

## Lusikisiki DWS Mining Application

### ECOLOGICAL IMPACT ASSESSMENT

P WMA 12/T60/00/5414/4

Prepared for:



**water & sanitation**

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## REVISIONS TRACKING TABLE



### EOH Coastal and Environmental Services

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Name	Responsibility	Signature	Date
Roy de Kock	Ecological Specialist		September 2016
Alan Carter	Report Reviewer		September 2016

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## INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

In terms of Appendix 6 of the Environmental Impact Assessment Regulations (G. NR. 982) as regulated by the National Environmental Management Act (Act no. 107 of 1998 and amended in 2014; NEMA), a Specialist Report must contain all the information necessary for a proper understanding of the nature of issues identified, and must include–

1. (1) A specialist report prepared in terms of the NEMA 2014 Regulations must contain-
  - (a) details of-
    - (i) the specialist who prepared the report; and
    - (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
  - (b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
  - (c) an indication of the scope of, and the purpose for which, the report was prepared;
  - (d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;
  - (e) a description of the methodology adopted in preparing the report or carrying out the specialised process;
  - (f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;
  - (g) an identification of any areas to be avoided, including buffers;
  - (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;
  - (i) a description of any assumptions made and any uncertainties or gaps in knowledge;
  - (j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;
  - (k) any mitigation measures for inclusion in the EMPr;
  - (l) any conditions for inclusion in the environmental authorisation;
  - (m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
  - (n) a reasoned opinion-
    - (i) as to whether the proposed activity or portions thereof should be authorised; and
    - (ii) if the opinion is that the proposed activity 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;
  - (o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
  - (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
  - (q) any other information requested by the competent authority.

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## 1 THE PROJECT TEAM

In terms of Appendix 6 of the EIA Regulations (2014) a specialist report must contain-

- (a) details of-
  - (iii) the specialist who prepared the report; and
  - (iv) the expertise of that specialist to compile a specialist report including a curriculum vitae;
- (b) a declaration that the specialist is independent in a form as may be specified by the competent authority;

### 1.1 Details of specialist

#### **Mr Roy de Kock M.Sc., Cand. Nat. Sci.**

*(Agricultural and Soil Specialist)*

Roy is a Senior Consultant holding a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela Metropolitan University in Port Elizabeth. His MSc thesis focused on Rehabilitation Ecology using an open-cast mine as a case study. He has been working for CES since 2010, and is based at the East London branch where he focuses on Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies. Roy has worked on numerous projects in South Africa, Mozambique and Malawi. Roy is registered with the South African Council for Natural Scientific Professional (SACNASP).

#### **Dr Alan Carter Pri. Nat Sci.**

*(Report reviewer)*

As Director of the East London Office Alan has extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He is a member of the American Institute of Certified Public Accountants and holds a PhD in Plant Sciences. He is also a certified ISO14001 EMS auditor with the American National Standards Institute. Alan is registered with both the South African Council for Natural Scientific Professional (SACNASP).

### 1.2 Expertise

Projects Roy and Alan have worked on include:

Name of project	Description of responsibility	Date completed
SANRAL N2 between Tetyana & Sitebe Komkulu EIA (EC)	Ecological Impact Assessment	June 2015
Laman Mining renewal of Mining License (EC)	Ecological Impact Assessment	February 2015
ACSA East London Airport Vegetation Study (EC)	Ecological Impact Assessment	February 2014
SANRAL R61 Baziya to Mthatha EIA (EC)	Ecological Impact Assessment	November 2014
SANRAL Rehabilitation of the N9, Middelburg (EC)	Ecological Impact Assessment	June 2013

### 1.3 Declaration

- I, Roy de Kock, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014;
- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I 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, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this report are true and correct; 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.

\_\_\_\_\_  
Signature of the specialist:

\_\_\_\_\_  
Name of company (if applicable):

\_\_\_\_\_  
Date:



## 2 INTRODUCTION

In terms of Appendix 6 of the EIA Regulations (2014) a specialist report must contain-

- (c) an indication of the scope of, and the purpose for which, the report was prepared;
- (d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment;
- (e) a description of the methodology adopted in preparing the report or carrying out the specialised process;
- (i) a description of any assumptions made and any uncertainties or gaps in knowledge;
- (o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
- (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
- (q) any other information requested by the competent authority.

### 2.1 Project description

The Department of Water and Sanitation (DWS) is proposing the construction of the Lusikisiki Regional Water Supply Scheme (LRWSS) close to the town of Lusikisiki in the Eastern Cape Province. Included in this is the proposed application for two (2) new Borrow Areas in order to obtain building material for the construction of the proposed new dam wall that will be located along the Xura River (Figure 1.1).

EOH Coastal & Environmental Services (EOH) has been appointed by DWS to undertake Borrow Area sites and to obtain both environmental approvals in terms of the National Environmental Management Act (No. 107 of 1998; NEMA) and the associated NEMA Regulations (2014) as well as a mining permit in terms of the Minerals and Petroleum Resources Development Act (No. 28 of 2002; MPRDA).

### 2.2 Location

The results from the pre-feasibility study (Department of Water Affairs, 2011) show that sufficient construction material is available for the construction of a new rockfill dam wall for the proposed new dam close to Lusikisiki in the Eastern Cape Province.

Two Borrow Areas containing unweathered dolerite located on the western banks of the Xura River, downstream of the proposed dam, were identified as potential construction material (Figure 1.1). Both sources are covered with moderately to completely weathered shales. The moderately weathered shales can be used in the shells of the rockfill dam wall.

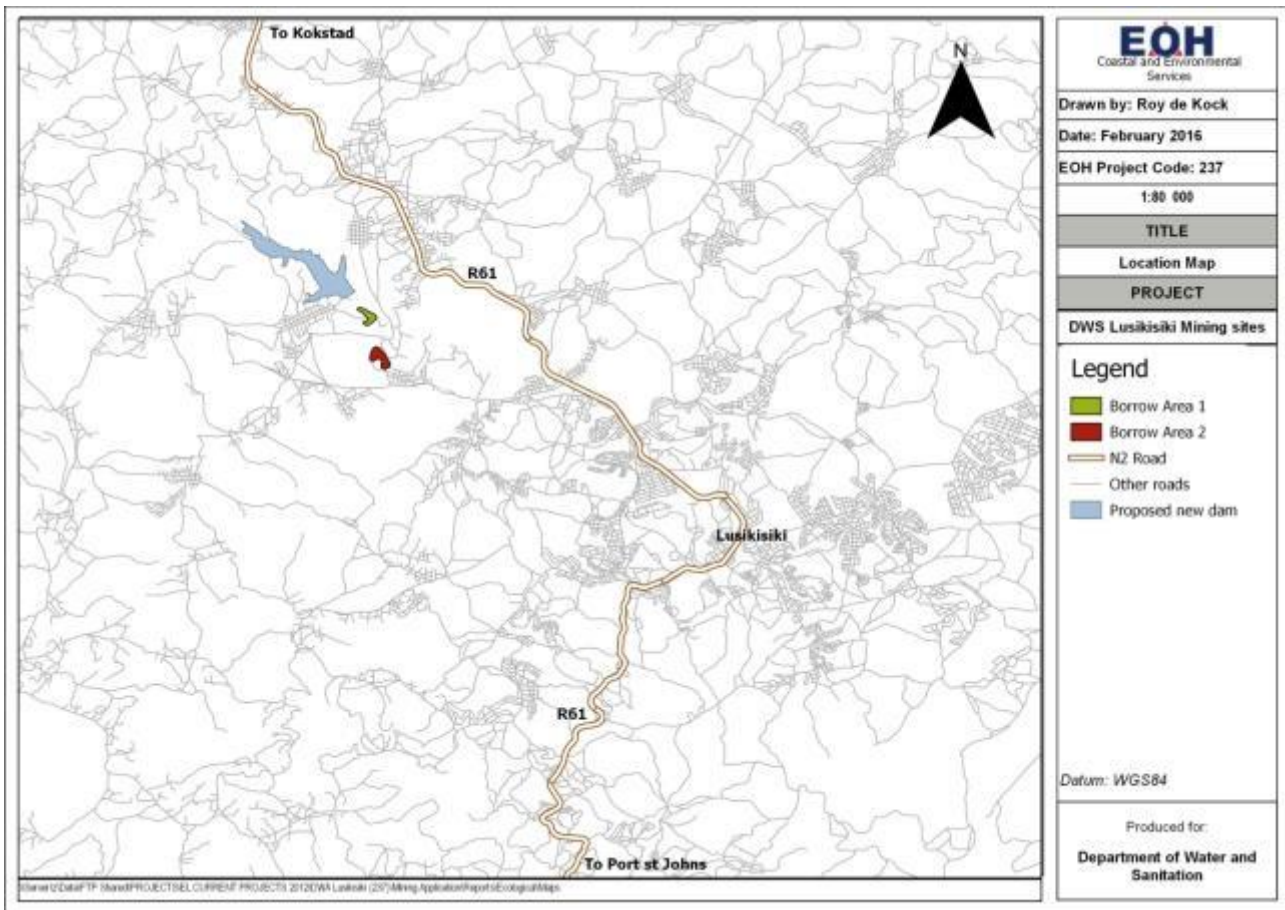


Figure 1.1. Location of the proposed 2 new Borrow Area sites outside Lusikisiki, Eastern Cape Province.

### 2.3 Terms of Reference

The Terms of Reference (ToR) for the Ecological Impact Assessment, described in the Scoping Report of the Environmental Impact Assessment (EIA), are provided below.

A detailed survey of the site will be undertaken to determine the possibility of there being listed threatened or protected ecosystems and species on the proposed project site. If any of these are found, the Environmental Management Programme (EMPr) will include recommended measures to remove or otherwise protect plant species found on the site that are afforded protection under the National Environmental Management: Biodiversity Act (no. 10 of 2004; NEMBA), during construction.

The ToR for an Ecological Impact Assessment includes:

1. Record the plant species that occur within the study area, based on field surveys;
2. Identify, and locate where possible, any plant Species of Conservation Concern (SCC), namely Threatened, Near Threatened, Rare (species with conservation status or which are) and endemic species (to the area);
3. All SCC's will be discussed in detail;
4. Compile a broad-scale vegetation or habitat map of the area. This vegetation map should indicate the extent that project activities would affect each vegetation or habitat type.
5. Work in consultation with other specialists to ensure that the linkages between the various systems are understood;
6. Provide a sensitivity map of the study areas in order for the proponent to better place the layout of the project's infrastructure;
7. Once a sensitivity map has been created, the consultant must suggest ecological corridors around or adjacent to the suggested project area, especially through sensitive sites or vegetation;

8. Ensure that the study deals with the issues raised during the scoping phase;
9. Identify and assess the environmental significance of the identified botanical impacts using the methodology prescribed by EOH, as this methodology is compliant with international best practice in EIA; and
10. To provide practical and realistic recommendations to mitigate the identified botanical impacts.

## **2.4 Methodology**

The aim of this assessment is to identify areas of ecological importance and to evaluate these in terms of their conservation importance. In order to do so, the ecological sensitivity of the area is assessed as well as an identification of potential plant Species of Conservation Concern (SCC) that may occur in habitats present in the area.

To a large extent, the condition and sensitivity of the vegetation will also determine the presence of animal SCC and areas with high faunal biodiversity. It is for this reason that the assessment focuses on the vegetation aspects of the site, and includes only a small section on the fauna recorded and expected to live on the site.

It is not the aim of this study to produce a complete list of all animal and plant species occurring in the region, but rather to examine a representative sample. It is however, important to note that areas of high sensitivity as well as SCC have been identified as far as possible, either from records from the site or a review of their habitat requirements, and whether or not these habitats occur within the site. The aim of this study is to identify areas of high sensitivity and those that may be subject to significant impacts from the project. It is important to note that an aquatic impact assessment has been conducted and as such those areas of ecological importance will be included in the sensitivity section of this report. Aspects that would increase impact significance include:

- Presence of plant SCC.
- Presence of animal SCC.
- Vegetation types (which also constitute faunal habitats) of conservation concern.
- Areas of high biodiversity.
- The presence of process areas:
  - Ecological corridors
  - Complex topographical features (especially steep and rocky slopes that provide niche habitats for both plants and animals).

### **2.4.1 Species of conservation concern**

#### **Plant SCC**

Data on the known distribution and conservation status for each potential plant SCC needs to be obtained in order to develop a list of SCC. These plant species are those that may be impacted significantly by the proposed activity. In general these will be species that are already known to be threatened or at risk. Efforts to provide the conservation status ('red list' status) of individual species may provide additional valuable information on SCC (see <http://www.iucnredlist.org/>). Species that are afforded special protection, which are protected by CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) are also regarded as SCC (see <http://www.cites.org/>).

#### **Animal SCC**

Animal SCC in terms of the project area is defined as:

**Threatened species:**

1. Animal species listed in the Endangered or Vulnerable categories in the revised South African Red Data Books (SA RDB – amphibians, du Preez and Carruthers, 2009; reptiles, Branch 1988; birds, SA Birding, 2008; terrestrial mammals, Apps, 2000); and/or
2. Species included in other international lists (e.g., 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Animals).

**Definitions**

The following definitions of the conservation status of plant and animal SCC are provided (Source: SANBI Red Data List):

- **Critically Endangered (CR)** - A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
- **Endangered (EN)** - A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
- **Vulnerable (VU)** - A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.
- **Near Threatened (NT)** - A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
- **Sensitive species** - Species not falling in the categories above but listed in:
  - Appendix 1 or 2 of the Convention of International Trade in Endangered Species (CITES).
- **Endemic species** - Species endemic to South Africa, and more specifically Eastern Cape.
- **Least concern (LC)** – A taxon is of Least Concern when it does not qualify for any of the other categories. Widespread and abundant taxa are typically listed in this category.

**2.4.2 Sampling protocol**

**Vegetation**

The entire site was observed to evaluate the vegetation of the study area and to add detailed information on the plant communities present. The site observation takes into account the amount of time available for the study and limitations such as the seasonality of the vegetation.

Vegetation within both Borrow Area sitewere assessed and surveyed and vegetation communities were then described according to the dominant species recorded from each type, and these mapped and assigned a sensitivity score.

**Animals**

The assessment of animals was based on a general observation of species noted onsite during the site assessment, but with particular consideration of known potential animal SCC.

### 2.4.3 Vegetation mapping

Mucina and Rutherford (2006) developed the National Vegetation map as part of a South African National Biodiversity Institute (SANBI) funded project: “It was compiled in order to provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before.” The map was developed using a wealth of data from several contributors and has allowed for the best national vegetation map to date, the last being that of A Cocks developed over 50 years ago. The SANBI Vegetation map informs finer scale bioregional plans such as in fall STEP. This SANBI Vegetation map project has two main aims:

- to determine the variation in and units of southern African vegetation based on the analysis and synthesis of data from vegetation studies throughout the region, and
- to compile a vegetation map. The aim of the map was to accurately reflect the distribution and variation on the vegetation and indicate the relationship of the vegetation with the environment. For this reason the collective expertise of vegetation scientists from universities and state departments were harnessed to make this project as comprehensive as possible.

The map and accompanying book describes each vegetation type in detail, along with the most important species including endemic species and those that are biogeographically important. This is the most comprehensive data for vegetation types in South Africa.

This is compared to actual conditions of vegetation observed onsite during the site assessment through mapping from aerial photographs, satellite images, literature descriptions (e.g. SANBI and ECBCP) and related data gathered on the ground.

### 2.4.4 Sensitivity assessment

This section of the report explains the approach to determining the ecological sensitivity of the study area on a broad scale. The approach identifies zones of high, moderate and low sensitivity according to a system developed by EOH and used in numerous ecological studies. It must be noted that the sensitivity zonings in this study are based solely on ecological characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on 10 criteria which are considered to be of importance in determining ecosystem and landscape sensitivity. The method predominantly involves identifying sensitive vegetation or habitat types, topography and land transformation (Table 2.1).

Although very simple, this method of analysis provides a good, yet conservative and precautionary assessment of the ecological sensitivity.

**Table 2.1. Criteria used for the analysis of the sensitivity of the area.**

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	<b>Topography</b>	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	<b>Vegetation</b> - Extent or habitat type in the region	Extensive	Restricted to a particular region / zone	Restricted to a specific locality / site
3	<b>Conservation status</b> of fauna / flora or habitats	Well conserved independent of conservation value	Not well conserved, moderate conservation value	Not conserved - has a high conservation value
4	<b>Species of special concern</b> - Presence and number	None, although occasional regional endemics	No endangered or vulnerable species, some indeterminate or rare endemics	One or more endangered and vulnerable species, or more than 2 endemics or rare species
5	<b>Habitat</b>	Extensive areas of	Reasonably extensive areas of	Limited areas of this

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
	<b>fragmentation</b> leading to loss of viable populations	preferred habitat present elsewhere in region not susceptible to fragmentation	preferred habitat elsewhere and habitat susceptible to fragmentation	habitat, susceptible to fragmentation
6	<b>Biodiversity</b> contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	<b>Visual quality</b> of the site or landscape from other vantage points	Site is hidden or barely visible from any vantage points with the exception in some cases from the sea	Site is visible from some or a few vantage points but is not obtrusive or very conspicuous	Site is visible from many or all angles or vantage points
8	<b>Erosion potential</b> or instability of the region	Very stable and an area not subjected to erosion	Some possibility of erosion or change due to episodic events	Large possibility of erosion, change to the site or destruction due to climatic or other factors
9	<b>Rehabilitation</b> potential of the area or region	Site is easily rehabilitated	There is some degree of difficulty in rehabilitation of the site	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce
10	<b>Disturbance</b> due to human habitation or other influences (alien invasive species)	Site is very disturbed or degraded	There is some degree of disturbance of the site	The site is hardly or very slightly impacted upon by human disturbance

A sensitivity map was drawn up with the aid of a satellite image so that the sensitive regions and vegetation types could be plotted (see Chapter 6). The following was also taken into account:

#### 2.4.5 Biodiversity

ECBCP is a first attempt at detailed, low-level conservation mapping for land-use planning purposes. The aim of ECBCP is to map critical biodiversity areas through a systematic conservation planning process. The current biodiversity plan includes the mapping of priority aquatic features, land-use pressures, critical biodiversity areas and develops guidelines for land and resource-use planning and decision-making.

The main outputs of the ECBCP are “critical biodiversity areas” (CBAs), which are allocated the following management categories:

CBA 1 = Maintain in a natural state

CBA 2 = Maintain in a near-natural state

Land use outputs not classified as CBAs are called Biodiversity Land Management Classes (BLMCs) and are allocated the following management categories.

BLMC 3 = Functional Landscapes

BLMC 4 = Towns & Settlements

BLMC 4 = Woodlots & Plantations

BLMC 4 = Cultivated Land

ECBCP maps the CBAs based on extensive biological data and input from key stakeholders. Although ECBCP is mapped at a finer scale than the National Spatial Biodiversity Assessment (Driver et al., 2005) it is still, for the large part, inaccurate and “course”. Therefore it is imperative that the status of the environment, for any proposed development MUST first be verified before the management recommendations associated with the ECBCP are considered (Berliner and Desmet, 2007). It is also important to note that in absence of any other biodiversity plan, the ECBCP has been adopted by the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) as a strategic biodiversity plan for the Eastern Cape.

#### **2.4.6 Protected Areas**

The purposes of identifying areas that are protected according to the National Environmental Management: Protected Areas (Act No. 57 of 2003; NEMPAA) are:

- To protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes in a system of protected area.
- To preserve the ecological integrity of these areas.
- To conserve biodiversity in these areas.
- To protect areas representative of all ecosystems, habitats and species naturally occurring in South Africa.
- To protect South Africa's threatened or rare species.
- To protect an area this is vulnerable or ecologically sensitive.
- To assist in ensuring the sustained supply of environmental goods and services.
- To provide for the sustainable use of natural or biological resources.
- To create or augment destinations for nature based tourism.
- To manage the inter-relationship between natural environment biodiversity, human settlement and economic development.
- Generally to contribute to human, social, cultural, spiritual and economic development.
- To rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species.

The goal of the National Protected Areas Expansion Strategy (NPAES) is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The NPAES has classified protected areas into three categories: formally protected areas, informally protected areas and focus areas. Focus areas are large, intact and unfragmented areas suitable for the creation or expansion of large protected areas.

#### **2.4.7 Water bodies**

The National Freshwater Ecosystem Priority Areas (NFEPA) aims to identify a national network of freshwater conservation areas in South Africa. Freshwater ecosystems provide a valuable natural resource, with economic, aesthetic, spiritual, cultural and recreational value. Yet the integrity of freshwater ecosystems in South Africa is declining at an alarming rate largely as a consequence of a variety of challenges that are practical (managing vast areas of land to maintain connectivity between freshwater ecosystems), socio-economic (competition between stakeholders for utilisation) and institutional (building appropriate governance and co-management mechanisms). NFEPA maps all known freshwater bodies with the aim to feed directly into the NBA (National Biodiversity Assessment) 2010.

## 2.5 Impact assessment

### 2.5.1 Impact rating methodology

To ensure a direct comparison between various specialist studies, a standard rating scale has been defined and will be used to assess and quantify the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed. Five factors need to be considered when assessing the significance of impacts, namely:

- Relationship of the impact to **temporal scales** - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- Relationship of the impact to **spatial scales** - the spatial scale defines the physical extent of the impact.
- The severity of the impact - the **severity/beneficial scale** is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on a particular affected system (for ecological impacts) or a particular affected party.
- The severity of impacts can be evaluated with and without **mitigation** in order to demonstrate how serious the impact is when nothing is done about it. The word 'mitigation' means not just 'compensation', but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.
- The **likelihood** of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- Each criterion is ranked with scores assigned as presented in Table 3-2 to determine the **overall significance** of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood are then read off the matrix presented in Table 3-3, to determine the overall significance of the impact. The overall significance is either negative or positive.
- The **significance scale** is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of a social nature need to reflect the values of the affected society.

### **Cumulative Impacts**

Cumulative impacts affect the significance ranking of an impact because the impact is taken in consideration of both onsite and offsite sources. For example, pollution making its way into a river from a development may be within acceptable national standards. Activities in the surrounding area may also create pollution which does not exceed these standards. However, if both onsite and offsite activities take place simultaneously, the total pollution level may exceed the standards. For this reason it is important to consider impacts in terms of their cumulative nature.



### Seasonality

Although seasonality is not considered in the ranking of the significance, it may influence the evaluation during various times of the year. As seasonality will only influence certain impacts, it will only be considered for these, with management measures being imposed accordingly (i.e. dust suppression measures being implemented during the dry season).

**Table 2.2. Significance Rating Table.**

<b>Temporal Scale</b> (The duration of the impact)	
Short term	Less than 5 years (many construction phase impacts are of a short duration).
Medium term	Between 5 and 20 years.
Long term	Between 20 and 40 years (from a human perspective almost permanent).
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
<b>Spatial Scale</b> (The area in which any impact will have an affect)	
Individual	Impacts affect an individual.
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Project Level	Impacts affect the entire project area.
Surrounding Areas	Impacts that affect the area surrounding the development
Municipal	Impacts affect either the Local Municipality, or any towns within them.
Regional	Impacts affect the wider district municipality or the province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Will definitely occur	Impacts will definitely occur.
<b>Degree of Confidence or Certainty</b> (The confidence with which one has predicted the significance of an impact)	
Definite	More than 90% sure of a particular fact. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.

**Table 2.3. Impact Severity Rating.**

<b>Overall Significance</b> (The combination of all the above criteria as an overall significance)
---

VERY HIGH NEGATIVE	VERY BENEFICIAL
<p>These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in <b>severe</b> or <b>very severe</b> effects, or <b>beneficial</b> or <b>very beneficial</b> effects.</p> <p><b>Example:</b> The loss of a species would be viewed by informed society as being of VERY HIGH significance.</p> <p><b>Example:</b> The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH significance.</p>	
HIGH NEGATIVE	BENEFICIAL
<p>These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light.</p> <p><b>Example:</b> The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.</p> <p><b>Example:</b> The change to soil conditions will impact the natural system, and the impact on affected parties (such as people growing crops in the soil) would be HIGH.</p>	
MODERATE NEGATIVE	SOME BENEFITS
<p>These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are real but not substantial.</p> <p><b>Example:</b> The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.</p>	
LOW NEGATIVE	FEW BENEFITS
<p>These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.</p> <p><b>Example:</b> The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.</p> <p><b>Example:</b> The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.</p>	
NO SIGNIFICANCE	
<p>There are no primary or secondary effects at all that are important to scientists or the public.</p> <p><b>Example:</b> A change to the geology of a particular formation may be regarded as severe from a geological perspective, but is of NO significance in the overall context.</p>	
DON'T KNOW	
<p>In certain cases it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information.</p> <p><b>Example:</b> The effect of a particular development on people's psychological perspective of the environment.</p>	

## 2.6 Assumptions and Limitations

This report is based on currently available information and, as a result, the following limitations and assumptions are implicit–

- The data analysed in this report is based on two site surveys of plant species. Therefore seasonal trends are not assessed. In addition, some plant species, with particular seasonal/short-lived flowering, may have gone undetected.

- A detailed faunal survey was not conducted. Opportunistic sightings/observations of animals occurring within the study site were recorded. In order to generate a more comprehensive list of animals species present, land-owners were questioned. This information, combined with an assessment of potential habitat to support faunal species, was used to determine the likelihood of the presence of animal species within the project area.

### 3 RELEVANT LEGISLATION

The development of the proposed two Borrow Areas will be subject to the requirements of various items of South African legislation. These are described below.

**Table 3.1. Environmental legislation considered in the preparation of the Ecological Impact Assessment for the two Borrow Areas outside Lusikisiki, Eastern Cape Province**

Title of Environmental legislation, policy or guideline	Implications for rehabilitation of the upgrade and construction of the N2
Constitution Act (No. 108 of 1996)	Obligation to ensure that the proposed development will not result in pollution and ecological degradation; and Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.
Minerals and Petroleum Resource Development Act (No. 28 of 2002)	This act makes provision for equitable access and to sustainable development of the nation's mineral and petroleum resources.
National Environmental Management Act (NEMA) (No. 107 of 1998)	The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA. The developer must apply the principles of Integrated Environmental Management and consider, investigate and assess the potential impact of existing and planned activities on the environment, socio-economic conditions and the cultural heritage.
National Environment Management: Biodiversity Act (No. 10 of 2004)	The proposed development must conserve endangered ecosystems and protect and promote biodiversity; Must assess the impacts of the proposed development on endangered ecosystems; No protected species may be removed or damaged without a permit; The proposed site must be cleared of alien vegetation using appropriate means.
National Environmental Management: Protected Areas Act (No. 57 of 2003)	The objective of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.  In terms of Section 50 (1)(a)(ii) of this Act, the management authority may "Carry out or allow an activity in the reserve aimed at raising revenue". However, Section 50 (2) states that such activity may not negatively affect the survival of any species in, or significantly disrupt the integrity of the ecological system of the nature reserve. Furthermore, in terms Section 51 (a), the Minister or MEC is responsible for the regulations or restrictions of the development and other activities in a protected environment, "which may be inappropriate for the area, given the purpose for which the area was declared".
National Water Act (No. 36 of 1998)	This Act provides details of measures intended to ensure the comprehensive protection of all water resources, including the water reserve and water quality. This proposed development will likely trigger the need for a water-use license according to Sections 21 (c) and (i) of the Act.
National Heritage Resource Act (25 of 1999)	Protection of natural and cultural heritage sites into the layout and operation of the project, where applicable. Ensuring compliance with both the South African Heritage Resources Agency (SAHRA) and the Eastern Cape Provincial Heritage Resources Agency (ECPHRA)
National Forest Act (84 of 1998)	Requires that a permit be obtained should any coastal forests be removed

Title of Environmental legislation, policy or guideline	Implications for rehabilitation of the upgrade and construction of the N2
1998)	during the construction phase of the project.

The following policies are relevant to the project:

**Municipal Policy**

OR Tambo Municipality IDP (2012-2017), EMP and SDF (2010)  
 OR Tambo Municipality Environmental Management Plan (2014)

**Provincial Policy**

Eastern Cape Biodiversity Conservation Plan (2007)

## 4 DESCRIPTION OF THE ENVIRONMENT

The study sites and surrounding areas were described using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications and biodiversity programmes and plans. This was followed by a site visit in order to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities (see Chapter 5).

### 4.1 Background and Literature review

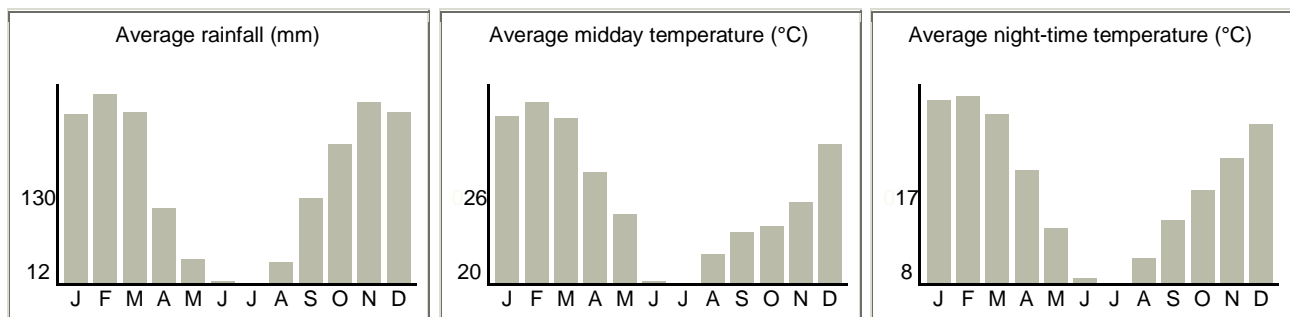
Published literature on the ecology of the area was referenced in order to describe the study site in the context of the region and the Eastern Cape Province. The following documents/plans are referenced:

- SANBI vegetation (Mucina & Rutherford, 2006)
- Eastern Cape Biodiversity Conservation Plan (ECBCP)
- The National Freshwater Ecosystem Priority Areas (NFEPA)
- National Protected Areas Act (NO. 57 of 2003; NEMPAA) and the National Protected Areas Expansion Strategy (NPAES)
- Review of the SANBI Red Data List
- Convention on International Trade in Endangered Species (CITES),
- International Union for Conservation of Nature (IUCN),
- Provincial Nature Conservation Ordinance (PNCO),
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species,
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Alien Invasive Vegetation
- Department of Agriculture, Forestry and Fisheries (DAFF) List of Protected Trees

#### 4.1.1 Climate

The proposed two Borrow Area sites are located close to the town of Lusikisiki in the Eastern Cape Province. The climatic condition of the study area is therefore extracted from Lusikisiki.

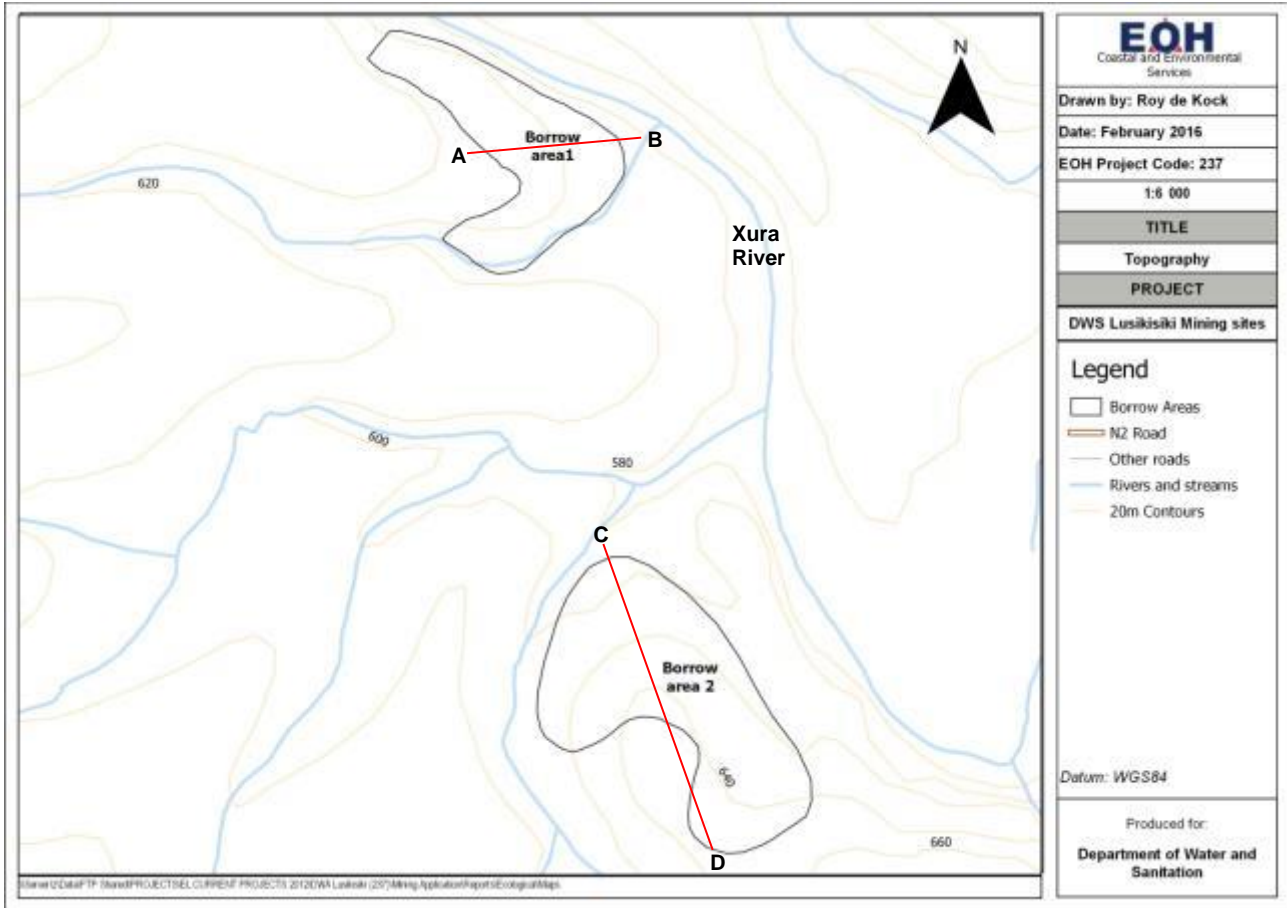
Lusikisiki normally receives about 874mm of rain per year, with most rainfall occurring mainly during summer. The graph below (Figure 4.1, lower left) shows the average rainfall values for Lusikisiki per month. It receives the lowest rainfall (12mm) in July and the highest (124mm) in February. The monthly distribution of average daily maximum temperatures (centre graph below) shows that the average midday temperatures for Lusikisiki range from 20.2°C in July to 25.5°C in February. The region is the coldest during July when temperature drops to 8°C on average during the night. The lower right graph shows monthly variation of average minimum daily temperatures.



**Figure 4.1. Graphs (from left to right) showing the average monthly rainfall; average monthly midday temperature; and average monthly night-time temperatures for Lusikisiki (SA Explorer; 2015).**

**4.1.2 Topography**

Both Borrow Area sites occur on slightly undulating landscapes where the land slopes towards the Xura River as well as to the associated tributary namely sloping downwards to the NE & SE at Borrow Area 1 while sloping downhill towards the NE & NW at Borrow Area 2 (Figure 4.2).



**Figure 4.2. Showing topography of the general area at both Borrow Areas 1 & 2. The red lines represent cross sections as shown in Figures 4.3 & 4.4.**

Figure 4.3 shows a 24m decrease in elevation eastwards from Point A to B (Figure 4.2) through Borrow Area 1 over a total length of 194m.



**Figure 4.3. Elevation profile for Borrow Area 1 from Point A to B as shown in Figure 4.2.**

Figure 4.4 shows a similar decrease in elevation when compared to Borrow Area 1 (Figure 4.3) where elevation decreases by 52m northwards from Point C to D (Figure 4.2) through Borrow Area 2 over a total length of 571m.



Figure 4.4. Elevation profile for Borrow Area 2 from Point C to D as shown in Figure 4.2.

### 4.1.3 Soils and geology

#### Geology

General geology of both Borrow Areas shows that the area consists of 600-100m deep undifferentiated Permian Ecca Group mudrock as well as intrusive Karoo dolerites (Figure 4.5).

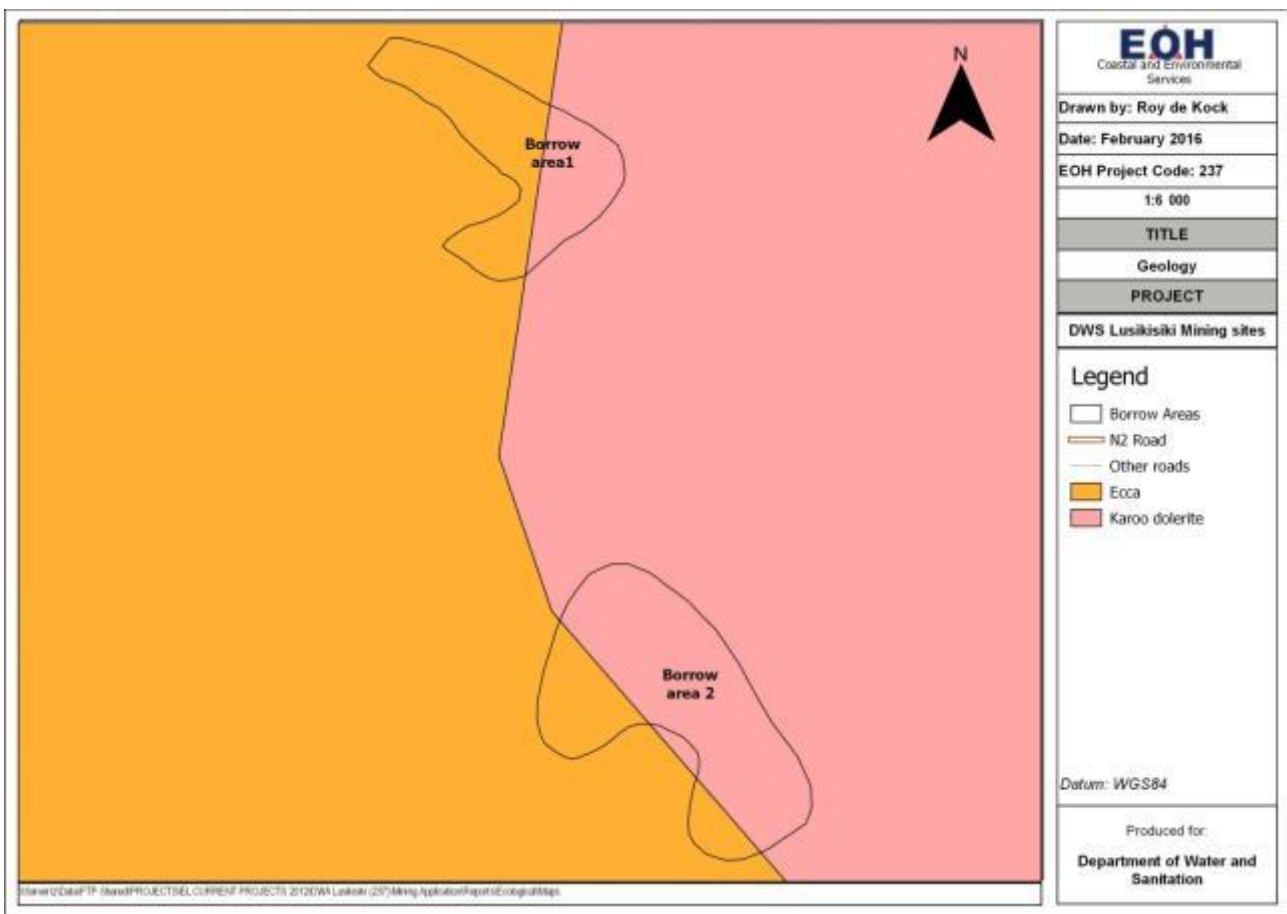


Figure 4.5. General geology of the study area.

#### Soils

Both sites as well as the surrounding landscape consist of soils with minimal development and shallow, overlying hard or weathering rock, with or without intermittent diverse soils.



#### 4.1.4 Water bodies

Figure 4.6 indicates all NFEPA identified freshwater bodies in and around the study area and includes wetlands, perennial rivers, non-perennial rivers and drainage systems.



Figure 4.6. NFEPA Water bodies identified in and around the study area.

#### 4.1.5 Agriculture

The Agricultural Georeferenced Information System (AGIS, 2007) of South Africa classified the agricultural potential at both Borrow areas sites as **moderate potential arable land**. **Grazing capacity onsite is low** due to highly transformed rangelands, resulting in **low carrying capacity** for domestic stock.

The surrounding areas are used for small scale farming & low cultivation (subsistence farming) with no commercial farming or irrigation occurring onsite.

#### 4.1.6 Protected areas

The National Environment Management: Biodiversity Act (No. 10 of 2004; NEMBA) list of threatened ecosystems (GN R.1002) has identified Ngongoni Veld found onsite as **Vulnerable** due to the fact that less than 60% of the original extent of the ecosystem remains as natural habitat.

None of the two Borrow Areas are located within 10km of a National Park or within any other protected area as regulated by either the National Protected Areas Act (NEMPAA) or the National Protected Areas Expansion Strategy (NPAES).

## 4.2 Vegetation and Floristics

### 4.2.1 SANBI classification (Mucina and Rutherford, 2006)

Ngongoni Veld is the only vegetation type identified within the proposed two Borrow Areas. Ngongoni Veld forms part of the Savanna Biome and is characterised by dense, tall grassland dominated by unpalatable Ngongoni grass (*Aristida junciformis*), with this monodominance associated with low species diversity. Woody thornveld (Bisho Thornveld) are found in valleys at lower altitudes. Terminalia supports bush clumps with *Acacia* species, *Cussonia spicata*, *Ziziphus micronata*, *Coddia rudis* and *Ehretia rigida* occurring.

SANBI classifies Ngongoni Veld as **Vulnerable**. Less than 1% is statutorily conserved in the Ophathe and Vernon Crookes Nature Reserves while some 39% transformed for cultivation, plantations, and urban development.

### 4.2.2 Forest classification

Although not indicated in the SANBI vegetation map, a patch of intrazonal Transkei Lower Scarp forest was identified immediately adjacent to Borrow Area 1 along the Xura River (Figure 4.7). According to the National Forest Act (No 84 of 1998; NFA) Classification of South African Indigenous forests, this forest type comprise of low-grown (up to 9 m) and middle-grown (15-25 m) species-rich forests. Species like *Milettia grandis*, *M. sutherlandii*, *Buxus macowanii*, *B. natalensis* and locally *Umtiza listeriana* are typical constituents of canopy layer. The ground layer is poorly developed.

This forest type and its individual species are protected under the NFA and permits will be required if elements of the forest are to be removed.

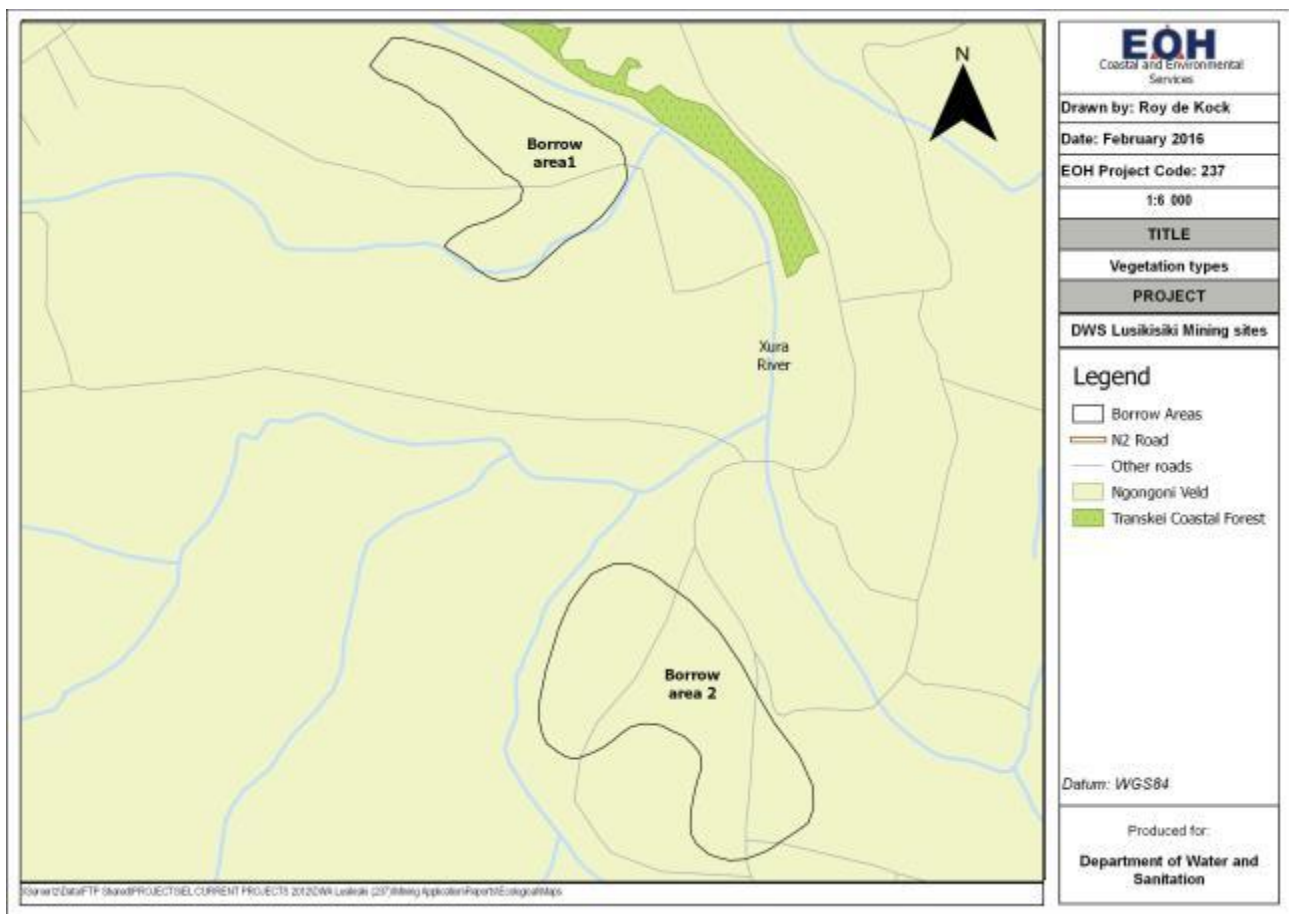


Figure 4.7. Vegetation types found onsite.

### 4.2.3 Eastern Cape Biodiversity Conservation Plan

The entire site is classified as a **CBA 2 area**, but current and historic land use may have altered that land use classification. The site is surrounded by villages (urban development) and the area has been significantly transformed through intensive grazing.

**The recommended land use management for CBA 2 areas are to maintain the environment in a near-natural state.**

### 4.2.4 Fauna (excluding bats)

#### Amphibians

Amphibians and reptiles are well represented in sub-Saharan Africa. However, distribution patterns in southern Africa are uneven both in terms of species distribution and in population numbers (du Preez and Carruthers, 2009). Climate, centres of origin and range restrictions are the three main factors that determine species distribution. The eastern coast of South Africa has the highest amphibian diversity and endemism while reptile diversity is generally highest in the north eastern extremes of South Africa and declines to the south and west (Alexander and Marais, 2010).

#### Reptiles

South Africa has 350 species of reptiles, comprising 213 lizards, 9 worm lizards, 105 snakes, 13 terrestrial tortoises, 5 freshwater terrapins, 2 breeding species of sea turtle and 1 crocodile (Branch, 1998). Of those 350 reptile species, the Eastern Cape is home to 133 which include 21 snakes, 27 lizards and eight chelonians (tortoises and turtles). The majority of these are found in Mesic Succulent Thicket and riverine habitats. Consultation of the Animal Demography Unit historical records indicates that 37 species of reptiles are likely to occur in the project site. One of these (*Bradypodion caffer* – Pondo Dwarf Chameleon) is classified as **Endangered** and one is listed as **Vulnerable** (*Bradypodion melanocephalum* – KwaZulu Dwarf Chameleon) (SARCA 2014). Dwarf chameleons usually occur in isolated populations within small patches of suitable habitat.

Pondo Dwarf Chameleons are only known to occur in the vicinity of Port St. Johns within low coastal forest (Tolley, 2010). It is estimated that their area of occupancy is 45km<sup>2</sup>. It is unlikely that this species occurs onsite.

The distribution range of the KwaZulu Dwarf Chameleon is not currently known (Armstrong, 2010). It is believed to be centred around the Durban area and strongly associated with the coast. It is unlikely that this species occurs within the study area given that it is severely degraded in most parts.

#### Amphibians

Amphibians are important in wetland systems, particularly where fish are excluded or of minor importance. In these habitats, frogs are dominant predators of invertebrates. Reports of declining amphibian populations continue to increase globally, even in pristine protected areas (Phillips 1994). These declines are not simple cyclic events; for example, frogs have been identified as bio-indicator species that reflect the wellbeing of aquatic ecosystems (Poynton and Broadley 1991). Frog abundance and diversity is a poignant reflection of the general health and well-being of aquatic ecosystems. According to historical records, 23 species of frog have been documented in the Quarter Degree Squares that the study area falls in. One of these species is listed as **Endangered** (*Natalobatrachus bonebergi* – Boneberg's Frog/ Natal Diving Frog) and one is listed as **Vulnerable** (*Afrivalus spinifrons* – Natal Banana Frog).

Boneberg’s Frog/Natal Diving Frog/ Kloof Frog has a distribution that ranges from Dwesa Nature Reserve in the Eastern Cape Province east to southern and central Kwa-Zulu Natal (SA-FRoG, 2012). Its Area of Occupancy is estimated to be 150km<sup>2</sup> (and declining). It occurs in nine locations, all between 50 and 900m above sea level. Its habitat preference is in coastal forests and gallery forests along streams. It is unlikely that this species will occur within the project area as it is too far inland and the level of degradation due to the current land use is likely to preclude this species from the area (Conradie, pers. comm).

The Natal Banana Frog is associated with low growing vegetation in shrubland and dry forest and breeds in vleis (including dams) and temporary pools and dams (SA-FRoG, 2012). It creates egg nests on emergent vegetation within these areas. This species is endemic to South Africa and occurs as two subspecies. *A. spinifrons* occurs in the Kwa-Zulu Natal lowlands and the Eastern Cape coast of South Africa at low to intermediate altitudes. Based on habitat preference and distribution it is likely that this species will occur within the project area.

### **Birds**

Nine bird species are endemic to South Africa, but there are no Eastern Cape endemics. However, there are 62 threatened species within the Eastern Cape Province (Barnes, 2000). Most of these species occur in grasslands or are associated with wetlands, indicating a need to conserve what is left of these ecosystems (Barnes, 2000). Historical records indicate that there are three Endangered species, eight Vulnerable species and eight Near Threatened species likely to occur in the area (Table 4.1).

While on site, three Southern Ground Hornbills (*Bucorvus leadbeateri*) were noted at an abandoned house located directly above the inundated area and eleven Cape Vultures (*Gyps coprotheres*) were counted soaring over the inundated area. It is likely that the Hornbills have a roost in the immediate area, however Cape Vultures have colony roosts and can fly long distances in search of carrion. Their presence is therefore not indicative of a nearby roost. Migratory birds may not have been observed at the time of the site visit, therefore species absence as reported in this study is not definitive.

**Table 4.1. Threatened bird species that are likely to occur in the study area (BirdlifeSA, 2012).**

Scientific Name	Common name	Red List status	NEM:BA	Noted on Site
<i>Balearica regulorum</i>	Grey Crowned Crane	Endangered	Endangered	
<i>Zoothera guttata</i>	Natal Thrush	Endangered	-	
<i>Campethera notata</i>	Knysna Woodpecker	Near Threatened	-	
<i>Neotis denhami</i>	Denham's Bustard	Near Threatened	Protected	
<i>Polemaetus bellicosus</i>	Martial Eagle	Near Threatened	-	
<i>Coracias garrulus</i>	European Roller	Near Threatened	-	
<i>Phalacrocorax capensis</i>	Cape Cormorant	Near Threatened	-	
<i>Puffinus griseus</i>	Sooty Shearwater	Near Threatened	-	
<i>Stephanoaetus coronatus</i>	Crowned Eagle	Near Threatened	-	
<i>Bradypterus sylvaticus</i>	Knysna Scrub-Warbler	Near Threatened	-	
<i>Bucorvus leadbeateri</i>	Southern Ground-hornbill	Near Threatened	-	X
<i>Geronticus calvus</i>	Southern Bald Ibis	Near Threatened	Vulnerable	
<i>Gyps coprotheres</i>	Cape Vulture	Near Threatened	Endangered	X
<i>Morus capensis</i>	Cape Gannet	Near Threatened	-	
<i>Procellaria aequinoctialis</i>	White-chinned Petrel	Near Threatened	-	
<i>Circus maurus</i>	Black Harrier	Vulnerable	-	
<i>Sagittarius serpentarius</i>	Secretary Bird	Vulnerable	-	

## **Mammals**

Large game makes up less than 15% of the mammal species in South Africa and a much smaller percentage in numbers and biomass. In developed and farming areas, this percentage is greatly reduced, with the vast majority of mammals present being small or medium-sized.

No large mammals were noted during the site visit. It is unlikely that any remain in the area due to the high density of human settlement. Mammals that still occur in the area are likely to be limited to small- (e.g. rodents) and the occasional medium-sized animals such as duiker in forest patches.

## 5 SITE OBSERVATIONS AND DESCRIPTIONS

While National level vegetation maps have described broad vegetation types, local conditions and micro-habitats (rainfall, soil structure, rocky outcrops, etc.) can result in variations in plant composition. A site investigation was therefore conducted on the 2-3 November 2015 in order to confirm desktop findings, to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities. The site visit also served to inform potential impacts of the proposed project and how significantly it would impact on the surrounding ecological environment.

### 5.1 Vegetation types and description

Two distinct vegetation types, with variations, were observed within and close to the 2 x Borrow areas during the site survey, namely:

- Undulating grassland (Both sites)
- Forest (close to Borrow area 1 only)

The vegetation types and the localised variations thereof are described below.

#### 5.1.1 *Undulating grassland*

Three variations within grasslands were noted, namely:

- Variation 1: Scrub dominated drainage systems (On Borrow area 1 only)
- Variation 2: Undulating grassland (Both sites)
- Variation 3: Riverine wetlands (Both sites)

Each of these is briefly described below.



#### Scrub dominated drainage systems

- This state of vegetation only occurred within the drainage system on Borrow Area 1.
- Local species like *Acacia natalensis* as well as alien vegetation (Wattle) interspersed with herbaceous and graminoid species occurs.
- Only a small portion of the site consists of scrub dominant drainage systems.
- This area may be considered as transformed grassland.





#### **Undulating grassland**

- These habitats are characterised by undulating hills and valleys dominated by Ngongoni grass.
- This is the dominant vegetation type found within both Borrow Areas.
- Remnants of old (15-20 years old) cultivation, like contouring and fallow crop fields observed within this vegetation type.
- This vegetation type is currently grazed on by domestic animals (cattle, sheep & goats).





#### **Riverine wetlands**

- All these wetlands occur outside the boundaries of both Borrow Areas but within a 500m radius. At Borrow Area 1 it borders the site boundary at the SE.
- All these wetlands are associated with riverine and drainage systems and are fed by these systems.
- Mostly long ngongoni grass and other grasses were observed. Some reeds & sedges were observed at local points.

### 5.1.2 Forests

Only one variation within forests was noted, namely:

- Variation 1: scarp forests



#### Scarp forests

- This vegetation type only occurs at a single point at Borrow Area 1 and is located on a steep slope next to the Xura River.
- Vegetation is dense with no alien infestation observed.
- Vegetation consists of *Milettia grandis*, *M. sutherlandii*, *Buxus macowanii*, *B. natalensis*.
- It is not expected that any forest vegetation will be affected as the site occurs outside the mining footprint.

Figure 5.1 below illustrates the different vegetation types observed onsite. It is important to note that only undulating grasslands will be impacted by the proposed mining activity at both Borrow Areas. The remaining vegetation types are described as surrounding vegetation types and may be indirectly impacted by the proposed mining activities.

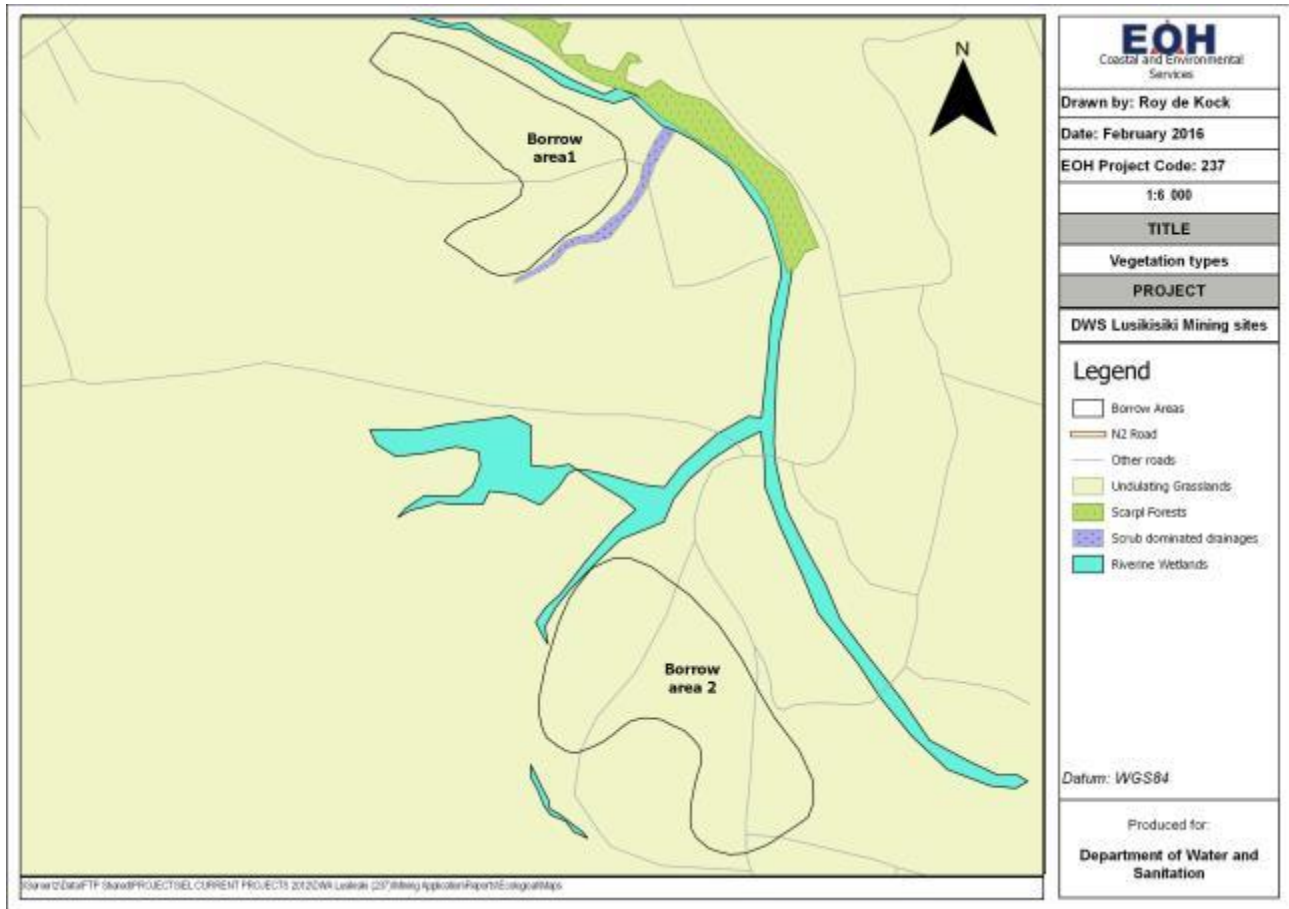


Figure 5.1. Vegetation types observed onsite.

### 5.2 Plant Species Observed

A total of 30 species were identified to occur within and around the 2 x Borrow areas (Appendix 1). Ngongoni veld, the dominant vegetation type, typically has low species diversity. It is therefore not surprising that the number of recorded species was low. Of these 30 species, only three are listed as species of conservation concern (SCC; Table 5.1 & Figure 5.2). These three species are all schedule 4 species on the Provincial Nature Conservation Ordinance Act 19 of 1974. The implication is that these species will require a permit for their removal or transplant prior to construction. No protected tree species were observed within the mining sites.

Table 5.1. Plant species of conservation concern identified in the Borrow areas

Family	Species	IUCN	SA RED LIST	PNCO	Protected Tree list	NEMBA
APOCYNACEAE	<i>Asclepia gibba</i>	-	Least Concern	Schedule 4	-	-
IRIDACEAE	<i>Dietes grandiflora</i>	-	Least Concern	Schedule 4	-	-
IRIDACEAE	<i>Moraea huttonii</i>	Least Concern	Least Concern	Schedule 4	-	-





Figure 5.2. Plant SCC identified onsite during the site assessment.

### 5.3 Wetland and rivers

Various additional wetlands, which were not classified according to NFEPA in Chapter 4 (Figure 4.6), were identified during the site assessment (Refer to Figure 5.1 above). All these wetlands are located in floodplains of rivers and streams immediately adjacent to the two Borrow areas. No wetland or rivers are located within any of the two Borrow areas (Figure 5.1).

### 5.4 Alien invasive species observed

There are a number of alien species present within both the Borrow areas, particularly along drainage lines. Alien species present on site and their category according to the NEMBA Alien and Invasive Species Regulations (published 1 August 2014) are presented below (Table 5.2). It is advised that an alien invasive management plan is created and implemented during the mining phase and that active clearing of alien species listed as category 1b in impacted areas is carried out.

Table 5.2. Alien invasive species present on site

Species	Comment
<b>Category 1b</b>	
<i>Cirsium vulgare</i>	1) According to NEMBA category 1b Listed species are those species listed as such by notice in terms of section 70(1)(a) of the Act as species which must be contained.
<i>Tecoma capensis</i>	

Species	Comment
<i>Cereus jamacaru</i>	2) A landowner upon whose land a Category 1 b Listed Invasive Species occurs and which species is under the landowner's control must: <ul style="list-style-type: none"> <li>(a) comply with the provisions of section 73(2) of the Act; and</li> <li>(b) contain the listed invasive species in compliance with section 75 (1), (2) and (3) of the Act;</li> </ul>
<i>Cuscuta campestris</i>	
<i>Solanum mauritianum</i>	
<i>Solanum elaeagnifolium</i>	
<i>Lantana camara</i>	
<b>Uncategorised</b>	
<i>Bidens pilosa</i>	Although classified as weed species, these species don't occur on the Alien and Invasive Species Regulations List.
<i>Taraxacum officinale</i>	
<i>Hypochaeris radicata</i>	
<i>Verbena aristigera</i>	
<i>Verbena bonariensis</i>	

## 5.5 Faunal habitats

Selected faunal groups or species were not specifically surveyed. However field observation during a site survey in November was undertaken.

The habitats that support various faunal assemblages are described in Table 5.3 and the species observed during the site visit as well as by local land owners (pers. Comm.) are listed in Table 5.4 for mammals and Table 5.5 for reptiles.

**Table 5.3. Faunal species supported by the various habitats included in the proposed site**

Habitat Type	List of Faunal Species
Undulating grasslands & Scrub dominated drainage systems	<b>Mammals:</b> Rough-haired mole Elephant shrew Musk shrews Vervet monkey Common mole-rat White-tailed mouse Fat mouse Brants climbing mouse Namaqua rock mouse Red veld rat Four striped grass mouse House mouse

Habitat Type	List of Faunal Species
	<p>Natal multimammate mouse  House rat  Angoni vlei rat  Vlei rat  Slender mongoose  Yellow mongoose</p> <p><b>Snakes and lizards</b>  Bibron’s blind snake  Peter’s thread snake  Southern brown house snake  Cape wolf snake  Common slug eater  Spotted bush snake  Mole snake  Rhombic skaapsteker  Cross-marked grass snake  Cape centipede eater snake  Spotted harlequin snake  Striped harlequin snake  Common egg eater  Red-lipped/Herald snake  Boomslang  Sundevall’s garter snake  Rinkhals  Puff adder  Cape skink  Striped skink  Delalande Sandveld lizard  Yellow-throated plated lizard  Rock monitor  Variable skink  Highveld girdled lizard  Drakensberg crag lizard</p>
Riverine wetlands	<p><b>Mammals:</b>  Greater-cane rat  Angoni vlei rat</p> <p><b>Snakes and Lizards:</b>  Common brown water snake  Dusky bellied water snake  Aurora house snake  Olive house snake  Common slug eater  Spotted bush snake  Green water snake  Water monitor</p>
Forest	<p><b>Mammals:</b>  Woodland dormouse  Porcupine  Red veld rat  Natal multimammate mouse</p>

Habitat Type	List of Faunal Species
	House rat Vlei rat Slender mongoose White-tailed mongoose Large spotted genet  <b>Snakes and Lizards:</b> Olive house snake Aurora house snake Southern brown egg eater Rhombic night adder

**Table 5.4. Recorded sightings of mammal species listed in Table 5.3**

Common Name	Scientific Name	Observed	Known to occur in the project area (pers. comm.)
Golden mole	<i>Chrysoxalax villosus</i>	No	No
Elephant Shrew (Eastern Rock Sengi)	<i>Elephantulus myurus</i>	No	No
Sclaters Forest Shrew Forest Shrew	<i>Mysorex sclateri</i> <i>Mysorex varius</i>	No	No
Musk Shrews	<i>Crocidura species (at least 3)</i>	No	No
Vervet Monkey	<i>Cercopithecus pygerythrus</i>	No	Yes
Scrub Hare	<i>Lepus saxatilis</i>	No	Yes
Woodland Dormouse	<i>Graphiurus murinus</i>	No	No
Common (African) Mole-rat	<i>Cryptomys hottentotus</i>	No	No
Porcupine	<i>Hystrix africaeaustralis</i>	No	No
Greater Cane-rat	<i>Thryonomys swinderianus</i>	No	No
White-tailed Mouse	<i>Myodomys albicaudatus</i>	No	No
Fat Mouse	<i>Steatomys pratensis</i>	No	No
Brants Climbing Mouse Chestnut Climbing Mouse	<i>Dendromus mesomelas</i> <i>Dendromus mystacalis</i>	No	No
Namaqua Rock Mouse	<i>Micaelamys namaquensis</i>	No	No
Red Veld Rat	<i>Aethomys chrysophilus</i>	No	No
Four-striped Grass Mouse	<i>Rhabdomys pumilio</i>	No	Yes
House Mouse	<i>Mus musculus</i>	No	Yes
Natal Multimammate Mouse	<i>Mastomys natalensis</i>	No	No
House Rat	<i>Rattus rattus</i>	No	Yes
Angoni Vlei Rat Vlei Rat	<i>Otomys angoniensis</i> <i>Otomys irroratus</i>	No	Yes
Slender Mongoose	<i>Galerella sanguinea</i>	Yes	Yes
White-tailed Mongoose	<i>Ichneumia albicauda</i>	No	Yes
Yellow Mongoose	<i>Cynictis penicillata</i>	No	Yes
Rock Dassie	<i>Procavia capensis</i>	No	Yes

Table 5.5. Recorded reptilian species listed in Table 5.3

Common name	Scientific name	Observed	Known to occur in the project area (pers comm.)
<b>Snakes</b>			
Bibron's Blind Snake	<i>Typhlops bibronii</i>	No	Yes
Peter's Thread Snake	<i>Leptotyphlops scutifrons</i>	No	No
Common Brown Water Snake	<i>Lycodonomorphous rufulus</i>	No	Yes
Dusky bellied Water Snake	<i>Lycodonomorphous laevisimums</i>	No	Yes
Southern Brown House Snake	<i>Lamprophis capensis</i>	No	Yes
Olive House Snake	<i>Lamprophis inornatus</i>	No	No
Aurora House Snake	<i>Lamprophis aurora</i>	No	No
Spotted House Snake	<i>Lamprophis guttatus</i>	No	No
Cape Wolf Snake	<i>Lycophidion capense</i>	No	No
Common Slug Eater	<i>Duberria lutrix</i>	No	No
Mole Snake	<i>Pseudaspis cana</i>	No	Yes
Many-spotted Snake	<i>Amplorhinus multimaculatus</i>	No	No
Rhombic Skaapsteker	<i>Psammophylax rhombeatus</i>	No	Yes
Cross-marked Grass Snake	<i>Psammophis crucifer</i>	No	No
Cape Centipede Eater	<i>Aparallactus capensis</i>	No	No
Spotted Harlequin Snake	<i>Homoroselaps lacteus</i>	No	No
Striped Harlequin Snake	<i>Homoroselaps dorsalis</i>	No	No
Common Egg Eater	<i>Dasypeltis scabra</i>	No	No
Southern Brown Egg Eater	<i>Dasypeltis inornata</i>	No	No
Spotted Bush Snake	<i>Philothamnus semivariiegatus</i>	No	Yes
Green Water Snake	<i>Philothamnus hoplogaster</i>	No	Yes
Red-lipped Snake	<i>Crotaphopeltis hotamboeia</i>	No	No
Boomslang	<i>Dispholidus typus</i>	No	No
Rinkhals	<i>Hemachatus haemachatus</i>	Yes	Yes
Rhombic Night Adder	<i>Causus rhombeatus</i>	No	Yes
Puff Adder	<i>Bitis arientans</i>	No	Yes
<b>Lizards</b>			
Cape Skink	<i>Trachylepis capensis</i>	No	Unknown
Variable Skink	<i>Trachylepis varia</i>	No	Unknown
Striped Skink	<i>Trachylepis striata</i>	No	Unknown
Yellow-throated Plated Lizard	<i>Gerrhosaurus flavigularis</i>	No	No
Highveld Girdled Lizard	<i>Cordylus vittifer</i>	No	Unknown
Drakensberg Crag Lizard	<i>Cordylus melanotus</i>	No	Unknown
<b>Monitors</b>			
Water Monitor	<i>Varanus niloticus</i>	No	Yes
Rock Monitor	<i>Varanus albigularis</i>	No	Yes
<b>Geckos</b>			



## 5.6 Faunal Species of Special Concern

The following faunal SCC may be found onsite:

<b><i>Common name</i></b>	<b><i>Scientific name</i></b>
Rough-haired Golden Mole	<i>Chrysothalax villosus</i>
Maquassie Musk Shrew	<i>Crocidura maquassiensis</i>
White Tailed Mouse	<i>Mystromys albicaudatus</i>
Sclaters forest Shrew	<i>Myosorex sclateri</i>
Forest Shrew	<i>Myosorex varius</i>

## 6 SITE SENSITIVITY

In terms of Appendix 6 of the EIA Regulations (2014) a specialist report must contain-

- (f) the specific identified sensitivity of the site related to the activity and its associated structures and infrastructure;
- (g) an identification of any areas to be avoided, including buffers;
- (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;

### 6.1 Conservation and Spatial Planning Tools

Several conservation planning tools are available for the study areas. These tools allow for the potential identification of any sensitive and important areas from a vegetation and faunal perspective at the early stage of a development and allow for the fine-tuning of plans and infrastructure layouts.

The following tools were identified and are discussed below:

- NEMBA Threatened Ecosystems
- ECBCP Critical Biodiversity Areas
- NFEPA Wetlands & rivers
- NFA Protected forests

These tools together with the field survey have been used to assess the sensitivity of the study area. Sensitivity of the two Borrow areas as well as the surrounding environment is shown on a sensitivity map (Figure 6.1 below).

### 6.2 NEMBA Threatened Ecosystems

NEMBA provides a list of threatened terrestrial ecosystems. This was established as little attention has historically been paid to the protection of ecosystems outside of protected areas. The purpose of listing threatened ecosystems is primarily to reduce the rate of ecosystem and species extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems.

The entire area for both Borrow areas is located on Ngongoni Veld which is classified as **Vulnerable** by NEMBA. However, the vegetation that occurs here is widespread, transformed and very few SCC were identified onsite therefore these areas will be allocated a **moderate sensitivity** (Figure 6.1).

### 6.3 ECBCP Critical Biodiversity Areas

ECBCP has classified the entire area as a CBA 2 area which states that the environment must be managed in a near natural state. The site visit has confirmed that both areas are degraded and shows signs of intensive grazing as well as historical planting (tilling of soils) and urban development (remnants of old huts). Grassland onsite is secondary in nature with various “*other*” graminoids (other than Ngongoni grass) dispersed throughout the site areas. Based on the site assessment, all these areas are allocated a **low sensitivity** (Figure 6.1)

## 6.4 NFEPA wetlands and rivers

In this report, wetlands, rivers and drainage systems have been classified as having a **high sensitivity** (Figure 6.1). Additional wetlands associated with river floodplains were identified during the site assessment. Although no wetland or river systems are located within any of the two Borrow areas, various systems were identified immediately adjacent to both Borrow areas which may indirectly be impacted by mining activity.

### 6.4.1 NFA Protected forests

Although no forest as classified by the NFA were identified onsite, a single scarp forest was identified on a steep slope along the Xura River adjacent to Borrow area 1. Vegetation in this forest area is dense with no alien infestation observed. Vegetation consists of *Milettia grandis*, *M. sutherlandii*, *Buxus macowanii*, and *B. natalensis* among others. Based on this classification, this areas was allocated a **high sensitivity** (Figure 6.1)

## 6.5 Sensitivity map

A sensitivity map was developed based on the allocations made in Sections 6.1 – 6.4, for the two Borrow areas (Figure 6.1).

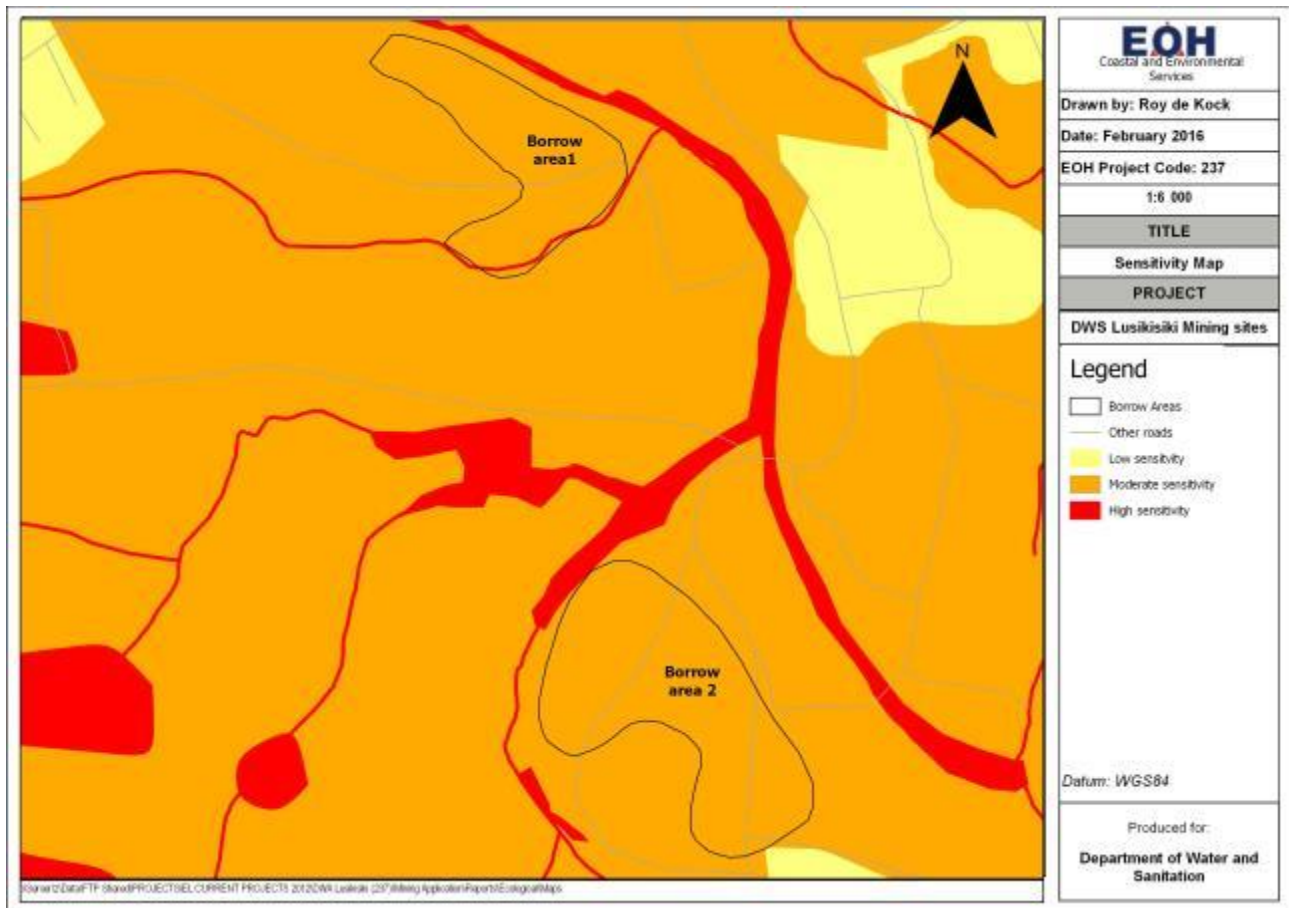


Figure 6.1. Sensitivity map for the two Borrow areas and surrounding environment.

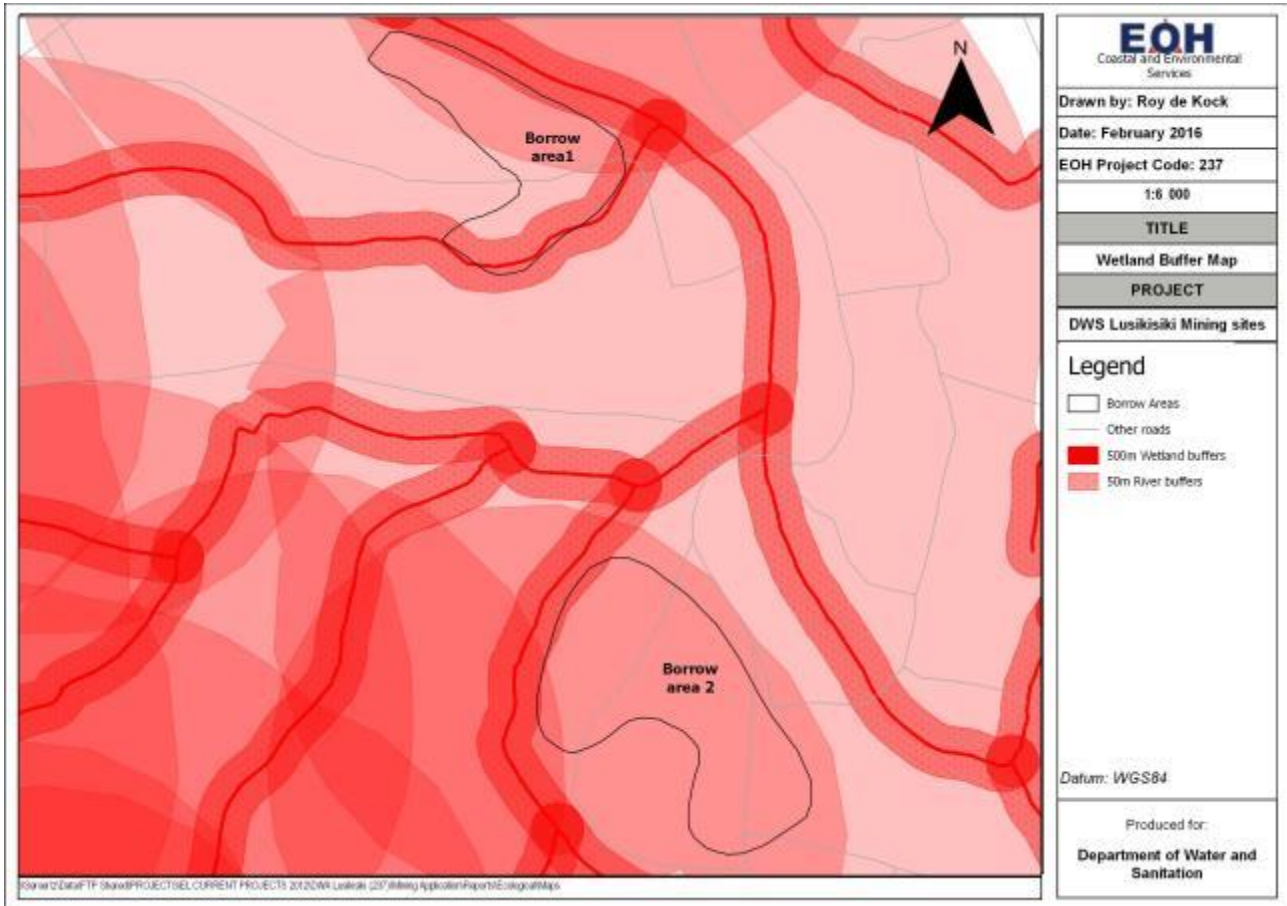
## 6.6 Recommendations

Various mitigations are recommended (based on the level of sensitivity of the affected area) to reduce the impacts of the proposed two Borrow areas on the surrounding natural environment.

**6.6.1 High sensitivity areas**

All rivers and wetlands are considered as “high sensitivity”, (coloured red in Figure 6.1). Authorisation must be obtained from the DWS prior to any construction taking place within the required buffers as indicated below:

- 50m buffer around all rivers and drainage systems
- 500m buffer around all wetlands.



**Figure 6.2. Wetland and river buffer map**

Based on Figure 6.2, an application for a WULA will be required for both Borrow areas. This application must be obtained prior to commencement of any activity onsite.

**6.6.2 Moderate sensitivity areas**

These areas include all natural veld. These have been categorised as moderate sensitivity due to the vulnerability classification by NEMBA even though being highly degraded. Scattered plant SCC are also found. The relevant permits must be obtained if any SCC will to be damaged or removed from site.

**6.6.3 Low sensitivity areas**

These areas are considered as severely disturbed or transformed by human activities, including cultivation, urban development and rural settlements. These areas are suitable for development due to absence of SCC and other significant ecological features and will only require low level mitigations.

## 6.7 Issues identified

The following issues were identified during the sensitivity assessment of the proposed two Borrow areas outside Lusikisiki.

**Table 6.1. Issues identified during the sensitivity assessment of the proposed two Borrow areas.**

ISSUES IDENTIFIED	DESCRIPTION OF IMPACTS
Loss of vulnerable vegetation	Both Borrow areas will lead to the temporary loss of natural but degraded Ngongoni grassveld during the mining phase. The clearing of vegetation outside the mining footprint may lead to the unnecessary loss of natural vegetation.
Loss of SCC	The mining activity at both Borrow areas will lead to the destruction of habitats and the loss of identified and unidentified plant and animal SCC.
Damage to the riverine systems	Mining activities at both Borrow areas may cause increased levels of erosion, sedimentation and pollution of the surrounding watercourses. Poor planning and design (i.e. inappropriate utilisation of sensitive riverine systems) will lead to the degradation of watercourses, associated natural habitats and sensitive aquatic systems.
Soil erosion	Inappropriate stormwater design of both mining sites may lead to an increase in surface soil erosion.
Control of alien plant species	The clearing of existing natural vegetation creates 'open' habitats that will favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring natural ecosystems.
Rehabilitation of disturbed areas	Poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow invading alien vegetation species to expand.

## 7 MANNER IN WHICH THE ENVIRONMENT MAY BE AFFECTED

In terms of Appendix 6 of the EIA Regulations (2014) a specialist report must contain-

(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment;

(k) any mitigation measures for inclusion in the EMPr;

### 7.1 Impacts identified

Ecological impacts that were identified during the Planning and Design, Construction and Operation (Mining) Phase of the proposed 2 x Borrow areas outside Lusikisiki are described below. These included the consideration of direct, indirect and cumulative impacts that may occur.

The construction phase has been assessed as being completed once both mining sites are established and mineral extraction can occur. The operational phase has been assessed as the mining period where minerals are extracted from the ground and transported offsite.

**Table 7.1. Impacts identified during the phases of the two Borrow areas.**

Phases	Issue	Nature of Impact	Description of Impact
Planning & Design	Loss of natural vegetation	Direct	During the planning and design phase, poor site planning and demarcation of the borrow pit sites could result in the unnecessary loss of natural vegetation.
		N/A	Not applicable to this phase
	Loss of SCC	Direct	During the planning and design phase the mining layout at both Borrow areas may lead to the destruction of habitats and the loss of identified and unidentified plant and animal SCC.
		N/A	Not applicable to this phase
	Damage to the riverine systems	Direct	During the planning and design phase the inappropriate design of stormwater management may cause the degradation of watercourses, associated natural habitats and sensitive aquatic ecosystems.
		N/A	Not applicable to this phase
	Soil erosion	Direct	During the planning and design phase inappropriate stormwater design may lead to an increase in surface soil erosion.
Control of alien plant species	Yes	During the planning and design phase, the lack of an appropriate Rehabilitation and Alien Management Plan will result in the invasion of alien vegetation species in areas impacted on by the borrow pits.	
Rehabilitation of disturbed areas	N/A	Not applicable to this phase	
Site establishment	Loss of natural vegetation	N/A	Not applicable to this phase
		N/A	Not applicable to this phase
	Loss of SCC	N/A	Not applicable to this phase
		N/A	Not applicable to this phase
	Damage to the riverine systems	N/A	Not applicable to this phase
		N/A	Not applicable to this phase
Soil erosion	Direct, indirect, cumulative	During the site establishment phase, the extensive clearing of ground cover may lead to soil erosion.	
Control of alien plant species	Direct, indirect	During the site establishment phase, the clearing of existing natural vegetation creates 'open' habitats that are susceptible to the establishment of undesirable alien plant species in areas	

Phases	Issue	Nature of Impact	Description of Impact
			that are typically very difficult to eradicate and may pose a threat to natural ecosystems.
	Rehabilitation of disturbed areas	N/A	Not applicable to this phase
<b>Mining</b>	Loss of natural vegetation	Direct	During the mining phase, both Borrow areas will lead to the temporary loss of natural but degraded Ngongoni grassveld during the mining phase.
		Direct	During the mining phase the clearing of vegetation outside the mining sites will lead to the unnecessary loss of natural vegetation.
	Loss of SCC	Direct, indirect, cumulative	During the mining phase the uncontrolled clearing of areas outside the mining area may lead to the unnecessary loss of identified and unidentified plant and animal SCC.
		Direct, indirect, cumulative	During the mining phase, mining activities will lead to the loss of identified and unidentified plant and animal SCC.
	Damage to the riverine systems	Direct, indirect, cumulative	During the mining phase, mining activities may cause increased levels of erosion, sedimentation and pollution of the surrounding watercourses.
		N/A	Not applicable to this phase
	Soil erosion	Direct, indirect, cumulative	During the mining phase the extensive clearing of ground cover may lead to soil erosion.
	Control of alien plant species	Direct, indirect, cumulative	During the mining phase the lack of an effective alien vegetation management plan may lead to the large scale alien plant invasion.
	Rehabilitation of disturbed areas	Direct, indirect, cumulative	During the mining phase the failure to adequately rehabilitate areas post-mining could lead to a large scale alien plant invasion and potential displacement of indigenous vegetation.
<b>Decommissioning and closure (Post-mining)</b>	Loss of natural vegetation	N/A	Not applicable to this phase
	Loss of SCC	N/A	Not applicable to this phase
	Damage to the riverine systems	N/A	Not applicable to this phase
	Soil erosion	N/A	Not applicable to this phase
	Spillages of harmful substances	N/A	Not applicable to this phase
	Control of alien plant species	Direct, indirect, cumulative	During the decommissioning and closure phase the lack of an effective alien vegetation management plan may lead to the large scale alien plant invasion.
	Rehabilitation of disturbed areas	Direct, indirect, cumulative	During the decommissioning and closure phase the failure to adequately rehabilitate areas post-mining could lead to a large scale alien plant invasion and potential displacement of indigenous vegetation.
<b>No-Go option</b>	Not constructing the borrow pits	Direct, cumulative	Not constructing the borrow pits will result in no change in the current ecological landscape.

## 7.2 Impact assessment

The impacts identified in Section 7.1 are assessed in terms of the criteria described in Section 2.4.7 and are summarised in the tables below (Table 7.2 – 7.4).



**Table 7.2. Assessment and mitigation of impacts in the Planning and Design Phase.**

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/ BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
<b>Issue: Loss of natural vegetation</b>							
During the planning and design phase, poor site planning and demarcation of the borrow pit sites could result in the unnecessary loss of natural vegetation.	Localised	Long-term	Possible	Moderately Severe	MODERATE	<ul style="list-style-type: none"> <li>The borrow pit sites must be selected so that any sensitive ecological features are avoided.</li> <li>The borrow pit sites must be clearly demarcated prior to the site establishment and mining phases to prevent the unnecessary clearing of natural vegetation outside of the designated borrow pit sites.</li> </ul>	LOW
<b>Issue: Loss of SCC</b>							
During the planning and design phase the mining layout at both Borrow areas may lead to the destruction of habitats and the loss of identified and unidentified plant and animal SCC.	Localised	Permanent	Definite	Moderately Severe	MODERATE	<ul style="list-style-type: none"> <li>Borrow pit design should avoid areas where plant and animal SCC have been identified.</li> <li>If unavoidable, permits must be obtained from the relevant departments in order to remove plant and animal SCC from the development area prior to mining.</li> </ul>	LOW
<b>Issue: Damage to the riverine systems</b>							
During the planning and design phase the inappropriate design of stormwater management may cause the degradation of watercourses, associated natural habitats and sensitive aquatic systems.	Localised	Medium-term	Probable	Severe	HIGH	<ul style="list-style-type: none"> <li>The mining engineer must ensure that appropriate stormwater structures are included in the borrow pit design to manage stormwater and to minimise erosion and sedimentation of watercourses.</li> <li>The mining engineer must ensure that borrow pits situated on slopes</li> </ul>	MODERATE



DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/ BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
						incorporate stormwater diversion. <ul style="list-style-type: none"> <li>The mining engineer must ensure that all stormwater structures are designed in line with both DMR and DWS requirements.</li> <li>If any planned mining takes place inside or within 50 meters of any river, stream or drainage system, or within 500m of a wetland, authorisation must be obtained from DWS.</li> </ul>	
<b>Issue: Soil erosion</b>							
During the planning and design phase inappropriate stormwater design may lead to an increase in surface soil erosion.	<b>Localised</b>	<b>Medium-term</b>	<b>Possible</b>	<b>Moderately Severe</b>	<b>MODERATE</b>	<ul style="list-style-type: none"> <li>Appropriate stormwater structures must be designed and implemented.</li> <li>All infrastructure situated on slopes must incorporate stormwater diversions.</li> </ul>	<b>LOW</b>
<b>Issue: Control of alien species</b>							
During the planning and design phase, the lack of an appropriate Rehabilitation and Alien Management Plan will result in the invasion of alien vegetation species in areas impacted on by the borrow pits.	<b>Study site</b>	<b>Short-term</b>	<b>Probable</b>	<b>Moderately Severe</b>	<b>MODERATE NEGATIVE</b>	<ul style="list-style-type: none"> <li>A Rehabilitation and Alien Management Plan must be developed prior to any activities associated with the borrow pits commencing.</li> </ul>	<b>LOW NEGATIVE</b>

**Table 7.3. Assessment and mitigation of impacts identified in the Site Establishment Phase.**

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY/BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
<b>Issue: Soil erosion</b>							
During the site establishment phase, the extensive clearing of ground cover may lead to soil erosion.	Study area	Short-term	Possible	Moderately severe	MODERATE	<ul style="list-style-type: none"> <li>Bank restoration, re-vegetation and stabilisation must be implemented once site establishment is complete and must include the use of gabions for bank stabilisation if required.</li> </ul>	LOW
<b>Issue: Control of alien plant species</b>							
During the site establishment phase, the clearing of existing natural vegetation creates 'open' habitats that are susceptible to the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to natural ecosystems.	Study site	Short-term	Probable	Moderately severe	MODERATE	<ul style="list-style-type: none"> <li>A Rehabilitation and Alien Management Plan must be developed and implemented during the site establishment phase to reduce the establishment and spread of undesirable alien plant species.</li> <li>Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. This must be done under the supervision of the ECO.</li> </ul>	LOW

**Table 7.4. Assessment and mitigation of impacts identified in the Mining Phase for all alternatives.**

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
<b>Issue: Loss of natural vegetation</b>							
During the mining phase, both Borrow areas will lead to the temporary loss of natural but degraded Ngongoni grassveld during the mining phase.	Study site	Long-term	Definite	Moderately severe	MODERATE	<ul style="list-style-type: none"> <li>The entire site must be rehabilitated to natural Ngongoni Veld after completion of all mining activities.</li> </ul>	MODERATE
During the mining phase	Localised	Short-term	Possible	Highly severe	HIGH	<ul style="list-style-type: none"> <li>Mining activities must be limited</li> </ul>	LOW

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/ BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
the clearing of vegetation outside the mining sites will lead to the unnecessary loss of natural vegetation.						<p>to the designated footprint of the mining site i.e. mining minerals, stockpiles, vehicular storage, mine camps etc., must only occur in the designated mining area.</p> <ul style="list-style-type: none"> <li>• The mining site must be demarcated prior to mining commencing.</li> <li>• The mining footprint must be approved by an ECO to ensure that natural vegetation is not unnecessarily damaged.</li> </ul>	
<b>Issue: Loss of SCC</b>							
During the mining phase the uncontrolled clearing of areas outside the mining area may lead to the unnecessary loss of identified and unidentified plant and animal SCC.	<b>Localised</b>	<b>Short-term</b>	<b>Possible</b>	<b>Highly severe</b>	<b>HIGH</b>	<ul style="list-style-type: none"> <li>• No SCC must be removed outside the approved demarcated mining areas.</li> <li>• No vegetation removal must occur outside the approved demarcated mining area.</li> <li>• The contractor's workers must not poach or trap wild animals.</li> <li>• The contractor's workers must not harvest natural vegetation.</li> </ul>	<b>LOW</b>
During the mining phase, mining activities will lead to the loss of identified and unidentified plant and animal SCC.	<b>Study site</b>	<b>Long-term</b>	<b>Definite</b>	<b>Moderately severe</b>	<b>MODERATE</b>	<ul style="list-style-type: none"> <li>• The developer must develop a Vegetation and Animal Relocation Plan that must be approved by the appointed ECO and incorporated into the site EMPr.</li> <li>• All SCC must be removed according to the approved Vegetation and Animal Relocation Plan</li> <li>• Permits must be obtained for all</li> </ul>	<b>LOW</b>

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/ BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
						SCC prior to commencement of construction activities onsite.	
<b>Issue: Damage to riverine systems</b>							
During the mining phase, mining activities may cause increased levels of erosion, sedimentation and pollution of the surrounding watercourses.	<b>Localised</b>	<b>Long-term</b>	<b>Possible</b>	<b>Highly severe</b>	<b>HIGH</b>	<ul style="list-style-type: none"> <li>• If any mining activity occurs within 50 meters of a river, stream or drainage system, or within 500m of a wetland, authorisation must be obtained from DWS.</li> <li>• No mining must be done within any waterbody.</li> <li>• Silt fences should be used to prevent soil eroding from nearby mining activities reaching watercourses.</li> <li>• Wet cement must not be allowed to come into contact with any watercourse.</li> <li>• Mine staff must not use any open water body or natural water source adjacent to the mining site for the purposes of bathing, washing of clothing or for any construction related activities.</li> <li>• All mine-water and contaminated runoff must be directed away from the watercourses.</li> </ul>	<b>LOW</b>
<b>Issue: Soil erosion</b>							
During the mining phase the extensive clearing of ground cover may lead to soil erosion.	<b>Study area</b>	<b>Long-term</b>	<b>Possible</b>	<b>Moderately severe</b>	<b>MODERATE</b>	<ul style="list-style-type: none"> <li>• Bank restoration, re-vegetation and stabilisation must be implemented and inspected regularly during mining and must include the use of gabions</li> </ul>	<b>LOW</b>

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/ BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
						for bank stabilisation if required.	
<b>Issue: Control of alien plant species</b>							
During the mining phase the clearing of existing natural vegetation creates 'open' habitats that are susceptible to the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to natural ecosystems.	Study site	Long-term	Probable	Moderately severe	MODERATE	<ul style="list-style-type: none"> <li>A Rehabilitation and Alien Management Plan must be developed and implemented during the mining phase to reduce the establishment and spread of undesirable alien plant species.</li> <li>Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. This must be done under the supervision of the ECO.</li> </ul>	LOW
<b>Issue: Rehabilitation of disturbed areas</b>							
During the mining phase the failure to adequately rehabilitate areas post-mining could lead to a large scale alien plant invasion and potential displacement of indigenous vegetation.	Study site	Long-term	Probable	Moderately severe	MODERATE	<ul style="list-style-type: none"> <li>All impacted areas must be rehabilitated back to Ngongoni veld after mining.</li> <li>Only topsoil from the immediate area must be used for rehabilitation. If none available alternative methods must be investigated and implemented like hydro-seeding, planting etc.</li> <li>All mined areas must be restored as per the Rehabilitation and Alien Management Plan.</li> </ul>	LOW

**Table 7.5. Assessment and mitigation of impacts identified in the Decommissioning and Closure Phase for all alternatives.**

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/ BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
<b>Issue: Control of alien plant species</b>							
During the decommissioning and closure phase the lack of an effective alien vegetation management plan may lead to the large scale alien plant invasion.	Study site	Long-term	Probable	Moderately severe	MODERATE	<ul style="list-style-type: none"> <li>A Rehabilitation and Alien Management Plan must be developed and implemented during the decommissioning and closure phase to reduce the establishment and spread of undesirable alien plant species.</li> <li>Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. This must be done under the supervision of the ECO.</li> </ul>	LOW
<b>Issue: Rehabilitation of disturbed areas</b>							
During the decommissioning and closure phase the failure to adequately rehabilitate areas post-mining could lead to a large scale alien plant invasion and potential displacement of indigenous vegetation.	Study site	Long-term	Probable	Moderately severe	MODERATE	<ul style="list-style-type: none"> <li>All impacted areas must be rehabilitated back to Ngongoni veld after mining.</li> <li>Only topsoil from the immediate area must be used for rehabilitation. If none available alternative methods must be investigated and implemented like hydro-seeding, planting etc.</li> <li>All mined areas must be restored as per the Rehabilitation and Alien Management Plan.</li> </ul>	LOW

**Table 7.6. Assessment and mitigation of impacts identified in the No-go alternative.**

DESCRIPTION OF IMPACTS	SPATIAL SCALE	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE/ LIKELIHOOD	SEVERITY/ BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
<b>Issue: Not construction the borrow pits</b>							
Not constructing the borrow pits will result in no change in the current ecological landscape.	Study area	Permanent	Definite	Beneficial	BENEFICIAL	<ul style="list-style-type: none"> <li>None</li> </ul>	BENEFICIAL

## 8 IMPACT STATEMENT, CONCLUSION AND RECOMMENDATIONS

In terms of Appendix 6 of the EIA Regulations (2014) a specialist report must contain-

- (l) any conditions for inclusion in the environmental authorisation;
- (m) any monitoring requirements for inclusion in the EMP or environmental authorisation;
- (n) a reasoned opinion-
  - (i) as to whether the proposed activity or portions thereof should be authorised; and
  - (ii) if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMP, and where applicable, the closure plan;

### 8.1 Conclusions

The following table summarises the change in impacts from pre- to post- mitigation for two borrow pit areas outside Lusikisiki, Eastern Cape province.

**Table 8.1. Assessment of pre- and post-mitigation impact significance.**

	PRE-MITIGATION				POST-MITIGATION			
	LOW	MODERATE	HIGH	UN-KNOWN	LOW	MODERATE	HIGH	UN-KNOWN
Planning and Design	0	4	1	0	4	1	0	0
Site establishment	0	2	0	0	2	0	0	0
Mining	0	5	3	0	7	1	0	0
Decommissioning and closure	0	2	0	0	2	0	0	0
<b>TOTAL</b>	<b>0</b>	<b>13</b>	<b>4</b>	<b>0</b>	<b>15</b>	<b>2</b>	<b>0</b>	<b>0</b>

### 8.2 Current status

The vegetation on the study site is mostly degraded and transformed as a result of previous land use such as agriculture and grazing. Some SCC were observed onsite and will require permits before they can be removed. Both Borrow areas are surrounded by wetlands and river & stream systems which will require intensive management to minimise impacts.

### 8.3 Recommendations for the two Borrow areas

All the mitigation measures provided below are to be implemented in the Planning and Design, Site Establishment, Mining and Decommissioning and Closure Phases for the two Borrow areas.

#### 8.3.1 Planning and Design Phase

The following conditions associated with Planning and Design Phase must be implemented:

##### Issue: Loss of natural vegetation

- The borrow pit sites must be selected so that any sensitive ecological features are avoided.
- The borrow pit sites must be clearly demarcated prior to the site establishment and mining phases to prevent the unnecessary clearing of natural vegetation outside of the designated borrow pit sites.



**Issue: Loss of SCC**

- Borrow pit design should avoid areas where plant and animal SCC have been identified.
- If unavoidable, permits must be obtained from the relevant departments in order to remove plant and animal SCC from the development area prior to mining.

**Issue: Damage to the riverine systems**

- The mining engineer must ensure that appropriate stormwater structures are included in the borrow pit design to manage stormwater and to minimise erosion and sedimentation of watercourses.
- The mining engineer must ensure that borrow pits situated on slopes incorporate stormwater diversion.
- The mining engineer must ensure that all stormwater structures are designed in line with both DMR and DWS requirements.
- If any planned mining takes place inside or within 50 meters of any river, stream or drainage system, or within 500m of a wetland, authorisation must be obtained from DWS.

**Issue: Soil erosion**

- Appropriate stormwater structures must be designed and implemented.
- All infrastructure situated on slopes must incorporate stormwater diversions

**Issue: Control of alien species**

- A Rehabilitation and Alien Management Plan must be developed prior to any activities associated with the borrow pits commencing.

**8.3.2 Site Establishment Phase**

The following conditions associated with Site Establishment Phase must be implemented:

**Issue: Soil erosion**

- Bank restoration, re-vegetation and stabilisation must be implemented once site establishment is complete and must include the use of gabions for bank stabilisation if required.

**Issue: Control of alien plant species**

- A Rehabilitation and Alien Management Plan must be developed and implemented during the site establishment phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. This must be done under the supervision of the ECO.

**8.3.3 Mining Phase**

The following conditions associated with the Mining Phase must be implemented:

**Issue: Loss of natural vegetation**

- The entire site must be rehabilitated to natural Ngongoni Veld after completion of all mining activities.
- Mining activities must be limited to the designated footprint of the mining site i.e. mining minerals, stockpiles, vehicular storage, mine camps etc., must only occur in the designated mining area.
- The mining site must be demarcated prior to mining commencing.
- The mining footprint must be approved by an ECO to ensure that natural vegetation is not unnecessarily damaged.

**Issue: Loss of SCC**

- No SCC must be removed outside the approved demarcated mining areas.
- No vegetation removal must occur outside the approved demarcated mining area.

- The contractor's workers must not poach or trap wild animals.
- The contractor's workers must not harvest natural vegetation.
- The developer must develop a Vegetation and Animal Relocation Plan that must be approved by the appointed ECO and incorporated into the site EMP.
- All SCC must be removed according to the approved Vegetation and Animal Relocation Plan
- Permits must be obtained for all SCC prior to commencement of construction activities onsite.

**Issue: Damage to riverine systems**

- If any mining activity occurs within 50 meters of a river, stream or drainage system, or within 500m of a wetland, authorisation must be obtained from DWS.
- No mining must be done within any waterbody.
- Silt fences should be used to prevent soil eroding from nearby mining activities reaching watercourses.
- Wet cement must not be allowed to come into contact with any watercourse.
- Mine staff must not use any open water body or natural water source adjacent to the mining site for the purposes of bathing, washing of clothing or for any construction related activities.
- All mine-water and contaminated runoff must be directed away from the watercourses.

**Issue: Soil erosion**

- Bank restoration, re-vegetation and stabilisation must be implemented and inspected regularly during mining and must include the use of gabions for bank stabilisation if required.

**Issue: Control of alien plant species**

- A Rehabilitation and Alien Management Plan must be developed and implemented during the mining phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. This must be done under the supervision of the ECO.

**Issue: Rehabilitation of disturbed areas**

- All impacted areas must be rehabilitated back to Ngongoni veld after mining.
- Only topsoil from the immediate area must be used for rehabilitation. If none available alternative methods must be investigated and implemented like hydro-seeding, planting etc.
- All mined areas must be restored as per the Rehabilitation and Alien Management Plan.

**8.3.4 Decommissioning and Closure Phase**

The following conditions associated with the Decommissioning and Closure Phase must be implemented:

**Issue: Control of alien plant species**

- A Rehabilitation and Alien Management Plan must be developed and implemented during the decommissioning and closure phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting etc. This must be done under the supervision of the ECO.

**Issue: Rehabilitation of disturbed areas**

- All impacted areas must be rehabilitated back to Ngongoni veld after mining.
- Only topsoil from the immediate area must be used for rehabilitation. If none available alternative methods must be investigated and implemented like hydro-seeding, planting etc.
- All mined areas must be restored as per the Rehabilitation and Alien Management Plan.

#### **8.4 Proposed management plans to be developed and implemented as part of the final EMPr**

In summary, the following plans need to be developed as part of the final EMPr and Project monitoring, incorporating all the issues, conclusions and recommendations of this report:

- Vegetation and Animal Relocation Plan
- Rehabilitation and Alien Management Plan

#### **8.5 Environmental Statement and Opinion of the Specialist**

The ecological impacts of all aspects for both Borrow Areas were assessed and considered to be ecologically acceptable, provided that the mitigation measures provided in this report are implemented. All impacts are rated as **MODERATE to HIGH pre-mitigation** (Table 8.1), therefore implementation of recommended mitigation measures coupled with comprehensive rehabilitation and monitoring in terms of re-vegetation and restoration is an important element of the mitigation strategy. Implementing the recommended mitigations measures will **reduce impacts to MODERATE and LOW**.

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**10 APPENDIX 1 – PLANT SPECIES LIST**

Family	Species	IUCN	SA RED LIST	PNCO	Protected Tree list	NEMBA
FABAECEAE	<i>Acacia natalitia</i>	-	-	-	-	-
GRAMINACEAE	<i>Aristida junciformis</i>	-	Least Concern	-	-	-
APOCYNACEAE	<i>Asclepia gibba</i>	-	Least Concern	Schedule 4	-	-
ASTERACEAE	<i>Bidens pilosa</i>	-	Not Evaluated	-	-	-
GRAMINACEAE	<i>Bothriochloa insculpta</i>	-	-	-	-	-
FABAECEAE	<i>Chamaecrista mimosoides</i>	-	-	-	-	-
ASTERACEAE	<i>Cirsium vulgare</i>	-	Not Evaluated	-	-	-
RUBIACEAE	<i>Conostomium natalense</i>	-	-	-	-	-
CONVOLVULACEAE	<i>Cuscuta campestris</i>	-	Not Evaluated	-	-	-
IRIDACEAE	<i>Dietes grandiflora</i>	Least Concern	Least Concern	Schedule 4	-	-
POACEAE	<i>Eragrostis curvula</i>	-	Least Concern	-	-	-
ASTERACEAE	<i>Euryops laxis</i>	-	-	-	-	-
ASTERACEAE	<i>Gerbera ambigua</i>	-	-	-	-	-
ASTERACEAE	<i>Hellichrysum alloides</i>	-	-	-	-	-
STERCULIACEAE	<i>Hermannia grandistipula</i>	-	-	-	-	-
POACEAE	<i>Hyparrhenia hirta</i>	-	Least Concern	-	-	-
HYPOXIDACEAE	<i>Hypoxis cf argentea</i>	-	Least Concern	-	-	-
IRIDACEAE	<i>Moraea huttonii</i>	-	-	-	-	-
POACEAE	<i>Panicum maximum</i>	-	-	-	-	-
POACEAE	<i>Paspalum scrobiculatum</i>	-	-	-	-	-
RUBIACEAE	<i>Pentanisia prunelloides</i>	-	-	-	-	-
SCROPHULARIACEAE	<i>Selago tarachodes</i>	-	-	-	-	-
ASTERACEAE	<i>Senecio exuberans</i>	-	-	-	-	-
SOLANACEAE	<i>Solanum mauritianum</i>	-	-	-	-	-
SOLANACEAE	<i>Solanum elaeagnifolium</i>	-	-	-	-	-
POACEAE	<i>Sporobolus africanus</i>	-	-	-	-	-
POACEAE	<i>Sporobolus pyramidalis</i>	-	-	-	-	-

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BIGNONIACEAE	<i>Tecoma capensis</i>	-	Least Concern	-	-	-
POACEAE	<i>Themeda triandra</i>	-	Least Concern	-	-	-
COMPOSITEAE	<i>Vernonia galpinii</i>	-	-	-	-	-