (including turbidity) should be monitored monthly during periods of extraction. Constituents should not vary more than 15% between the upstream control site and the downstream site.
• The spill prevention and management plan created for the construction phase should also be implemented during the operational phase.
• Where possible vegetated buffer strips should remain intact and all runoff from disturbed areas should be controlled accordingly.
• An alien and invasive plant management plan should be implemented.

Decommissioning Phase:
• Maintain erosion and sediment control during reinstatement of the banks and channel.
• Establish an indigenous riparian plant community and manage alien and invasive species in accordance with an approved management plan.

Cumulative impacts:
• Regulate sand extraction volumes in relation to sand recruitments volumes.
• Regulate water pollution through increased turbidity, uncontrolled runoff, suspension of toxic sediment and contamination through spills and leaks from mining machinery through the licensing process.
• Regulate the extent of destruction of riparian and floodplain features through strict limitation within the licensing conditions. An important requirement is to leave vegetated buffer strips between sand laydown areas and the active channel. Patches of undisturbed riparian vegetation should be left intact between disturbed areas.
• A catchment scale alien and invasive management plan should be created by the provincial or local conservation authority. Such a plan may be in collaboration with a local catchment management agency, and specific requirements for the plan be regulated through the licensing requirements for regulated activity that may pose threat in this regard.

It is imperative that an effective management plan is implemented to ensure that all mitigation measures discussed in the report are adhered to. The project proposal will be permissible if all the conditions, mitigation measures and environmental impact regulations are implemented.
1.10 REFERENCES


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Aquatic Ecology Assessment, pg 1-63
Kotze, P. J. (2002). The ecological integrity of the Klip River (Gauteng). University of Johannesburg.


McMillan, P. H. (1998). An integrated habitat assessment system (IHAS v2) for the rapid biological assessment of rivers and streams. A CSIR research project. Number ENV-P-1 98132 for the water resources management programme. CSIR.


### 1.11 APPENDIX – ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

<table>
<thead>
<tr>
<th>Management objective/Target</th>
<th>Management action</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Methodology</td>
</tr>
<tr>
<td><strong>1) Construction Phase:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1) Potential Impact 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevent erosion and</td>
<td>Erosion and Sediment control management plan need to be implemented prior to the onset of pre-construction activity</td>
<td>Environmental control officer to inspect erosion control measures (silt fences, buffer strips)</td>
</tr>
<tr>
<td>sedimentation from</td>
<td></td>
<td></td>
</tr>
<tr>
<td>occurring</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2) Potential Impact 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevent water contamination</td>
<td>Maintain construction equipment outside the marginal (riparian area). Create and implement a hydrocarbon spill prevention plan. Prevent silt from entering the watercourse through the application of silt fences downslope of any disturbed areas (laydown area, sump, etc.).</td>
<td>Visual inspections during. <em>In situ</em> water quality (including turbidity) upstream and downstream of disturbed areas</td>
</tr>
<tr>
<td>through uncontrolled runoff</td>
<td></td>
<td></td>
</tr>
<tr>
<td>and spills from machinery</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3) Potential Impact 3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>See impact 1.1</td>
<td>See impact 1.1</td>
<td>See impact 1.1</td>
</tr>
</tbody>
</table>

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Aquatic Ecology Assessment, pg 1-1
<table>
<thead>
<tr>
<th>Management objective/Target</th>
<th>Management action</th>
<th>Monitoring Methodology</th>
<th>Frequency</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2) Operational Phase:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.1) Potential Impact 4</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain instream habitat</td>
<td>Closely Monitor the sand abstraction volumes and sediment recruitment rates. The active channel dimensions should remain relatively unchanged as annual wet season sediment recruitment should replace the mined sand. Control the annual timing and duration of sand abstraction.</td>
<td>Measure average channel bed slope over the sand extraction area with a dumpy level or total station. Measure the average channel width.</td>
<td>Annually prior to the onset of the seasonal mining activity.</td>
<td>ECO and Construction Manager. The channel measurements should be completed by a competent surveyor.</td>
</tr>
<tr>
<td><strong>2.2) Potential Impact 5</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintain instream water quality</td>
<td>Design and implement erosion sediment control management plan. Monitor silt fences and erosion control measures (berms and vegetated buffer strips for efficacy and repair or augment insufficient measures. Monitor in situ water quality (including turbidity) upstream and downstream during abstraction activity. Downstream readings should not vary more than with that of upstream measurements 15% for any duration. Maintain construction equipment outside See impact 1.1. Visual inspection. Use multiparameter calibrated water quality meter and in situ turbidity meter to take instream measurements weekly during sand extraction. Reading should be taken</td>
<td></td>
<td></td>
<td>ECO and Construction Manager. Visual inspection should be completed weekly during operations. In situ water quality measurements should be taken weekly during extraction activity.</td>
</tr>
<tr>
<td>Management objective/Target</td>
<td>Management action</td>
<td>Monitoring</td>
<td></td>
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<td>----------------------------</td>
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<tr>
<td>the marginal (riparian area). Where this is not possible (for instance refuelling the barge) contamination of surface water with hydrocarbons should be prevented through spill prevention and management measures. These measures should be part of the hydrocarbon spill prevention and spill management plan.</td>
<td>immediately upslope and downslope (no more than 250m) of extraction activity. Visual inspection and control of machine maintenance and barge refuelling.</td>
<td>Visual inspection and control of machine maintenance should take place continually during operations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Create and implement a hydrocarbon spill prevention plan.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### 2.3) Potential Impact 6

**Protect riparian habitat**

- Control the area within which construction equipment are allowed to operate.

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Frequency</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual inspection and control of area where machines are allowed to operate.</td>
<td>continuously or on an ad hoc basis during operations</td>
<td>ECO and Construction Manager.</td>
</tr>
</tbody>
</table>

### 2.4) Potential Impact 7

**Control alien and invasive species within the riparian zone**

- Implement an alien and invasive plant management plan. The plan should include details of monitoring and removing or controlling the recruitment of alien and invasive species within the disturbed areas. Note that alien and invasive plant control

<table>
<thead>
<tr>
<th>Methodology</th>
<th>Frequency</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanically remove alien and invasive species. One or two technicians should be trained in identifying the alien and invasive</td>
<td>Quarterly monitoring and removal of alien and invasive species</td>
<td>ECO and Construction Manager.</td>
</tr>
<tr>
<td>Management objective/Target</td>
<td>Management action</td>
<td>Monitoring</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------</td>
<td>------------</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Methodology</td>
</tr>
<tr>
<td></td>
<td>will extent further than the footprint boundaries.</td>
<td>species by a suitably qualified specialist.</td>
</tr>
</tbody>
</table>

### 3) Decommissioning Phase:

#### 3.1) Potential Impact 8

**Erosion and sediment control**

- Erosion and sedimentation monitoring will have to occur until the re-sloped and reinstated bank areas have been stabilised.
- See impact 1.1
- Monthly during the wet season until banks have been stabilised
- ECO and Construction Manager.

#### 3.2) Potential Impact 9

- **Reinstate riparian banks and control alien and invasive species.**
- Plant indigenous riparian species (including suitable woody and non-woodies) within disturbed area.
- Monitor the establishment and recruitment of plants within the rehabilitated area.
- Monitor and control alien invasive species until the disturbed areas have successfully been recruited by indigenous riparian species.
- Re-slope, replace topsoil, scarify and broadcast an herbaceous indigenous seed mix. Manually plant a woody mix or as recommended by a suitably qualified specialist.
- Visual inspection of recruitment success and removal of alien and invasive control (see 2.4
- Visual inspection of recruitment success should occur quarterly.
- Alien and invasive control should occur quarterly until the recruitment of indigenous riparian species are successful.
- A vegetation specialist should inspect the success of riparian vegetation rehabilitation.
- Alien and invasive control can be carried out by the ECO.
## Management objective/Target

<table>
<thead>
<tr>
<th>Management objective/Target</th>
<th>Management action</th>
<th>Monitoring</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>4) Cumulative impacts</td>
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<td>Avoid cumulative change or</td>
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<td>Monitor the</td>
<td>ECO and</td>
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<td>change in instream habitat</td>
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<td>volume of</td>
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<td>regarding the</td>
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<td>volume and timing</td>
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<td>of sand extraction</td>
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<td>4.2) Cumulative Impact 2</td>
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<td>Avoid cumulative impact on</td>
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<td>ECO and</td>
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<td>Construction</td>
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<td>4.4) Cumulative Impact 3</td>
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<td>Control alien and invasive</td>
<td>See 2.4</td>
<td>See 2.4</td>
<td>ECO and</td>
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<tr>
<td>species on the margins</td>
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<td>Construction</td>
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<td>(riparian zone of</td>
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## Management objective/Target

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</table>
1.12 APPENDIX – CURRICULUM VITAE

Michiel Jonker

<table>
<thead>
<tr>
<th>Name:</th>
<th>Michiel Jonker</th>
<th>Marital status:</th>
<th>Married</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of birth:</td>
<td>25/05/1984</td>
<td>Driver's license:</td>
<td>Code 8</td>
</tr>
<tr>
<td>ID No.:</td>
<td>840525 5110 085</td>
<td>Contact No:</td>
<td>084 585 7479</td>
</tr>
<tr>
<td>Place of birth:</td>
<td>Johannesburg, South Africa</td>
<td>Email:</td>
<td><a href="mailto:michiel@ecotone-sa.co.za">michiel@ecotone-sa.co.za</a></td>
</tr>
<tr>
<td>Postal address:</td>
<td>PO Box 84 Florida, Johannesburg, South Africa, 1710</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experience:</td>
<td>10 Years</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Education

University of Johannesburg

2011 M.Sc (Environmental Management)
This is a lectured Masters degree focussing on the concepts and principles of environmental management. The MSc. includes three modules: (1) Environmental management, biosphere and the environment. (2) Environmental management skills and (3) A mini dissertation in related field works.

2009 M.Sc (Aquatic Health) cum laude
This Masters study has an ecotoxicological basis. It deals with the effects of androgenic and estrogenic growth-promoting hormones, used in cattle feeding lots, on aquatic freshwater ecosystems. It aims to incorporate biomarkers in fish (metabolomics and cellular energy allocation) as well as studies of general water quality, sediment composition and invertebrate community structures.

2006 B.Sc Honours (Zoology) cum laude
**Related course work:** Laboratory and field skills, Philosophy and research methodology, population genetics, project management, mammal diversity, eco-physiology, parasite ecology, ichthyology, research project, biological systems integrity, terrestrial ecology, nature conservation.

2005 B.Sc (Natural and Environmental Sciences)
Majors: Geography and Zoology
Minors: Environmental management, botany, chemistry, environmental chemistry, biogeochemistry, statistics, information science
**Related course work:** Cartography, biogeography, soil science, climatology and geomorphology, economic and urban geography, GIS, Geography of Africa and South Africa, invertebrate and vertebrate diversity, parasitology, ecotoxicology, terrestrial ecology and limnology, animal physiology, economic and ethno-botany, plant diversity, plant-water relations, organic and physical chemistry.
Employment and Work Experience

Feb ’08 – Pres Ecotone Freshwater Consultants CC
Member and Freshwater Ecologist

Recent projects:


- **Imperata / AHTech** Aquatic assessment of the Moreletaspruit associated with the Menlyn diesel spill (October 2016).

- **ERM** Environmental Flow assessment, Yiben Dam Project, Sierra Leone (July 2016).

- **SMD / EIMS** aquatic ecology and impact assessment - Scoping and EIA/EMP Report for the proposed expansion of the Kao Diamond Mine, Lesotho (May 2016).

- **Vaalbult Colliery** aquatic specialist assessment, proposed road crossing, Carolina, Mpumalanga (February 2016 – Present).

- **EkolInfo** aquatic biomonitoring plan and implementation for the Elands River associated with the Maseve mining operations near Sun City, in the North-West Province, (January 2016- present).


- **Delta Mining** wetland assessment and watercourse management plan for mining operations associated with the Proposed Rietkuil operations. Rietkuil, Delmas, Mpumalanga (February 2016).

- **SLR Consulting** - Biodiversity assessment, management and biomonitoring plan for the proposed expansion of the Hoffontein Toxic Waste Disposal Facility, Gauteng (January 2016).

- **Envirolutions (Eskom)** Pre-, during- and post construction biomonitoring for pylon constructions crossing smaller tributaries of the Vaal River, Vereeniging, Gauteng (January 2015- present).

- **WPC Ngonye Falls- 52 MW Hydroelectric Power Plant**. Baseline biodiversity study and Environmental Flow Assessment, Zambia (October 2015 to present).

- **Ara-sul** Aquatic baseline assessment of the Sabie River, up- and downstream of Corumana Dam, Kruger National Park and Mozambique (November 2015 to January 2016).

- **EcoGain** Wetland and Impact assessment associated with the proposed Opencast Mining Operation, Delmas (October 2015 to present).

- **Envirolutions** Water Quality Assessment, Broadacres Retirement Village, Broadacres Gauteng Province (November 2015).


- **Hydrological Alteration-Aquatic Ecology Assessment** - **New Largo** (July 2010 - Present).

- **Goliath Gold** Aquatic and impact assessment associated with the proposed de-water of a mine shaft, Heidelberg, Gauteng (January – May 2015).


- **Dyambyini / ESKOM - Majuba Power Station**, Wetland Specialist Assessment (December - January 2015).

- **Doogvallei Rail Siding Company (Pty) Ltd**, Aquatic Biomonitoring Assessment of associated drainage lines, Carolina Mpumalanga (September 2012 – January 2015).

- **Pembani Coal**: Aquatic Biomonitoring Assessment, Carolina (March 2012 –January 2015).

- **Kumba Iron Ore**, Wetland and River study for WULa, Thabazimbi, Limpopo (December 2014).

- **FFMES, Cominco Phosphate Mine**, Hinda Project Freshwater Baseline Study and critical habitat assessment, Republic of Congo (March to August 2014).

- **Lidwala, Majuba Wetland Rehabilitation Proposal, Wetland Specialist Assessment** (March-July 2014).

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Aquatic Ecology Assessment, pg 1-2
<table>
<thead>
<tr>
<th>Organization/Project</th>
<th>Description</th>
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<tbody>
<tr>
<td>Imperata, NKP Terminal 2</td>
<td>Wetland Monitoring Assessment (June – July 2014).</td>
</tr>
<tr>
<td>Jeffars and Green</td>
<td>Thabong Interchange, Wetland Rehabilitation Plan (June 2014).</td>
</tr>
<tr>
<td>Envirobility</td>
<td>Sand Quarry, Diepsloot, Wetland Specialist Assessment (March 2014 – May 2014).</td>
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<tr>
<td>WSP, Kathu CSP Project</td>
<td>Northern Cape, Wetland Specialist Assessment (January 2014 – April 2014).</td>
</tr>
<tr>
<td>ERM, Mulungushydropower Project</td>
<td>Aquatic Specialist (February, 2013).</td>
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<tr>
<td>ERM, Muchinga Hydropower Stations</td>
<td>Aquatic Specialist, Zambia (April, 2013).</td>
</tr>
<tr>
<td>FFMES, Exxaro DMC Iron Congo Project</td>
<td>Aquatic specialist study, Mayoko, Republic of Congo (September 2012).</td>
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<tr>
<td>GladAfrica</td>
<td>Centurion Lake Sediment Trap, Aquatic Specialist Study, Gauteng, South Africa (November, 2012).</td>
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<tr>
<td>MSA, Meyerton Waste Water Treatment Works Upgrade</td>
<td>Aquatic Specialist Study, Gauteng, South Africa (November 2012).</td>
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<td>ESKOM, Majuba Ash Disposal Facility</td>
<td>Wetland Specialist Study for the Scoping/EIA, Mpumalanga, South Africa (September, 2012).</td>
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<td>ESKOM, Tutuka Ash Disposal Facility</td>
<td>Wetland Specialist Study for the EIA, Mpumalanga, South Africa (September, 2012).</td>
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<td>FFMES, Sintoukola Project</td>
<td>Aquatic specialist study, Republic of Congo (May 2012; July 2012).</td>
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<tr>
<td>Coffey Environments, Tete Iron Project</td>
<td>Aquatic specialist study of the Revuboe River, Chiuta and Moatize districts, Tete, Mozambique (March 2012).</td>
</tr>
<tr>
<td>Shanduka Coal</td>
<td>wetland and impact assessment for a proposed 400kV line relocation, Middleburg, Mpumalanga (April, 2012).</td>
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<tr>
<td>Homeland Mining and Energy SA</td>
<td>proposed Eloff Opencast Mine, specialist wetland assessment (± 1400 ha) just outside the town of Delmas, Mpumalanga (February, 2012).</td>
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<tr>
<td>Shanduka Coal</td>
<td>wetland and impact assessment of a pan located in the Graspan Colliery, Middleburg, Mpumalanga (January, 2012).</td>
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<tr>
<td>Moamba Dam Project, Moamba, Mozambique</td>
<td>Aquatic Consultant- Impacto: Aquatic ecology assessment for proposed (July, 2011).</td>
</tr>
<tr>
<td>Fresh water Ecology</td>
<td>scoping study-Hendrina-Mpumalanga (May 2011)</td>
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<tr>
<td>Aquatic Biomonitoring Assessment-Blesbokspruit- Hydro Testing</td>
<td>(May 2011)</td>
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<td>Aquatic Consultant- Lidwala environmental and engineering consultants: Sanral N14 river/stream crossing aquatic assessment (May 2011).</td>
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<tr>
<td>Aquatic Consultant- Randwater: Proposed water and treated water residue pipeline near Lethabo power station in Vereeniging (May 2011).</td>
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<tr>
<td>Aquatic Consultant- Anglo Coal: Assessment on non-perennial drainage lines associated with proposed coal mining development near All days in Limpopo (May, 2011).</td>
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<tr>
<td>Hydro Testing Biomonitoring(KP290+100) KwaZulu-Natal- Aquatic Ecology Assessment</td>
<td>(February 2011)</td>
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<td>Aquatic Consultant- Riversdale: Aquatic specialists on the Benga Coal Project, Tete, Mozambique (January, 2011).</td>
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<tr>
<td>Aquatic Consultant – Imperata – Aquatic assessment for a proposed Rand Water pipeline crossing over the Pienaars River near Pretoria (May, 2010).</td>
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<tr>
<td>Aquatic Consultant – EkoInfo – Aquatic assessment for a NuCoal mine (Vuna colliery) near Middelburg Mpumalanga (March 2010- Current)</td>
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<tr>
<td>Aquatic Consultant – EcoAgent- A MSA project – Detailed Aquatic assessment for the propped Veremo Magnetite mine in the Eastern Bushveld near Stofberg Mpumalanga (May 2010)</td>
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Aquatic Ecology Assessment, pg 1-3
Aquatic Consultant – New Multi-Purpose Pipeline (NMPP) a combined Transnet, Group Five and Spiecapag project – Aquatic assessment and monitoring of associated river crossings in the Upper Vaal, Thukela and Mvoti Water Management Areas (October 2009-Current).


Aquatic Consultant – Ekoinfo – Klipriviersberg Full Aquatic assessment (January, 2009)


Aquatic Consultant – NSS – Optimum Coal Fish diversity assessment (March 2009)


Aquatic Consultant – Lonmin Aquatic biodiversity assessment and action plan (January, 2009).

Aquatic Consultant – SASOL – aquatic ecosystem impact assessment for proposed pipeline development (January 2009).

Aquatic Consultant – Arcus Gibb – Aquatic biodiversity assessment for proposed coal Eskom Mulilo coal mining development (December 2008).

Aquatic Consultant – ESKOM - Biomonitoring for proposed Majuba railroad construction for Eskom (October 2008-current).

Feb 07 – Jan 08 EnviRoss Environmental Scientific Consultants Cc Consultant

Junior Scientist – Enviross cc - Aquatic macro-invertebrate biodiversity study for proposed feedlot Mpumalanga 2007. (November 2007)

Junior Scientist – Enviross cc - Tshwane sewerage works bio-monitoring, (September 2007).

Junior Scientist – Econ@uj - Ecological state of five estuaries in the Wild coast for proposed heavy mineral mining (October 2007).

Aquatic Consultant – Ekoinfo - Aquatic ecological assessment for proposed golf course development in North West province for Sun City (August 2007).


Junior Scientist – Econ@uj - Aquatic health determination and eco-classification for TOTAL coal in 2006 (May 2006).

Junior Scientist – Econ@uj - Aquatic health and fish diversity assessment at Klipplaat nature reserve, 2006 (September 2006).

Technical Assistant - University of Johannesburg Zoology department - Aquatic health and biodiversity of the Crocodile West Marico and Magaliesburg system, 2007 (February 2007).

Technical Assistant – Enviross cc - Owl surveys (March 2007).

Project Manager - University of Johannesburg Zoology department - Aquatic health and biodiversity of lake Chrissie in Mpumalanga, 2007 (April 2007)

Technical Assistant - University of Johannesburg Zoology department - PhD study regarding effects of pesticides on the freshwater aquatic health in the Levubu River in Venda (Limpopo Province) (February 2008)

Researcher - University of Johannesburg Zoology department - Presented poster at Zoological Society South Africa (ZSSA) in July 2007: Abiotic factors influencing invertebrate community structures in pan and dams in the Mpumalanga Highveld area (June 2007)
Workshops and Courses

2011  **Tools for Wetland Assessment Short Course**  
Department of Environmental Science Rhodes University; Grahamstown Port Elizabeth

ISO 14001, OHSAS 18001 and development of Environmental Management Systems, University of Johannesburg, Auckland Park, Johannesburg

2008  **Wetland and Riparian Delineation Course**  
Accredited wetland delineator  
Wetland Consulting Services and Department of Water Affairs and Forestry (DWAF) Pretoria, South Africa.

2008  **Skippers Course**  
License Holder of a Category “R” skippers license

2007  **SASS5 Accredited Practitioner**  
Auditors: Christa Thirion (DWAF, RQS), Colleen Todd (DWAF, RQS) and Hermien Roux (North West Nature Conservation).

2007  **Multivariate Statistics Training**  
Collaboration between Wageningen University (Holland) and University of Johannesburg, UJ Eiland, Vaal Dam

2006  **Advanced 4x4 driving course**

Societies and Accreditations

2009  **The South African Council for Natural Scientific Professions (SACNASP)**  
Professional Natural Scientist  
Pr. Sci. Nat. (Aquatic Health, Zoological & Ecological Sciences)  
Registration number: 400275/12

2009  **Member of the International Association of Impact Assessment-SA (IAIA SA).**

2006  **Member of the Zoological Society of Southern Africa (ZSSA)**

2006  **Member of the Southern African Society of Aquatic Scientists (SASaqS)**

Presentations

Jun 2010  **South African Society of Aquatic Scientists (SASaqS) Congress**  
MN Jonker, G. Walsh & JHJ van Vuren

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Aquatic Ecology Assessment, pg 1-5
Creating Management Thresholds for Fish Communities Exposed to the Effects of Coal Mining in the Mpumalanga Highveld.

Oct 2009 Department of Geography and Energy studies, University of Johannesburg
*Historical overview of water quality associated with the Blesbokspruit RAMSAR site.* Syndicate project completed in partial fulfilment of M.Sc (Environmental Management).

MN Jonker
*Differences in invertebrate community structures associated with pans and dams in the Mpumalanga Highveld, South Africa.*

Publications


I, Michiel Jonker, do hereby declare that all the information furnished above is true to the best of my knowledge.

Michiel Jonker
MSc (Aquatic Health) UJ
MSc (Environmental Management) UJ
Pr. Sci. Nat.
Freshwater Ecologist
M +27 84 585 7479
T +27 11 672 1375
F 088 011 672 1375
michiel@ecotone-sa.co.za
www.ecotone-sa.co.za
HERITAGE IMPACT ASSESSMENT FOR A PROPOSED SAND MINE ALONG THE UMZIMKHULU RIVER, PORT SHEPSTONE, PORT SHEPSTONE MAGISTERIAL DISTRICT, KWAZULU-NATAL

Required under Section 38 (8) of the National Heritage Resources Act (No. 25 of 1999).

Report for:

CSIR – Environmental Management Services
P.O. Box 320, Stellenbosch, 7599
Tel: 021 888 2432
Email: BMqokeli@csir.co.za

On behalf of:

Ms Singh

Dr Jayson Orton
ASHA Consulting (Pty) Ltd
40 Brassie Street, Lakeside, 7945
Tel: (021) 788 8425 | 083 272 3225
Email: jayson@asha-consulting.co.za

Jaco van der Walt
Heritage Contracts & Archaeological Consulting
37 Olienhout Street, Modimolle, 0510
Tel: 082 373 8491
Email: jaco.heritage@gmail.com

24 June 2017
Specialist declaration

I, Jayson Orton, as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- I act as the independent specialist in this application;
- I 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 regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations 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 vested interest in the proposed activity proceeding;
- 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;
- I have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- I have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Name of Specialist: Dr Jayson Orton

Signature of the specialist: _______________________________

Date: 23 June 2017
EXECUTIVE SUMMARY

ASHA Consulting (Pty) Ltd was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of a 5 ha sand mine on Farm Seafield 17474/Remainder and Ambleside 2624/Remainder in Kwa-Zulu-Natal (S30° 43’ 07” E30° 25’ 57’’). It is proposed to mine sand from the Umzimkulu River bed and process it on the river bank.

Because of the proposed location of the mining (i.e. within an active river bed) and the very small area proposed for processing-related activities, no field study was carried out for this project. A desktop palaeontological study was commissioned and its findings included in the heritage impact assessment. The desktop studies revealed that the likelihood of encountering significant heritage resources in the study area is extremely low, while the cultural landscape would suffer a negligible impact.

The potential impacts to heritage resources are deemed to be of very low significance. No mitigation or monitoring are required.

Because no significant impacts to heritage resources are expected, it is recommended that the proposed sand mine should be authorised but subject to the following condition which should be incorporated into the Environmental Authorisation:

- If any archaeological material, palaeontological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.
Glossary

Early Iron Age: Period of the Iron Age dating approximately between AD 200-900.

Early Stone Age: Period of the Stone Age extending approximately between 2 million and 200 000 years ago.

Later Stone Age: Period of the Stone Age extending over the last approximately 20 000 years.

Middle Iron Age: Period of the Iron Age dating approximately between AD 900-1300.

Middle Stone Age: Period of the Stone Age extending approximately between 200 000 and 20 000 years ago.

Late Iron Age: Period of the Iron Age dating approximately between AD 1300-1840.

Sub-fossil: An item that has not become fully mineralised (fossilised) either because of poor mineralisation conditions or because the time since the plant or animal died is not sufficient to have allowed the mineralisation process to be completed.

Abbreviations

APHP: Association of Professional Heritage Practitioners

ASAPA: Association of Southern African Professional Archaeologists

BAR: Basic Assessment Report

CSIR: Council for Scientific and Industrial Research

CRM: Cultural Resources Management

DMR: Department of Mineral Resources

EAP: environmental assessment practitioner

EIA: Early Iron Age

ESA: Early Stone Age

HIA: Heritage Impact Assessment

KZN: KwaZulu-Natal

LIA: Late Iron Age

LSA: Later Stone Age

MSA: Middle Stone Age

NEMA: National Environmental Management Act (No. 107 of 1998)

NHRA: National Heritage Resources Act (No. 25) of 1999

NID: Notification of Intent to Develop

PPP: Public Participation Process

SAHRA: South African Heritage Resources Agency

SAHRIS: South African Heritage Resources Information System
Compliance with Appendix 6 of the 2017 EIA Regulations

<table>
<thead>
<tr>
<th>Requirements of Appendix 6 – GN R326 (7 April 2017)</th>
<th>Addressed in the Specialist Report</th>
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</thead>
<tbody>
<tr>
<td>1. (1) A specialist report prepared in terms of these Regulations must contain</td>
<td></td>
</tr>
<tr>
<td>a) details of-</td>
<td></td>
</tr>
<tr>
<td>i. the specialist who prepared the report; and</td>
<td>Section 1.4 Appendix 1</td>
</tr>
<tr>
<td>ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;</td>
<td></td>
</tr>
<tr>
<td>b) a declaration that the specialist is independent in a form as may be specified by the competent authority;</td>
<td>Page ii</td>
</tr>
<tr>
<td>c) an indication of the scope of, and the purpose for which, the report was prepared;</td>
<td>Section 1.3</td>
</tr>
<tr>
<td>(cA) an indication of the quality and age of base data used for the specialist report;</td>
<td>Section 3</td>
</tr>
<tr>
<td>(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;</td>
<td>Sections 5 &amp; 6</td>
</tr>
<tr>
<td>d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;</td>
<td>n/a (see Section 3.2)</td>
</tr>
<tr>
<td>e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;</td>
<td>Section 3</td>
</tr>
<tr>
<td>f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying alternatives;</td>
<td>Section 1.1.1</td>
</tr>
<tr>
<td>g) an identification of any areas to be avoided, including buffers;</td>
<td>n/a</td>
</tr>
<tr>
<td>h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;</td>
<td>n/a</td>
</tr>
<tr>
<td>i) a description of any assumptions made and any uncertainties or gaps in knowledge;</td>
<td>Section 3.5</td>
</tr>
<tr>
<td>j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;</td>
<td>Sections 5 &amp; 6</td>
</tr>
<tr>
<td>k) any mitigation measures for inclusion in the EMPr;</td>
<td>n/a</td>
</tr>
<tr>
<td>l) any conditions for inclusion in the environmental authorisation;</td>
<td>Section 13</td>
</tr>
<tr>
<td>m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;</td>
<td>Section 9</td>
</tr>
<tr>
<td>n) a reasoned opinion-</td>
<td>Sections 12 and 13</td>
</tr>
<tr>
<td>i. whether the proposed activity, activities or portions thereof should be authorised;</td>
<td></td>
</tr>
<tr>
<td>(iA) regarding the acceptability of the proposed activity and activities; and</td>
<td></td>
</tr>
<tr>
<td>ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;</td>
<td></td>
</tr>
<tr>
<td>o) a description of any consultation process that was undertaken during the course of preparing the specialist report;</td>
<td>Section 10</td>
</tr>
<tr>
<td>p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and</td>
<td>Section 10</td>
</tr>
<tr>
<td>q) any other information requested by the competent authority.</td>
<td>n/a</td>
</tr>
</tbody>
</table>

2. Where a government notice gazetted by the Minister provides for any protocol of minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply | n/a |
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1. INTRODUCTION

ASHA Consulting (Pty) Ltd was appointed by the Council for Scientific and Industrial Research (CSIR) to conduct an assessment of the potential impacts to heritage resources that might occur through the proposed development of a 5 ha sand mine on Farm Seafield 17474/Remainder and Ambleside 2624/Remainder in Kwa-Zulu-Natal (S30° 43’ 07” E30° 25’ 57”).

Figure 1: Extract from the 1:50 000 topographic map 3030CBMap showing the location of the site (red shaded polygon). (Mapping information supplied by Chief Directorate: National Geo-Spatial Information. Website: wwwi.ngi.gov.za)

1.1. Project description

- A Mining Permit is required for the proposed establishment of a small scale 5 hectare sand mining operation.
- The existing access road from Batstones Drift will be used to access the site. An existing farm road leads to the mining area. No new roads will be required.
- Approximately 100 m$^3$ of river sand will be mined per day from the riverbed using a mechanical pump.
- The sand will then be left to dry in a pit about 20 metres from the riverbank while the water drains off and flows back into the river. Disturbance of the Riparian zone will be avoided to ensure that the river bank is not disturbed and the river is not diverted.
- Site infrastructure will include a chemical toilet and waste bin No buildings will be erected on site.
- Equipment and/or plant will include a front end loader and truck for the transportation of sand away from the site, and a vehicle for staff transport. No permanent infrastructure will be erected on the mining site.
The areas used for facilities or equipment will be rehabilitated by maintaining the general topography of the area and removing all equipment and facilities from the site. At the end of the project life cycle, a thick soil layer of approximately 333 mm will be spread across the disturbed areas then ripped, fertilised and re-vegetated. Post-closure monitoring will assist in determining the success of the rehabilitation and also identify whether any additional measures need to be taken to ensure the area is restored to a reasonable and acceptable condition. The area within the river where sand was mined will be rehabilitated naturally during the rainy season where flood waters will deposit more sand across the mined area.

1.1.1. Aspects of the project relevant to the heritage study

The mining will not have any effect on heritage since it will be below water in an active river. The presence of equipment on the river bank and the drying pit may result in archaeological impacts or visual contextual impacts to heritage resources and it is thus only this component that is relevant to the heritage study.

1.2. Terms of reference

ASHA Consulting, in association with HCAC, was asked to prepare a Heritage Impact Assessment (HIA) that would meet the requirements of Amafa/Heritage KwaZulu Natal (Amafa).

On being notified about the proposed project, Amafa requested that a HIA be submitted. The HIA should cover:

- Identification of all heritage resources in the development area and its surroundings -50m
- Assessment of the impact of the development on such heritage
- Evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development
- Results of consultation with communities affected by the proposed development and other interested and affected parties regarding the impact of the development on heritage resources.
- Consideration of alternatives if heritage resources are affected by the development
- Mitigation plans for any adverse effects during and after completion of the project
- Table of all heritage resources identified. This should show Heritage resource type, description, location, significance and reasons for this rating.

It should also be noted, however, that following S.38(3) of the National Heritage Resources Act (No. 25 of 1999), even though certain specialist studies may be specifically requested, all heritage resources should be identified and assessed.

1.3. Scope and purpose of the report

A heritage impact assessment (HIA) is a means of identifying any significant heritage resources before development begins so that these can be managed in such a way as to allow the development to proceed (if appropriate) without undue impacts to the fragile heritage of South Africa. This HIA report aims to fulfil the requirements of the heritage authorities such that a comment can be issued for consideration by the Department of Mineral Resources (DMR) who will review the Basic Assessment Report (BAR) and grant or withhold authorisation. The HIA report will outline any management and/or mitigation requirements that will need to be complied with from a
heritage point of view and that should be included in the conditions of authorisation should this be granted.

1.4. The authors

Dr Jayson Orton has an MA (UCT, 2004) and a D.Phil (Oxford, UK, 2013), both in archaeology, and has been conducting Heritage Impact Assessments and archaeological specialist studies in the Western Cape and Northern Cape provinces of South Africa since 2004 (Please see curriculum vitae included as Appendix 1). He has also conducted research on aspects of the Later Stone Age in these provinces and published widely on the topic. He is an accredited heritage practitioner with the Association of Professional Heritage Practitioners (APHP) and also holds archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233) as follows:

- Principal Investigator: Stone Age, Shell Middens & Grave Relocation; and
- Field Director: Colonial Period & Rock Art.

Jaco van der Walt provided Iron Age expertise for the project. He has an MA in Archaeology (Wits, 2012) and has worked in the heritage field since 2001 across much of southern Africa (Please see curriculum vitae included in Appendix 1). He has carried out and published research on Iron Age sites and is an accredited heritage practitioner with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #159) as follows:

- Field Director: Iron Age, Shell Middens & Grave Relocation; and
- Field Supervisor: Colonial Period, Stone Age & Grave Relocation.

2. HERITAGE LEGISLATION

There is one national and one provincial act relevant to this project.

At the national level the National Heritage Resources Act (NHRA) No. 25 of 1999 protects a variety of heritage resources as follows:

- Section 34: structures older than 60 years;
- Section 35: palaeontological, prehistoric and historical material (including ruins) more than 100 years old;
- Section 36: graves and human remains older than 60 years and located outside of a formal cemetery administered by a local authority; and
- Section 37: public monuments and memorials.

Following Section 2, the definitions applicable to the above protections are as follows:

- Structures: “any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith”;
- Palaeontological material: “any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trace”;
- Archaeological material: a) “material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years, including artefacts,
human and hominid remains and artificial features and structures”; b) “rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation”; c) “wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation”; and d) “features, structures and artefacts associated with military history which are older than 75 years and the sites on which they are found”;

- Grave: “means a place of interment and includes the contents, headstone or other marker of such a place and any other structure on or associated with such place”; and
- Public monuments and memorials: “all monuments and memorials a) “erected on land belonging to any branch of central, provincial or local government, or on land belonging to any organisation funded by or established in terms of the legislation of such a branch of government”; or b) “which were paid for by public subscription, government funds, or a public-spirited or military organisation, and are on land belonging to any private individual.”

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscape” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value; some of these speak directly to cultural landscapes.

Section 38 (2a) states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted. This report fulfils that requirement.

At the provincial level the KwaZulu-Natal Heritage Act (No. 4 of 2008) protects heritage resources as follows:

- Section 33: structures older than 60 years;
- Section 34: graves of victims of conflict;
- Section 35: traditional burial places; and
- Section 36: battlefield sites, archaeological sites, rock art sites, palaeontological sites, historic fortifications, meteorite or meteorite impact sites.

Unlike the NHRA, the KwaZulu-Natal Heritage Act also protects intangible heritage.

Under the National Environmental Management Act (No. 107 of 1998; NEMA), as amended, the project is subject to a BAR. Heritage KwaZulu-Natal is required to provide comment on the proposed project in order to facilitate final decision making by the DMR.
3. METHODS

3.1. Literature survey and information sources

A survey of available literature was carried out to assess the general heritage context into which the development would be set. This literature included published material, unpublished commercial reports and online material, including reports sourced from the South African Heritage Resources Information System (SAHRIS). The 1:50 000 map and historical aerial images were sourced from the Chief Directorate: National Geo-Spatial Information.

3.2. Field survey

Because the mining area is under water in an active river channel and the related activities will be on the river bank very close (in archaeological terms) to the river, no heritage resources are anticipated and hence no field survey was carried out.

3.3. Grading

Section 7 of the NHRA provides for the grading of heritage resources into those of National (Grade 1), Provincial (Grade 2) and Local (Grade 3) significance. Grading is intended to allow for the identification of the appropriate level of management for any given heritage resource. Grade 1 and 2 resources are intended to be managed by the national and provincial heritage resources authorities, while Grade 3 resources would be managed by the relevant local planning authority. These bodies are responsible for grading, but anyone may make recommendations for grading.

It is intended under S.7(2) that the various provincial authorities formulate a system for the further detailed grading of heritage resources of local significance but this is generally yet to happen. SAHRA (2007) has formulated its own system\(^1\) for use in provinces where it has commenting authority. In this system sites of high local significance are given Grade IIIA (with the implication that the site should be preserved in its entirety) and Grade IIIB (with the implication that part of the site could be mitigated and part preserved as appropriate) while sites of lesser significance are referred to as having ‘General Protection’ and rated with an A (high/medium significance, requires mitigation), B (medium significance, requires recording) or C (low significance, requires no further action).

3.4. Impact assessment

For consistency, the impact assessment was conducted through application of a scale supplied by the CSIR.

3.5. Assumptions and limitations

It is assumed that the expected pattern of not finding any archaeological resources within active river channels or very close to the channel will hold true.

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\(^1\) The system is intended for use on archaeological and palaeontological sites only.
3.6. Consultation processes undertaken

The NHRA requires consultation as part of an HIA but, since the present study falls within the context of an EIA which includes a public participation process (PPP), no dedicated consultation was undertaken as part of the HIA. Interested and affected parties would have the opportunity to provide comment on the heritage aspects of the project during the PPP. Comments will be dealt with in Section 10 below.

4. PHYSICAL ENVIRONMENTAL CONTEXT

4.1. Site context

The site lies within a largely rural area focused on the growing of sugar cane (Figure 2). However, a residential suburb lies across the river 350 m to the south. This suburb forms the approximate inland edge of port Shepstone. A large sugar mill provides an industrial component to the landscape some 500 m to the west, also on the opposite side of the river. Slightly further afield some 3 km to the west of the study area, and again to the south of the river, there is a mine producing various building materials.

Figure 2: Aerial view of the broader context of the study area (yellow polygon) showing the agricultural lands, the mining area in the west and Port Shepstone and the N2 freeway to the east.
4.2. Site description

The majority of the proposed site (and all of the proposed mining area) is within the Umzimkulu River bed and is comprised of recently deposited river sand. The small section on the river bank where processing, drying and storage of sand will occur is a largely open and already disturbed area surrounded by dense grass and riparian vegetation (Figure 3). This section extends to a maximum of 60 m from the water’s edge. Figures 4 to 7 show a series of views across the site taken in February 2016 by the environmental assessment practitioner (EAP).

Figure 3: Aerial view of the immediate context of the study area (yellow polygon) showing the existing road to be used for access (black line) and the sugar cane and riparian vegetation along the river.
**Figure 4:** View towards the south across the mining area (i.e. the river).

**Figure 5:** View towards the south across the sand storage area with the mining area (i.e. the river) in the background.

**Figure 6:** View towards the west across the sand storage area with the access road coming in to the site on the right hand side. The shed has been removed since the photograph was taken.
Figure 7: View towards the northwest across the sand storage area with the access road coming in to the site on the right hand side. The shed has been removed since the photograph was taken.

5. HERITAGE CONTEXT

This section of the report contains the desktop study and establishes what is already known about heritage resources in the vicinity of the study area. Because no fieldwork was undertaken for this assessment, the desktop study will form the basis of the impact assessment. The study focuses most strongly on archaeological and palaeontological heritage since it is those two aspects that Amafa was most concerned about.

5.1. Archaeological aspects

The mining area is located within an active river channel and is generally underwater. As such, no archaeology will be present there. The river bank section is largely disturbed by previous activities on the site and, being so close to the river, is unlikely to have allowed for human habitation in the past. Figure 4 shows that where indigenous riparian vegetation has not been disturbed by farming activities, as is the case on the present site, the vegetation is incredibly dense making settlement and active use of the river bank virtually impossible.

In general, all types of archaeological material may be expected in the broader area. These include Early Stone Age (ESA), Middle Stone Age (MSA), Later Stone Age (LSA), Early and Late Iron Age (EIA & LIA) and historical period sites. Later Stone Age people would have made use of the riverine areas for hunting with game trails providing access through the dense vegetation. Habitation sites are likely to have been somewhat further from the river where the vegetation was less dense. ESA and MSA sites, by contrast, date from much further back in time and may be more widely encountered due to differences in vegetation cover through time.
One of the better known archaeological phenomena of the KwaZulu-Natal (KZN) coastline is the abundant Early and Middle Stone Age artefacts that can be found in places in the Berea Formation coastal dunes. While the area around Xolobeni just south of Port Edward and within the Eastern Cape is perhaps the best documented (Fisher et al. 2013; Kuman 2006; Van Schalkwyk & Wahl 2007), similar material has been found on the KZN south coast (Davies 1982). These resources tend to be located within about 1-2 km of the coastline.

Iron Age people arrived in the area some 1500 years ago. Their settlement pattern in the southern KZN area was guided by the following environmental features:

- Iron Age people favoured areas of Eastern Valley Bushveld for settlement. This vegetation type generally occurs in river valleys away from the coast at elevations of between 100 and 1000 m above sea level (Rutherford et al. 2006). The spoils of this vegetation type are arable and the vegetation includes a sweetveld understory (G. Whitelaw pers. comm. 2015); and
- Iron Age settlements are most likely to be found in river valleys with alluvial terraces and gently sloping terrain seeming to have been most popular. Very few sites are found on steeper slopes or hilltops.

Further north in KZN Iron Age sites are also known from the Berea Dunes (G. Whitelaw pers. comm. 2015).

In his large-scale survey of the area south of Port Edward – 50 km southwest of the study area – Derricourt (1977) found Iron Age sites to be rare in contrast to Stone Age sites. This may have been because of the elevation criterion noted above. The area is however known to contain sites from the Blackburn Branch of the Urewe ceramic tradition, dating to AD 1050 to 1500 (Huffman 2007). Approximately 60 km to the north at Scottburgh 2 km inland rescue excavations at the hilltop site of Mpambanyoni recorded a Late Iron Age site dating to the beginning of the second millennium A.D., suggesting a similarity with the site of Blackburn (Robey 1980).

The present study area is located at just 10 m above sea level and thus does not host Eastern Valley Bushveld. Being in an incised river valley it is also located in an area away from the coastal dunes of the Berea Formation. It may be concluded that Iron Age sites are unlikely to be found in the the study area.

Only a small number of cases are lodged on SAHRIS for this area. One of these examined three areas in the hills to the northwest of the study area and found no heritage resources (Wahl & Van Schalkwyk 2014), while another to the west recorded only recent graves (Van Schalkwyk 2016).

5.2. Palaeontological aspects

The SAHRIS Palaeosensitivity Map indicates the site to be within an area of moderate palaeontological sensitivity (Figure 8). For this reason Dr John Almond of Natura Viva cc was commissioned to produce a desktop study.

Almond (2017) notes that the bedrocks of the area belong to the Pietermaritzburg Formation (Ecca Group and Karoo Supergroup) which, in turn, overlie Dwyka Group glacial deposits to the south. The Ecca rocks are intensely intruded by Karoo Dolerite. Above these bedrocks is a thick layer (up to 38 m is on record for this area) of late Caenozoic alluvial deposits that fills the river valleys,
especially close to the coast. While the older alluvium is likely to be tertiary or Quaternary in age, the less consolidated sands at the top of the sequence are all likely Holocene or recent in age.

![Figure 8: Extract from the SAHRIS Palaeosensitivity Map indicating the site (yellow polygon) to be of medium sensitivity (green shading).](image)

The palaeontology of the Pietermaritzburg Formation is not well understood, partly due to poor surface exposures and extensive weathering. However, these rocks will not be impacted at all by the proposed sand mine and are thus not of further relevance. The older and deeper-lying alluvial sediments along the Umzimkulu River might contain palaeontologically important fossils (e.g. mammalian bones and teeth, fish, freshwater molluscs and crustaceans, and transported terrestrial plant material like wood and leaves). Such material is not yet known from the area but it is likely that these older alluvial deposits will not be impacted by the proposed superficial sand mining. The younger sandy alluvial deposits on the Umzimkulu River bed and banks are expected to contain, at most, subfossil material of little or no palaeontological interest (Almond 2017).

5.3. The cultural landscape, historical aspects and the built environment

The simplest way to examine the local historical environment is via historical aerial photography. Three series were available. Going back 41 years to 1976 one finds that the site looked little different to what it looks like today (Figure 9). Sugar cane farming was well-entrenched on the north bank of the river and the sugar mill and residential suburb to the southwest and southeast of the site respectively were in place. The small stream to the northeast of the study area was meandering far more which suggests it may have been artificially straightened to increase the amount of land available for sugar cane cultivation. Although not shown in this view, the N2 freeway had yet to be built to the east of the study area, but a river crossing was available at Sugar Mill Road just west of the current N2 bridge location.
Stepping back further to 1963 we see a similar picture except that another river crossing was available to the west, opposite the sugar mill, and a small patch of land had not yet been cultivated just northwest of the site (Figure 10). Its uniformly dark colour suggests natural vegetation. The suburb to the southeast of the study area was beginning to be laid out but was still low density.

The earliest available image was from 1955 (Figures 11 & 12). While the sugar mill was already there, along with the adjacent river crossing, the Sugar Mill Road crossing had not yet been constructed. The area to the southeast was far more rural with very few buildings visible. Of most interest is that there are two small light patches within the area of undisturbed vegetation to the northwest of the site. These may either represent small structures or else clearings. They would
have been located some 130-150 m away from the edge of the proposed mining area. There is very obviously no sign of these patches today with the area being completely cultivated and planted to sugar cane.

**Figure 11**: Comparative 1955 (Job 358, strip 13, photograph 6634) and modern aerial photographs.

**Figure 12**: Comparative 1955 (Job 358, strip 13, photograph 6634) and modern aerial photographs showing a close up view of the site.

This series of images shows that the area has long been a rural one dominated by the cultivation of sugar cane and, as evidenced by the sugar mill, the production of sugar. Port Shepstone gradually grew and infrastructure (like the N2 freeway) was added as the population of the area became larger. At the site level it actually looks as though cultivation occurred even closer to the river in the past but that there has likely never been any sort of development on the site itself. The nature of
this rural cultural landscape with scattered industrial activities (sugar mill and mining) and the small scale of the proposed activities are such that no significant changes are likely to come about. It is also notable that the site lies in the bottom of a river valley which means that its visual exposure is extremely limited.

5.4. Graves and burial grounds

Iron Age graves tend to be located within homestead settings and, because occupation of this area is unlikely to have occurred, the chances of such graves being present are negligible. It is unlikely that Stone Age graves would be located so close to the river in an area that was likely to have been very densely vegetated in the distant past. Nevertheless, a very small possibility does exist that unmarked pre-colonial graves could be uncovered during excavation of the sand storage pit.

Modern graves are also most commonly located within active or abandoned homesteads. No homesteads occur within close proximity of the study area. A recent survey some 3 km to the southwest of the present study area demonstrated this pattern very strongly (Van Schalkwyk 2016).

2.2 Km to the north of the study area is a grave site, simply referred to as Ndongeni's Grave. Ndongeni was a 16 year old servant for Dick King, a 29-year-old wagon driver. They left Durban on horseback for Grahamstown to seek reinforcements for the British garrison under siege by Voortrekkers at Durban. Ndungeni never made it to Grahamstown but was later awarded a piece of land for his efforts, he was still alive in 1911 and buried here (Couzens 2004).

5.5. Summary of heritage indicators

It is unlikely that there will be any heritage indicators of concern in or close to the study area. The only heritage material that could possibly be impacted would be relatively recent isolated sub-fossils trapped in the Holocene and younger surficial sands targeted for mining. This material is of very low significance. Visual disturbance of the cultural landscape will be negligible because of the small scale of the proposed project.

5.6. Statement of significance and provisional grading

Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), “cultural significance” means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance.

There are no specific heritage resources worthy of grading in or close to the study area. The broader cultural landscape around the study area has low-medium significance at the local level for its aesthetic and historical value (i.e. Grade III).

6. IMPACT ASSESSMENT

The only possible impacts to heritage that might occur are to isolated sub-fossils and to the cultural landscape. However, as noted above, the very low significance of the palaeontological material and the small scale of the proposed activity means that the impacts will not have any significance. These impacts would occur during the construction and operation phases, while decommissioning would
result in a return to the status quo with no new impacts possible. Table 1 provides an impact assessment for the direct impacts. Because there are no significant heritage resources in the area, indirect impacts will not occur. All potential impacts are deemed to be of very low significance and, from a heritage point of view, the site can easily absorb the activity. Because any palaeontological material in the area would be very isolated, relatively recent and likely in poor context, and because the landscape impacts are essentially zero, no cumulative impacts are expected to occur. There are no heritage-related mitigation requirements.

7. LEGISLATIVE AND PERMIT REQUIREMENTS

Once Amafa has issued a final comment on this proposed project, there will be no further legal or permitting requirements in terms of the NHRA.

8. ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The Environmental Management Programme (EMPr) should include a note on what to do in the event that any heritage resource is uncovered during the proposed project. Although considered extremely unlikely, such finds may include buried foundations, a grave, or a dense concentration of fossils or artefacts. If any heritage resource is uncovered it should be protected in place and reported to an archaeologist or heritage practitioner or to Amafa as the responsible provincial heritage resources authority.

Because of the extremely low likelihood of any heritage resources being encountered, there is no requirement for monitoring.

9. EVALUATION OF IMPACTS RELATIVE TO SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS

Section 38(3)(d) of the NHRA requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development. This project will result in a small number of jobs that will last for several years. Because no heritage resources are expected to be significantly impacted, the provision of a few employment opportunities far outweighs any potential heritage impacts.

10. CONSULTATION

As noted above, this heritage impact assessment is to be included within the BAR which will be circulated to I&APs for comment.
### Table 1: Impact assessment summary table – Construction and Operation Phase direct impacts.

<table>
<thead>
<tr>
<th>Aspec/Impact pathway</th>
<th>Nature of potential impact/risk</th>
<th>Status</th>
<th>Spatial Extent</th>
<th>Duration</th>
<th>Consequence</th>
<th>Probability</th>
<th>Reversibility of impact</th>
<th>Implantability of receiving environment/resource</th>
<th>Potential mitigation measures</th>
<th>Significance of impact/risk = consequence x probability</th>
<th>Confidence level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clearing of site and dredging and storage of sand.</td>
<td>Destruction of isolated fossils</td>
<td>Negative</td>
<td>Site</td>
<td>Permanent</td>
<td>Slight</td>
<td>Very unlikely</td>
<td>Non-reversible</td>
<td>High</td>
<td>Plant search and rescue (EMPr)</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>Alteration to the cultural landscape</td>
<td>Negative</td>
<td>Site</td>
<td>Medium-term</td>
<td>Slight</td>
<td>Likely</td>
<td>High (with rehabilitation)</td>
<td>Low</td>
<td>Erosion Management Plan (EMPr)</td>
<td>Very low</td>
<td>Very low</td>
<td>5</td>
</tr>
</tbody>
</table>
11. LEGISLATIVE AND PERMIT REQUIREMENTS

Once Amafa has issued a final comment on this proposed project, there will be no further legal or permitting requirements in terms of the NHRA.

12. ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The Environmental Management Programme (EMPr) should include a note on what to do in the vent that any heritage resource is uncovered during the proposed project. Although considered extremely unlikely, such finds may include buried foundations, a grave, or a dense concentration of fossils or artefacts. If any heritage resource is uncovered it should be protected in place and reported to an archaeologist or heritage practitioner or to Amafa as the responsible provincial heritage resources authority.

Because of the extremely low likelihood of any heritage resources being encountered, there is no requirement for monitoring.

13. EVALUATION OF IMPACTS RELATIVE TO SUSTAINABLE SOCIAL AND ECONOMIC BENEFITS

Section 38(3)(d) of the NHRA requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development. This project will result in a small number of jobs that will last for several years. Because no heritage resources are expected to be significantly impacted, the provision of a few employment opportunities far outweighs any potential heritage impacts.

14. CONSULTATION

As noted above, this heritage impact assessment is to be included within the BAR which will be circulated to I&APs for comment.

15. CONCLUSIONS

It is highly unlikely that any significant impacts to heritage resources would occur through implementation of the proposed project.
16. RECOMMENDATIONS

Because no significant impacts to heritage resources are expected, it is recommended that the proposed sand mine should be authorised but subject to the following condition which should be incorporated into the Environmental Authorisation:

- If any archaeological material, palaeontological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

17. REFERENCES


APPENDIX 1 – Curriculum Vitae

Jayson David John Orton
ARCHAEOLOGIST AND HERITAGE CONSULTANT

Contact Details and personal information:

Address: 40 Brassie Street, Lakeside, 7945
Telephone: (021) 788 8425
Cell Phone: 083 272 3225
Email: jayson@asha-consulting.co.za

Birth date and place: 22 June 1976, Cape Town, South Africa
Citizenship: South African
ID no: 760622 522 4085
Driver’s License: Code 08
Marital Status: Married to Carol Orton
Languages spoken: English and Afrikaans

Education:

SA College High School Matric 1994
University of Cape Town B.A. (Archaeology, Environmental & Geographical Science) 1997
University of Cape Town B.A. (Honours) (Archaeology)* 1998
University of Cape Town M.A. (Archaeology) 2004
University of Oxford D.Phil. (Archaeology) 2013

*Frank Schweitzer memorial book prize for an outstanding student and the degree in the First Class.

Employment History:

Spatial Archaeology Research Unit, UCT Research assistant Jan 1996 – Dec 1998
Department of Archaeology, UCT Field archaeologist Jan 1998 – Dec 1998
UCT Archaeology Contracts Office Field archaeologist Jan 1999 – May 2004
UCT Archaeology Contracts Office Heritage & archaeological consultant Jun 2004 – May 2012
School of Archaeology, University of Oxford Undergraduate Tutor Oct 2008 – Dec 2008
ACO Associates cc Associate, Heritage & archaeological consultant Jan 2011 – Dec 2013
ASHA Consulting (Pty) Ltd Director, Heritage & archaeological consultant Jan 2014 –

Memberships and affiliations:

South African Archaeological Society Council member 2004 –
Assoc. Southern African Professional Archaeologists (ASAPA) member 2006 –
ASAPA Cultural Resources Management Section member 2007 –
UCT Department of Archaeology Research Associate 2013 –
Heritage Western Cape APM Committee member 2013 –
UNISA Department of Archaeology and Anthropology Research Fellow 2014 –
Fish Hoek Valley Historical Association 2014 –
Professional Accreditation:

ASAPA membership number: 233, CRM Section member
Principal Investigator: Coastal shell middens (awarded 2007)
                      Stone Age archaeology (awarded 2007)
                      Grave relocation (awarded 2014)
Field Director: Rock art (awarded 2007)
                Colonial period archaeology (awarded 2007)

Fieldwork and project experience:

Extensive fieldwork as both Field Director and Principle Investigator throughout the Western and Northern Cape, and also in the western parts of the Free State and Eastern Cape as follows:

Phase 1 surveys and impact assessments:
  - Project types
    - Notification of Intent to Develop applications (for Heritage Western Cape)
    - Heritage Impact Assessments (largely in the Environmental Impact Assessment or Basic Assessment context under NEMA and Section 38(8) of the NHRA, but also self-standing assessments under Section 38(1) of the NHRA)
    - Archaeological specialist studies
    - Phase 1 test excavations in historical and prehistoric sites
    - Archaeological research projects
  - Development types
    - Mining and borrow pits
    - Roads (new and upgrades)
    - Residential, commercial and industrial development
    - Dams and pipe lines
    - Power lines and substations
    - Renewable energy facilities (wind energy, solar energy and hydro-electric facilities)

Phase 2 mitigation and research excavations:
  - ESA open sites
    - Duinefontein, Gouda
  - MSA rock shelters
    - Fish Hoek, Yzerfontein, Cederberg, Namaqualand
  - MSA open sites
    - Swartland, Bushmanland, Namaqualand
  - LSA rock shelters
    - Cederberg, Namaqualand, Bushmanland
  - LSA open sites (inland)
    - Swartland, Franschhoek, Namaqualand, Bushmanland
  - LSA coastal shell middens
    - Melkbosstrand, Yzerfontein, Saldanha Bay, Paternoster, Dwarskersbos, Infanta, Knysna, Namaqualand
  - LSA burials
    - Melkbosstrand, Saldanha Bay, Namaqualand, Knysna
  - Historical sites
    - Franschhoek (farmstead and well), Waterfront (fort, dump and well), Noordhoek (cottage), variety of small excavations in central Cape Town and surrounding suburbs
  - Historic burial grounds
    - Green Point (Prestwich Street), V&A Waterfront (Marina Residential), Paarl
CV Jaco van der Walt

PERSONAL PARTICULARS:

NAME: Jaco van der Walt
MARITAL STATUS: Married with two dependants
DATE OF BIRTH: 1977-11-04
Work Address: 37 Olienhou Street, Modimolle, 0510
E-MAIL: jaco.heritage@gmail.com
MOBILE: +27 82 373 6401
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SYNOPSIS

Jaco has been actively involved as a professional archaeologist within the heritage management field in southern Africa for the past 15 years. Jaco acted as council member for the Association of Southern African Professional Archaeologist (ASAPA Member #159) in the Cultural Resource Management (CRM) portfolio for two years (2011 – 2012). Jaco was also a Research Associate with the University of Johannesburg from 2011 – 2013. He is well respected in his field and published in peer reviewed journals and presented his findings on various national and international conferences.

ACADEMIC QUALIFICATIONS:

Date of matriculation: 1995
Particulars of degrees/diplomas and/or other qualifications:
Name of University or Institution: University of Pretoria
Degree obtained : BA
Major subjects : Archaeology
Cultural Heritage Tourism
Year of graduation : 2001

Name of University or Institution: University of the Witwatersrand
Degree obtained : BA [Honours]
Major subjects : Archaeology
Year of graduation : 2002

Name of University or Institution: University of the Witwatersrand
Degree Obtained : BA [Masters]
Major subject : Archaeology
Year of Graduation : 2012

EMPLOYMENT HISTORY:

2011 – Present: Owner - Heritage Contracts and Archaeological Consulting CC.
CRM Archaeologist, Managed the Heritage Contracts Unit at the University of the Witwatersrand.

2005 - 2007: CRM Archaeologist, Director of Matakoma Heritage Consultants

2004: Technical Assistant, Department of Anatomy University of Pretoria

2003: Archaeologist, Mapungubwe World Heritage Site


2000: Museum Assistant, Fort Klapperkop.

Countries of work experience include:
MEMBERSHIP OF PROFESSIONAL ASSOCIATIONS:

- Association of Southern African Professional Archaeologists. Member number 159
- Association of Southern African Professional Archaeologists Cultural Resource Management Section
  Accreditation:
  Field Director - Iron Age Archaeology
  Field Supervisor - Colonial Period
  Archaeology, Stone Age Archaeology and Grave Relocation
- Accredited CRM Archaeologist with SAHRA
- Accredited CRM Archaeologist with AMAFA
- Co-opted council member for the CRM Section of the Association of Southern African Association
  Professional Archaeologists (2011 - 2012)

REFERENCES:

1. Prof Marlize Lombard
   Senior Lecturer, University of Johannesburg, South Africa
   E-mail: mlombard@uj.ac.za
2. Prof TN Huffman
   Department of Archaeology
   Tel: (011) 717 6040
   University of the Witwatersrand
3. Alex Schoeman
   University of the Witwatersrand
   E-mail: Alex.Schoeman@wits.ac.za
APPENDIX 2 – Palaeontological study
RECOMMENDED EXEMPTION FROM FURTHER PALAEONTOLOGICAL STUDIES:

PROPOSED SAND MINE ALONG THE UMZIMKULU RIVER, PORT SHEPSTONE, PORT SHEPSTONE MAGISTERIAL DISTRICT, KWAZULU-NATAL

John E. Almond PhD (Cantab.)
Natura Viva cc,
PO Box 12410 Mill Street,
Cape Town 8010, RSA
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June 2017

EXECUTIVE SUMMARY

It is proposed to develop a small-scale sand mine along the Umzimkulu River at Port Shepstone, KwaZulu-Natal. The shaley Ecca Group bedrocks in the Port Shepstone area (Early Permian Pietermaritzburg Formation) contain, at most, organic-walled microfossils and abundant but low-diversity trace fossils. These bedrocks as well as older (Tertiary to Quaternary) consolidated alluvial deposits along the river will not be directly impacted by the proposed mining development. The bedrocks are extensively baked by closely-spaced Karoo dolerite intrusions. The Holocene to Recent sandy alluvial deposits in and along the banks of the Umzimkulu River that will be directly affected by the proposed sand mine are of low palaeontological sensitivity, containing – at most – subfossil remains of groups such as mammals, molluscs, crustaceans and transported plant material (e.g. wood) that are not of high palaeontological significance or conservation value.

It is therefore recommended that, pending the discovery of significant new fossils remains (e.g. permineralised mammalian bone, teeth) during construction and operation of the proposed sand mine, exemption from further specialist palaeontological studies and mitigation be granted for this project.

1. OUTLINE OF THE PROPOSED DEVELOPMENT

It is proposed to develop a small-scale (5 ha) sand mine along the bed and adjoining banks of the Umzimkulu River on Farm Seafield 17474 / Remainder and Ambleside 2624 / Remainder on the outskirts of Port Shepstone, Port Shepstone Magisterial District, Kwa-Zulu-Natal (Figs. 1 & 2). The following project description is provided in the Heritage Impact Assessment for the project by Orton and Van der Walt (2017):

- A Mining Permit is required for the proposed establishment of a small scale 5 hectare sand mining operation.
- The existing access road from Batstones Drift will be used to access the site. An existing farm road leads to the mining area. No new roads will be required.
- Approximately 100 m$^3$ of river sand will be mined per day from the riverbed using a mechanical pump.
The sand will then be left to dry in a pit about 20 metres from the riverbank while the water drains off and flows back into the river. Disturbance of the riparian zone will be avoided to ensure that the river bank is not disturbed and the river is not diverted.

- Site infrastructure will include a chemical toilet and waste bin No buildings will be erected on site.
- Equipment and/or plant will include a front end loader and truck for the transportation of sand away from the site, and a vehicle for staff transport. No permanent infrastructure will be erected on the mining site.
- The areas used for facilities or equipment will be rehabilitated by maintaining the general topography of the area and removing all equipment and facilities from the site. At the end of the project life cycle, a thick soil layer of approximately 333 mm will be spread across the disturbed areas then ripped, fertilised and re-vegetated. Post-closure monitoring will assist in determining the success of the rehabilitation and also identify whether any additional measures need to be taken to ensure the area is restored to a reasonable and acceptable condition. The area within the river where sand was mined will be rehabilitated naturally during the rainy season where flood waters will deposit more sand across the mined area.

A palaeontological assessment as part of a HIA for this mining project has been requested by AMAFA Heritage KwaZulu-Natal (Case Ref: SAH16/10367; Interim Comment of 21 November 2016). The present palaeontological heritage assessment comment has accordingly been commissioned by ASHA Consulting (Pty) Ltd (Contact details: Dr Jayson Orton, ASHA Consulting (Pty) Ltd. 40 Brassie Street, Lakeside, 7945. E-mail: jayson@asha-consulting.co.za. Tel: 021 788 8425. Cell: 083 272 3225).

Figure 1. 1: 50 000 scale topographical map of Port Shepstone showing the location of the proposed sand mine (red polygon) along the Umzimkhulu River (Image abstracted from the Heritage Impact Assessment for the mining project by Orton and Van der Walt, 2017).
Figure 2. Google earth© satellite image of the sand mine study area (yellow polygon) along the Umzimkhulu River on the outskirts of Port Shepstone, KZN. The access road is shown in black (Image abstracted from the Heritage Impact Assessment for the mining project by Orton and Van der Walt, 2017).

2. GEOLOGICAL BACKGROUND

The geology of the sand mine study area is shown on 1: 250 000 geology sheet 3030 Port Shepstone (Figure 3) for which a short explanation has been published by Thomas (1988). The area is underlain at depth by Early Permian basinal mudrocks of the Pietermaritzburg Formation (Ecca Group, Karoo Supergroup) (Pp, dark brown in Fig. 3) which overlie glacial sediments of the Dwyka Group to the south. This unit reaches a thickness of some 400 m in the 1: 250 000 sheet 3030 study area (Thomas 1988). The formation comprises a monotonous succession of dark, blue-black, finely-laminated fissile shales with occasional thicker interbeds of massive claystones and micaceous siltstones. Highly carbonaceous mudrocks and locally abundant diagenetic carbonate concretions and lenses are also known from this unit (Thomas 1988, Johnson et al. 2006). Interbeds of siltstone and fine-grained sandstone towards the top of the upward-shallowing succession show soft-sediment deformation features. The Ecca bedrocks in this region are intensely intruded by Early Jurassic dolerites of the Karoo Dolerite Suite (Thomas 1988, Duncan & March 2006) (Jd, red in Fig. 3).

The Ecca Group bedrocks in the Port Shepstone area are overlain by very thick Late Cenozoic alluvial deposits along the major river systems as they near the coast (pale yellow in Fig. 3); a
thickness of over 38 m of alluvium has been measured in boreholes along the Umzimkhulu River near Port Shepstone (Du Toit 1946, Thomas 1988). The older, deeper-lying deposits are likely to be of Tertiary to Quaternary age while the unconsolidated sandy alluvium in the bed of the river that will be exploited by the proposed mine is of Holocene to Recent age.

Figure 3. Extract from the 1: 250 000 geology sheet 3030 Port Shepstone (Council for Geoscience, Pretoria) showing the approximate location of the proposed sand mine along the Umzimkhulu River near Port Shepstone (yellow rectangle). The bedrocks underlying the region comprise Early Permian basinal mudrocks of the Pietermaritzburg Formation (Ecca Group, Karoo Supergroup (Pp, dark brown) that are intruded in this area by Early Jurassic dolerites of the Karoo Dolerite Suite (Jd, red). The banks and bed of the Umzimkhulu River are mantled by Late Caenozoic alluvium (pale yellow with flying bird symbol).

3. PALAEONTOLOGICAL HERITAGE

The palaeontology of the Pietermaritzburg Formation is poorly understood (cf Groenewald 2012). This is partially, but not entirely, attributable to poor levels of Ecca bedrock exposure and extensive surface weathering in the region as a whole. Intervals of carbonaceous mudrocks are likely to contain assemblages of organic-walled microfossils such as acritarchs, pollens and spores, where these have not been destroyed by dolerite intrusion. Prolific assemblages of invertebrate burrows occur on some bedding planes, including carbonate-cemented mudrocks, and some horizons show high levels of bioturbation (i.e. sediment-mixing by infaunal organisms) (Johnson et al. 2006). The Ecca Group bedrocks will not be directly impacted by the proposed development.
The older (probably Late Tertiary / Neogene to Quaternary) alluvial sediments along the Umzimkhulu River might contain palaeontologically important fossil material such as mammalian bones and teeth, fish, freshwater molluscs and crustaceans and transported terrestrial plant material (e.g. wood, leaves). To the author's knowledge such fossils have not yet been recorded here and these older alluvial deposits are unlikely to be incised by the proposed superficial sand mining. The younger sandy alluvial deposits on the Umzimkhulu River bed and banks are expected to contain, at most, subfossil material of little or no palaeontological interest.

4. CONCLUSIONS & RECOMMENDATIONS

The shaley Ecca Group bedrocks in the Port Shepstone area (Early Permian Pietermaritzburg Formation) contain, at most, organic-walled microfossils and abundant but low-diversity trace fossils. These bedrocks and older (Tertiary to Quaternary) consolidated alluvium will not be directly impacted by the proposed mining development. The Holocene to Recent sandy alluvial deposits in and along the banks of the Umzimkhulu River that will be directly impacted by the proposed sand mine are of low palaeontological sensitivity, containing – at most – subfossil remains of groups such as mammals, molluscs, crustaceans and transported plant material (e.g. wood) that are not of high palaeontological significance or conservation value.

It is therefore recommended that, pending the discovery of significant new fossils remains (e.g. permineralised mammalian bone, teeth) during construction and operation of the proposed sand mine, exemption from further specialist palaeontological studies and mitigation be granted for this project.

Should any substantial fossil remains (e.g. permineralised mammalian bones, teeth) be encountered during excavation, however, these should be safeguarded, preferably in situ, and reported by the ECO to AMAFA Heritage Kwazulu-Natal (Contact details: Amafa Ulundi Office. P.O. Box 523, Ulundi, 3838. Tel: 035 8702050. Fax: 086 5108074. E-mail: info@heritagekzn.co.za). This is so that appropriate action can be taken by a professional palaeontologist, at the developer’s expense. Mitigation would normally involve the scientific recording and judicious sampling or collection of fossil material as well as associated geological data (e.g. stratigraphy, sedimentology, taphonomy) by a professional palaeontologist. These recommendations should be included in the Environmental Management Programme (EMPr) for the proposed development.

5. KEY REFERENCES


6. QUALIFICATIONS & EXPERIENCE OF THE AUTHOR

Dr John Almond has an Honours Degree in Natural Sciences (Zoology) as well as a PhD in Palaeontology from the University of Cambridge, UK. He has been awarded post-doctoral research fellowships at Cambridge University and in Germany, and has carried out palaeontological research in Europe, North America, the Middle East as well as North and South Africa. For eight years he was a scientific officer (palaeontologist) for the Geological Survey / Council for Geoscience in the RSA. His current palaeontological research focuses on fossil record of the Precambrian – Cambrian boundary and the Cape Supergroup of South Africa. He has recently written palaeontological reviews for several 1: 250 000 geological maps published by the Council for Geoscience and has contributed educational material on fossils and evolution for new school textbooks in the RSA.

Since 2002 Dr Almond has also carried out palaeontological impact assessments for developments and conservation areas in the Western, Eastern and Northern Cape, Limpopo, Northwest and the Free State under the aegis of his Cape Town-based company Natura Viva cc. He has served as a long-standing member of the Archaeology, Palaeontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on palaeontological conservation and management issues for the Palaeontological Society of South Africa (PSSA), HWC and SAHRA. He is currently compiling technical reports on the provincial palaeontological heritage of Western, Northern and Eastern Cape for SAHRA and HWC. Dr Almond is an accredited member of PSSA and APHP (Association of Professional Heritage Practitioners – Western Cape).
Declaration of Independence

I, John E. Almond, declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development project, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

Dr John E. Almond
Palaeontologist, Natura Viva cc