



DRAFT BASIC ASSESSMENT REPORT:
PROPOSED UPGRADE OF THE NDABAKAZI
INTERCHANGE BETWEEN THE N2 AND THE
R409 NEAR BUTTERWORTH



O **CES**

ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES





**PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE
BETWEEN THE N2 AND THE R409 NEAR BUTTERWORTH.**

AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE

DEA REF:

DRAFT BASIC ASSESSMENT REPORT

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(SANRAL)**

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LIST OF ACRONYMS

The following acronyms have been used in this report:

BID:	Background Information Document
BAR:	Basic Assessment Report
CA:	Competent Authority
CBA:	Critical Biodiversity Area
CITES:	Committee for International Trade in Endangered Species
DEA:	Department of Environmental Affairs
DEDEAT:	Department of Economic Development, Environmental Affairs and Tourism
DWS:	Department of Water and Sanitation
EAP:	Environmental Assessment Practitioner
ECO:	Environmental Control Officer
ECPHRA:	Eastern Cape Provincial Heritage Resources Authority
EIA:	Environmental Impact Assessment
EIR:	Environmental Impact Report
EMPr:	Environmental Management Programme
GNR:	Government Notice Regulation
ha:	Hectare
I&APs:	Interested and Affected Parties
IDP:	Integrated Development Plan
NEMA:	National Environmental Management Act
NEM: WA:	National Environmental Management Waste Act
NFEPA:	National Freshwater Ecosystem Priority Area
PAES:	Protected Areas Expansion Strategy
PPP:	Public Participation Process
RDB:	Red Data Book
SACNASP:	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANRAL:	South African National Roads Agency SOC Limited
SDF:	Spatial Development Framework
SCC:	Species of Conservation Concern
WULA:	Water Use License Application



1 INTRODUCTION

According to Appendix 1, Section 3 (1), of the EIA Regulations (2014) (as amended), “A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—

(a) details of –

(i) the EAP who prepared the report; and

(ii) the expertise of the EAP, including a curriculum vitae”

1.1 PURPOSE OF THIS REPORT

This report fulfils the requirement of the EIA Regulations (2014, as amended) for the documentation of the Basic Assessment Process. The structure of this report is based on Appendix 1 of GN No. 326, of the EIA Regulations (2014, as amended), which clearly specifies the required content of a Basic Assessment Report (BAR).

1.2 ASSUMPTIONS AND LIMITATIONS

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

- The report is based on a project description taken from design specifications for the proposed construction of the Ndabakazi Interchange.
- Descriptions of the natural and social environments are based on the outcomes of the

In fulfilment of the above-mentioned legislative requirements, the details of the EAP that prepared this report, as well as the expertise of the individual members of the study team, are provided in the sections below.

1.3 DETAILS OF THE EAP

CES has been appointed by the SANRAL, as the independent Environmental Assessment Practitioner (EAP) to apply for an Environmental Authorisation (EA) for the construction of the Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province.

EAP: Dr Alan Carter Pr.Sci.Nat and registered with EAPSA
Company: CES
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Telephone: +27 (43) 726 7809
Fax: +27 (43) 726 8352
Email: a.carter@cesnet.co.za
Website: www.cesnet.co.za



1.3.1 DR ALAN CARTER – EXECUTIVE

Alan is the executive of the CES East London Office. He holds a PhD in Marine Biology and is a Certified Public Accountant, with extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He has 25 years' experience in environmental management and has specialist skills in sanitation, coastal environments and industrial waste. Dr Carter is registered as a Professional Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP). He is also registered as an EAP with the Environmental Assessment Practitioners of South Africa (EAPSA) interim EAP certification body. Alan will assume the role of project leader and report reviewer.

Please find the CV and proof of SACNASP and EAPSA registration in Appendix A

1.4 EXPERTISE OF THE PROJECT TEAM

CES was established in 1990 as a specialist environmental consulting company and has considerable experience in terrestrial, marine and freshwater ecology, the Social Impact Assessment (SIA) process, State of Environment Reporting (SOER), Integrated Waste Management Plans (IWMP), Environmental Management Programme (EMPr), Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) processes. CES has been active in all of the above fields, and in so doing have made a positive contribution towards environmental management and sustainable development in the Eastern Cape, South Africa and many other African countries. We believe that a balance between development and environmental protection can be achieved by skilful, considerate and careful planning.

Our staffs are currently comprised of 35 professional staff and 12 support staff. All professional staff members are well qualified, and as many as 90% have advanced postgraduate qualifications, including PhD, MSc and MA degrees in the biological, social and environmental sciences. In addition, CES has well-developed working relationships with a number of other individual specialist and specialist consulting companies who provide us with expertise in disciplines such as air quality impact assessments, noise impacts, heritage assessments, radiation hazard assessments, groundwater studies and health impact assessments. We have a demonstrated ability to manage EIAs for large and complex projects. This experience was initially gained during the undertaking of integrated environmental management studies, as well as the management of large and complex environmental and social impact assessments. CES has managed numerous large EIAs from pre-feasibility through to operation for international clients in six southern African countries. These have been rigorously reviewed by parties such as the World Bank, MIGA, European Investment Bank, IFC, German Investment Bank (KfW), African Development Bank, BHP Billiton international peer review team and the Dutch Development Bank (FMO).

The proposed project team consists of a number of highly qualified and experienced environmental consultants from CES (Table 1-1). Full curricula vitae for the project team are provided in Appendix A.



Table 1-1: CES Project Team

<p>Dr Alan Carter Project Leader and Quality Control</p>	<p>Dr Alan Carter 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. Dr Carter is registered as a Professional Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP) and a registered EAP with the Environmental Assessment Practitioners of South Africa (EAPSA). Alan will be responsible for all the review and quality control of the EIA process.</p>
<p>Mr Roy De Kock Project Manager, Report Review</p>	<p>Roy is a principal 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. He is registered as a Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP; No: 400216/16). Roy will assume the role of project manager, as well as report reviewer on the project team.</p>
<p>Ms Caryn Clarke Report Writer</p>	<p>Caryn holds a M.Sc. degree in Environmental Science from Rhodes University. Her Master's dissertation investigated climate change adaptation strategies of vulnerable rural households in Willowvale and Lesseyton, Eastern Cape. Her professional interests include climate change policy, renewable energy and various environmental impact assessments. Caryn has worked on numerous basic assessments projects including various linear developments such as roads and pipelines. She has extensive public participation and stakeholder engagement experience. Caryn is a registered Candidate Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP; No: 500022/14). Caryn will assume the role of report writer and facilitate the public participation process.</p>

1.5 DECLARATION

I, Dr. Alan Robert Carter, declare that:

- I act as the independent environmental practitioner 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 environmental impact assessments, 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 EAP:

A handwritten signature in black ink, appearing to be 'A. M.' with a flourish at the end.

Name of company:

CES Environmental and Social Advisory Services

Date:

2 May 2019

DRAFT



2 PROPERTY DESCRIPTION AND ACTIVITY LOCATION

In terms of Section Appendix 1; Content of a Basic Assessment Report of the EIA Regulations (2014, as amended), a BAR must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

- (b) the location of the activity, including –*
 - (i) the 21-digit Surveyor General code of each cadastral land parcel;*
 - (ii) where available, the physical address and farm name;*
 - (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;*
- (c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is—*
 - (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or*
 - (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken.*

The following section provides information on the general location of the proposed development as well as more detailed information regarding the land ownership within and surrounding the application area.

2.1 PROJECT LOCATION

The proposed Ndabakazi Interchange is located at the intersection between the N2 and the R409, 13 km south of Butterworth within the Amathole District Municipality of the Eastern Cape Province (Figure 3-1 above and Figure 2-1 below). The project starts at kilometer (km) 22 to km 25 of Section 17 of the National Route N2.

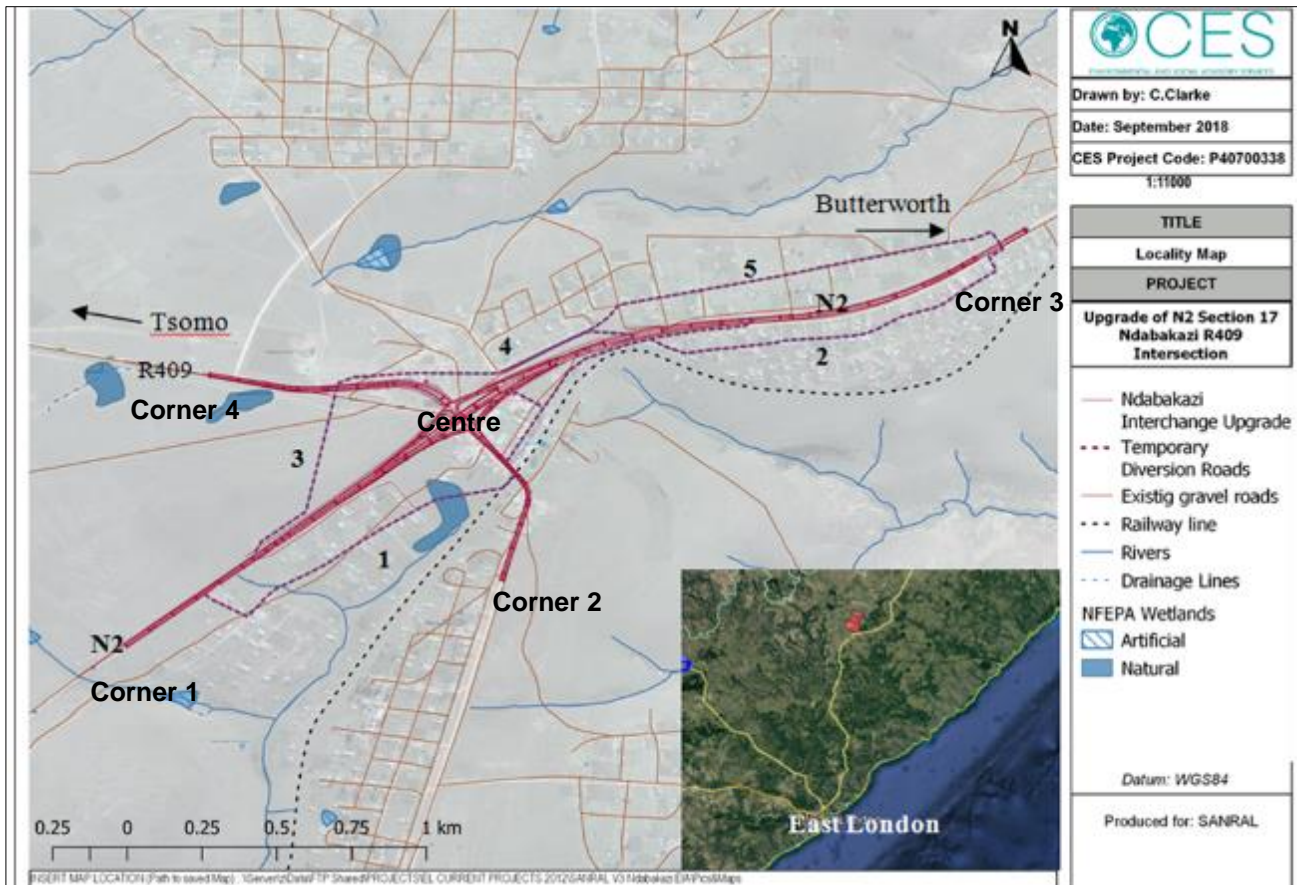


Figure 2-1: Location of the proposed development and route coordinates

The route coordinates of the Ndabakazi Interchange are detailed in Table 2-1 below.

Table 2-1: Coordinate points of the application area

NDABAKAZI INTERCHANGE	COORDINATES (DDMMSS)
Centre Coordinate	32° 20.930'S; 28° 2.107'E
Corner 1 Coordinates	32° 21.412'S; 28° 1.402'E
Corner 2 Coordinates	32° 21.284'S; 28° 2.196'E
Corner 3 Coordinates	32° 20.490'S; 28° 3.379'E
Corner 4 Coordinates	32° 20.827'S; 28° 1.503'E
250 m Coordinates	Please find coordinates taken every 250 m along the proposed Ndabakazi Interchange attached in Appendix E.
Temporary Deviations	Coordinates (DDMMSS)
250 m Coordinates	Please find coordinates taken every 250 m along the temporary traffic diversion routes attached in Appendix E.



Figure 2-2 to Figure 2-14 below consists of photographs showing the current status of the proposed upgrade route and surrounding area.



Figure 2-2: Nداباکازی Intersection looking north



Figure 2-3: Nداباکازی dam located west of the Nداباکازی Intersection



Figure 2-4: Old Borrow Pit area left unrehabilitated located adjacent (west) to the Nداباکازی dam



Figure 2-5: Informal businesses located along the R409, west of the N2



Figure 2-6: N2 Ndabakazi - R409 Intersection, looking west



Figure 2-7: Local businesses east of the N2 Ndabakazi –R409 Intersection



Figure 2-8: Wetland area located south east of the N2 Ndabakazi – R409 Intersection (looking west) (View of Photo 4)



Figure 2-9: Drainage channel east of the N2



Figure 2-10: Drainage channel east of the N2

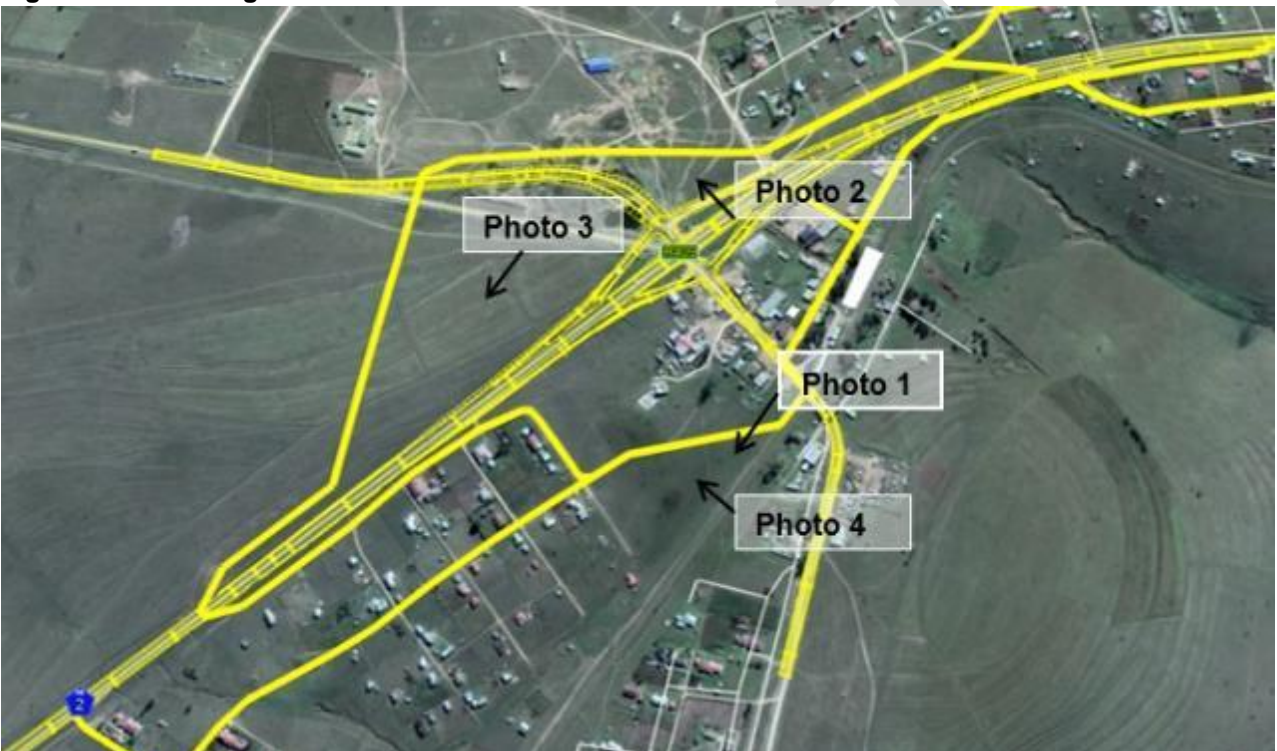


Figure 2-11: Location of photos taken in view of the proposed temporary diversion roads



Figure 2-12: View of Photo 1



Figure 2-13: View of Photo 2



Figure 2-14: View of Photo 3

2.2 LAND OWNERSHIP

The National Route N2 Section 17 including its road reserve is owned by SANRAL. The farms neighboring the road reserve are listed below in Table 2.1. No land ownership details are available for the farms near which the proposed development is located, however the surrounding land owners and residents have been notified of the proposed development as part of SANRAL’s established Project Liaison Committee (PLC). A meeting was held with the Local Chiefs and representatives of the Amahlubi Traditional Council on the 13 and 27 February 2019 (see Appendix B-6 for proof). A community resolution letter was signed by the Chief of the Amahlubi Traditional Council (on behalf of the Ndabakazi and Cegcuana Local Community) regarding SANRAL’s use of the land for the proposed road development.

The following land owners/representatives have been identified in Table 2-2 below:

Table 2-2: The farm numbers and portions, the coordinates and 21 surveyor general codes

APPLICABLE FARM PORTIONS	
Farm Portions:	762, 763, 764, 889, 890, 893, 896, 898, 899, 900
21-digit SG Codes:	C08700030000076200000 C08700030000076300000 C08700030000076400000 C08700090000088900000 C08700090000089000000 C08700090000089300000 C08700090000089600000 C08700090000089800000 C08700090000089900000 C08700090000090000000
Property owner: Contact Person: Postal Address: Telephone:	SANRAL Mbulelo Simon Peterson P.O. Box 24210, Bay West, Port Elizabeth, 6057 041 398 3200



NEIGHBOURING FARMS PORTIONS	
Farm Portion: 21 digit SG Code: Property owner:	RE/11111111 C08700091111111100000 Department of Rural Development and Land Reform (DRDLR)
Farm Portion: 21 digit SG Code: Property owner:	897 C08700090000089700000 Unknown
Farm Portion: Property owner:	NDABAKAZI 140 Allotment Area Department of Rural Development and Land Reform
Farm Portion: Property owner:	CEGCUANA 144 Allotment Area Department of Rural Development and Land Reform
Farm Portion: 21 digit SG Code: Property owner:	RE/719 C08700030000071900000 Unknown (Title deed: 8871/1948)
Farm Portion: 21 digit SG Code: Property owner:	RE/726 C08700030000072600000 Unknown (Title deed: 152/1993)
Farm Portion: 21 digit SG Code: Property owner:	765 C08700030000076500000 Unknown (Title deed: 152/1993)
Farm Portion: 21 digit SG Code: Property owner:	RE/878 C08700090000087800000 Unknown (Title deed: 8870/1948)
Farm Portion: 21 digit SG Code: Property owner:	766 C08700090000076600000 Unknown (Title deed: 139/1991)
Farm Portion: 21 digit SG Code: Property owner:	723 C08700030000072300000 Unknown (Title deed: 39/1986)
Farm Portion: 21 digit SG Code: Property owner:	913 C08700090000091300000 Ndabankulu SS School
Farm Portion: 21 digit SG Code: Town Code: Property owner:	Portions 1 – 363 of Farm 84 C0870000000008400000 C0870015000000100000 C08700150000036300000 Ndabakazi Junction Mnquma Local Municipality
Farm Portion: 21 digit SG Code: Property owner:	80 C0870000000008000000 Unknown

The figures below illustrate the information detailed in Table 2-2 above.

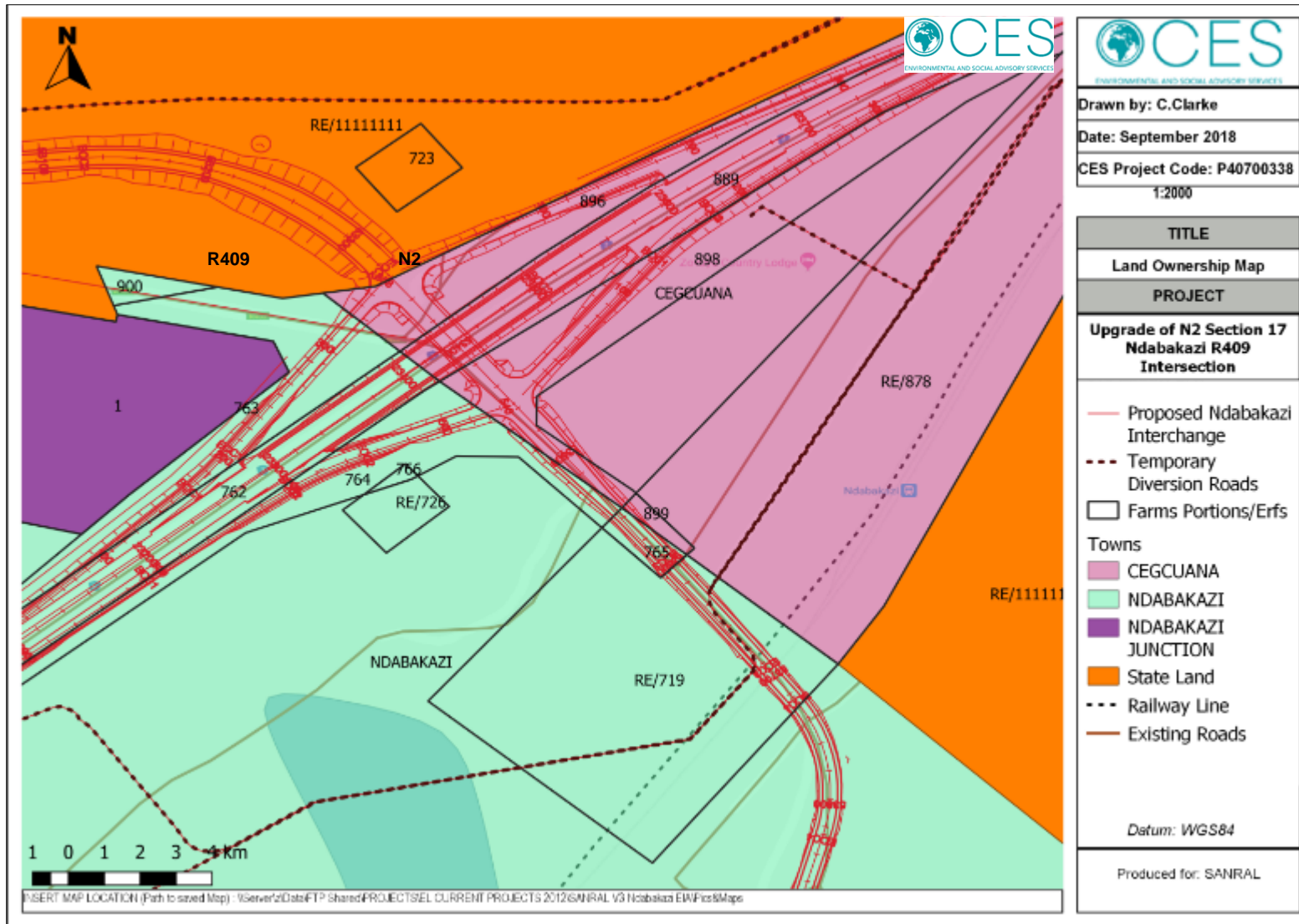


Figure 2-15: Land Ownership Map 1 (zoomed)

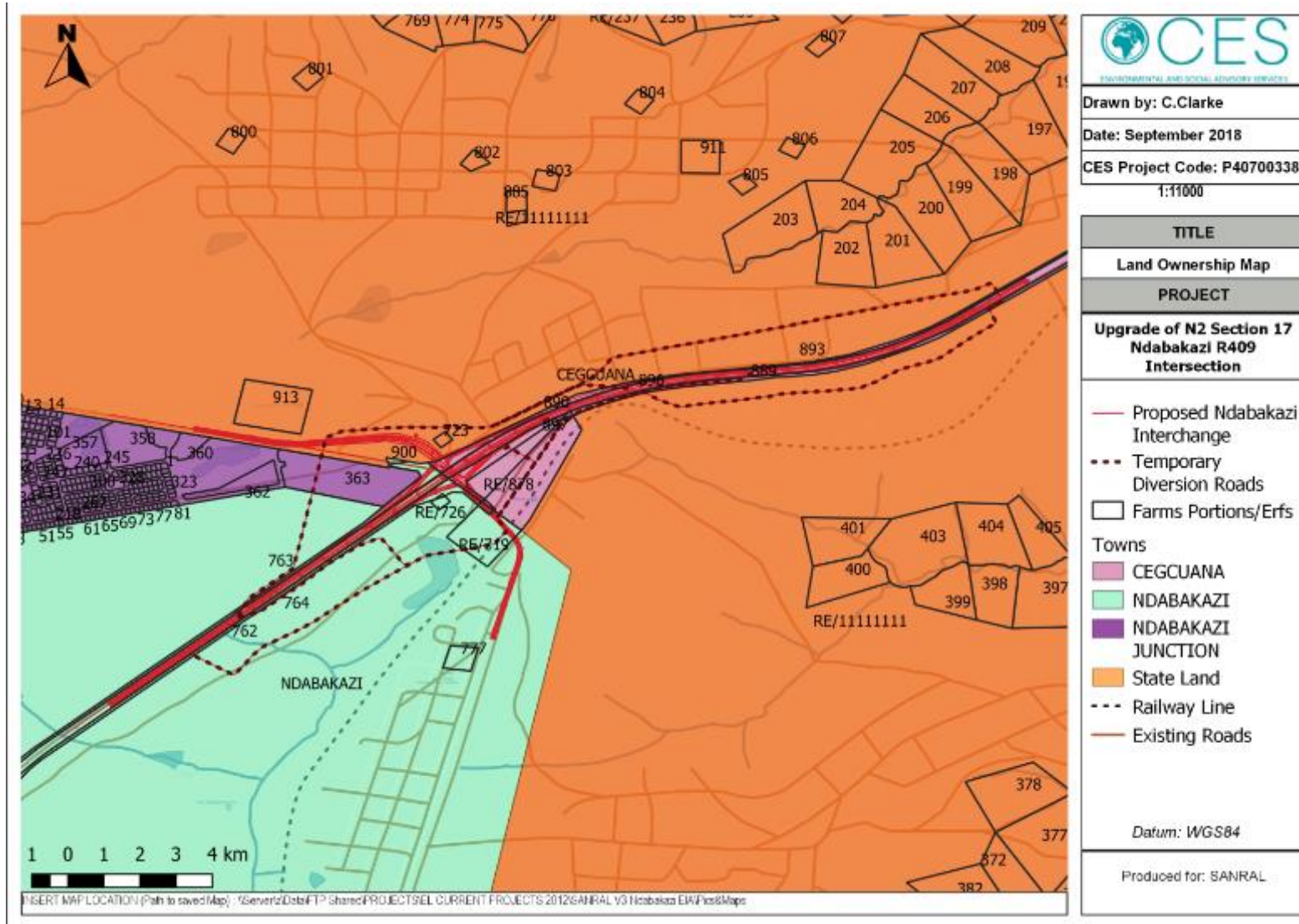


Figure 2-16: Land Ownership Map



3 PROJECT DESCRIPTION

According to Appendix 1, Section 3 (1), of the EIA Regulations (2014) (as amended), “A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—

- (d) a description of the scope of the proposed activity, including—
- (ii) a description of the activities to be undertaken including associated structures and infrastructure.

The following section provides a detailed description of the proposed development and the associated activities and infrastructure involved.

3.1 PROJECT DESCRIPTION

The South African National Roads Agency SOC Ltd. (SANRAL) is proposing the construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province (see Figure 3-1 below).

The proposed Ndabakazi Interchange development will consist of upgrading the existing N2 and R409 roads at the intersection as well as the construction of a new bridge over the N2 with corresponding interchange ramps. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2/R409 bridge.

In particular, the project will consist of the following:

3.1.1 EXISTING ROADS:

- Increasing the road reserve width from 30m to a minimum of 50m wide;
- General widening of the existing road cross section for passing lanes and 3.0m surfaced shoulders. The main carriageway is 10.4m and needs to be increased to 20.8m;
- Widening and/or new construction of existing drainage structures.

3.1.2 NEW INTERCHANGE (CALLED THE NDABAKAZI INTERCHANGE):

- Construction of a new bridge on the R409 over the N2;
- Substantial vertical geometric improvements will be required for the new N2/R409 bridge;
- Rehabilitation of pavement structure on existing alignment and construction of new pavement on new alignment, all for which suitable material will need to be sourced;
- Cut faces requiring stabilisation.



3.1.3 TEMPORARY DEVIATIONS:

- Temporary traffic diversion routes will be used during the construction phase of the Ndabakazi Interchange (refer to Figure 3-1 and section 6.2.2 below);
- The temporary diversion routes will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndabakazi Interchange;
- All temporary diversion routes will be surfaced (tarred).
- Temporary diversion routes 1 (as shown in Figure 3-1) will require a Water Use License Application (WULA), as the route crosses a drainage channel and a wetland area. In addition, majority of the temporary diversion routes fall within 500 m of a wetland. A WULA will be submitted to the Department of Water Affairs and Sanitation (DWS) as required and will run concurrently with the Basic Assessment Process.

DRAFT

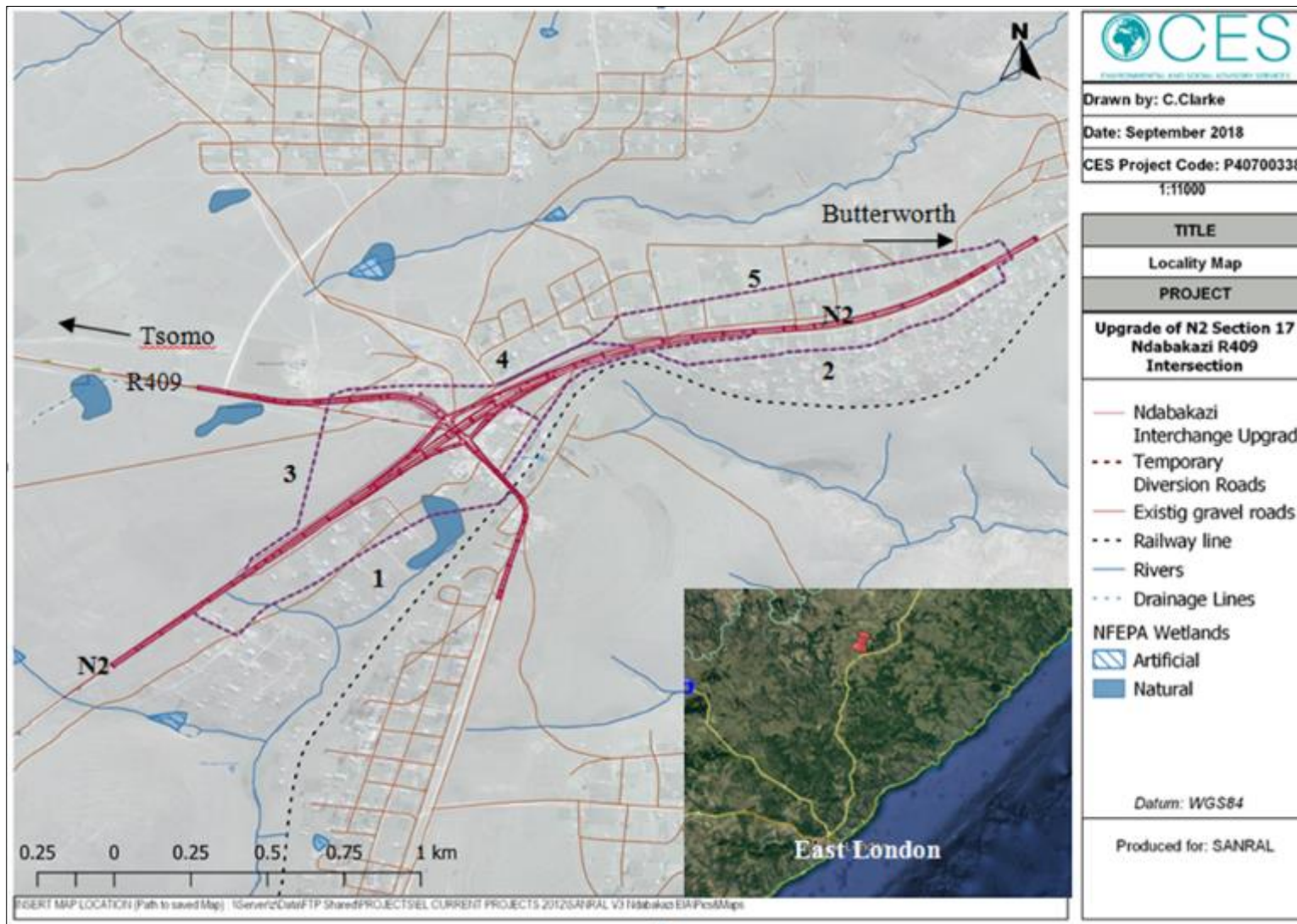


Figure 3-1: Proposed upgrading of the Ndabakazi Interchange.



The physical footprint of the Ndabakazi Interchange is estimated to be 369 390 m², however majority of this takes place on existing roads (363 390 m² or 36.3 km²) and will therefore only involve 6000 m² (or 6 km²) clearance of natural vegetation. An estimate of the physical size of the various road portions are further detailed in Table 3-1 below.

Table 3-1: Estimation of the physical size of the proposed Ndabakazi Interchange road portions

ROAD	LENGTH (M)	WIDTH (M)	AREA (M ²)
N2 road upgrade	5730	50	286 500
R409 road upgrade	1635	30	49 050
Temporary diversion road 1	1240	6	7 440
Temporary diversion road 2	1070	6	6 420
Temporary diversion road 3	800	6	4 800
Temporary diversion road 4	1050	6	6 300
Temporary diversion road 5	1480	6	8 880
Total Footprint			369 390

3.1.4 SITE ACCESS

The proposed Ndabakazi Interchange development is located within Section 17 of the National Route N2, therefore access to the site already exists.

The proposed temporary diversion routes (Figure 3-1 above) will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndabakazi Interchange.



4 LEGALISATIVE REQUIREMENTS

According to Appendix 1, Section 3 (1), of the EIA Regulations 2014 (as amended), “A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—

- (e) a description of the policy and legislative context within which the development is proposed including—
 - (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and
 - (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments.

This section describes the South African (National), Eastern Cape (Provincial), Amathole District Municipality and Mquma Local Municipality (MLM) legislation considered during the Basic Assessment process for the proposed development.

4.1 APPLICABLE LEGISLATION

4.1.1 THE CONSTITUTION (ACT NO. 108 OF 1996)

This is the supreme law of the land. As a result, all laws, including those pertaining to the proposed development, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, “everyone has the right –

- (a) To an environment that is not harmful to their health or well-being; and
- (b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that—
 - (i) prevent pollution and ecological degradation.
 - (ii) promote conservation; and
 - (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”

Relevance to the proposed Ndabakazi Interchange

The proponent has an obligation to ensure that the proposed development will:

- Not result in pollution and ecological degradation; and
- Be ecologically sustainable, while demonstrating economic and social development.



4.1.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998)

The objective of the National Environmental Management Act (NEMA) is “provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.”

NEMA provides the basis for environmental governance in South Africa by establishing principles and institutions for decision-making on matters affecting the environment. A key aspect of NEMA is that it provides a set of environmental management principles that apply throughout South Africa to the actions of all organs of state that may significantly affect the environment. Section 2 of NEMA contains principles relevant to the proposed project, and likely to be utilised in the process of decision making by DEDEAT (Table 4-1).

Table 4-1: NEMA Environmental Management Principles.

(2)	<i>Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably.</i>
(3)	<i>Development must be socially, environmentally and economically sustainable.</i>
(4)(a)	<p><i>Sustainable development requires the consideration of all relevant factors including the following:</i></p> <ul style="list-style-type: none"> <i>i. That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;</i> <i>ii. That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;</i> <i>iii. That waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner.</i>
(4)(e)	<i>Responsibility for the environmental health and safety consequences of a policy, programme, project, product, process, service or activity exists throughout its life cycle.</i>
(4)(i)	<i>The social, economic and environmental impacts of activities, including disadvantages and benefits, must be considered, assessed and evaluated, and decisions must be appropriate in the light of such consideration and assessment.</i>
(4)(j)	<i>The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers must be respected and protected.</i>
(4)(p)	<i>The costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects must be paid for by those responsible for harming the environment.</i>
(4)(r)	<i>Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in</i>



	<i>management and planning procedures, especially where they are subject to significant human resource usage and development pressure.</i>
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As these principles are utilised as a guideline by the competent authority in ensuring the protection of the environment, the proposed development should, where possible, be in accordance with these principles. Where this is not possible, deviation from these principles would have to be very strongly motivated.

NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution and may lead to the prosecution of managers or directors of companies for the conduct of the legal persons.

In addition, NEMA introduced a framework for environmental impact assessments, which aims to avoid detrimental environmental impacts through the regulation of specific activities that cannot commence without prior environmental authorisation. Authorisation in terms of the EIA Regulations GN R 326, 2014 (as amended), either requires a Basic Assessment (Listing Notices 1 and 3) or a Full Scoping and Environmental Impact Assessment report (S&EIR) (Listing Notice 2), depending on the type of activity. These assessments specify mitigation and management guidelines to minimise negative environmental impacts and optimise positive impacts.

Relevance to the proposed Ndabakazi Interchange

An application for Environmental Authorisation (as triggered by the EIA Regulations 2014 (as amended)) will be required. In terms of Section 28, every person who causes, has caused, or may cause significant pollution or degradation of the environment, must take reasonable measures to prevent pollution or rectify the damage caused. The undertaking of various specialist studies, in order to identify potential impacts on the environment and to recommend mitigation measures to minimise these impacts, complies with Section 28 of NEMA. 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.

In terms of the EIA regulations, the construction of the Ndabakazi Interchange triggers the need for a **Basic Assessment** process under the NEMA EIA Regulations of 2014 (as amended) in Listing Notice 1 and Listing Notice 3 respectively.

4.1.3 NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (ACT NO. 59 OF 2008)

The National Environmental Management: Waste Management Act (NEMWA) gives legal effect to the Government's policies and principles relating to waste management in South Africa, as reflected in the National Waste Management Strategy (NWMS).



The objects of the Act are “to protect health, well-being and the environment by providing reasonable measures for—

- *minimising the consumption of natural resources;*
- *avoiding and minimising the generation of waste;*
- *reducing, re-using, recycling and recovering waste;*
- *treating and safely disposing of waste as a last resort;*
- *preventing pollution and ecological degradation;*
- *securing ecologically sustainable development while promoting justifiable economic and social development;*
- *promoting and ensuring the effective delivery of waste services;*
- *remediating land where contamination presents, or may present, a significant risk of harm to health or the environment; and*
- *achieving integrated waste management reporting and planning.”*

Chapter 4 of this Act deals with the general duty in respect to waste management and emphasises that, “a holder of waste must, within the holder’s power, take all reasonable measures to:- avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts; prevent any employee or any person under his or her supervision from contravening this Act; and prevent the waste from being used for an unauthorised purpose”.

Chapter 4, Part 3 of this Act deals with reduction re-use and recovery of waste, Part 4 deals with waste management activities, Part 5 covers storage collection and transportation of waste, Part 6 deals with treatment, processing and disposal of wastes, Part 7 covers industry waste management plans and Part 8 deals with contaminated land. Chapter 5 covers all issues regarding the licensing of waste management activities. GN R 921 activities that have or are likely to have a detrimental effect on the environment.

Relevance to the proposed Ndabakazi Interchange

- All reasonable measures must be taken to avoid the generation of waste and, where such generation cannot be avoided, minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;
- Manage the waste in such a manner that it does not endanger human health or the environment or cause a nuisance through noise, odour or visual impacts;
- Prevent any employee or any person from contravening this Act and prevent the waste from being used for an unauthorised purpose;
- Spoil rock material which may be generated as a result of bulk sampling must be re-used where possible.
- The proponent must ensure that all activities associated with the project address waste related matters in compliance with the requirements of the Act.



4.1.4 NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT (ACT NO. 57 OF 2003)

The purpose of the National Environmental Management: Protected Areas Amendment Act (NEMPAA) 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.

The objectives of NEMPAA are:

- (a) *To provide, within the framework of national legislation, including the National Environmental Management Act, for the declaration and management of protected areas;*
- (b) *To provide for co-operative governance in the declaration and management of protected areas;*
- (c) *To effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity;*
- (d) *To provide for a representative network of protected areas on state land, private land and communal land;*
- (e) *To promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas;*
- (f) *To promote participation of local communities in the management of protected areas, where appropriate; and*
- (g) *To provide for the continued existence of South African National Parks.*

Relevance to the proposed Ndabakazi Interchange

- There are no known National, Provincial or locally protected areas found within the general study area. In addition, the proposed Ndabakazi Interchange does not fall within any National Protected Expansion Areas as per NPAES (2008).

4.1.5 NATIONAL ENVIRONMENT MANAGEMENT: BIODIVERSITY ACT (ACT NO. 10 OF 2004)

The National Environment Management: Biodiversity Act (NEMBA) provides for the management and conservation of South Africa's biodiversity and the protection of species and ecosystems that warrant national protection.

The objectives of NEMBA are:

- (a) *within the framework of the National Environmental Management Act, to provide for—*
 - (i) *the management and conservation of biological diversity within the Republic and of the components of such biological diversity;*
 - (ii) *the use of indigenous biological resources in a sustainable manner; and*
 - (iii) *the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources;*
- (b) *to give effect to ratified international agreements relating to biodiversity which are binding on the Republic;*
- (c) *to provide for co-operative governance in biodiversity management and conservation;*
and



(d) to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

The Act provides for the management and conservation of South Africa’s biodiversity within the framework of NEMA (Table 4-2). In terms of the Biodiversity Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (including The Endangered and Threatened Ecosystem Regulations, Government Notice R. 1002 dated 9th December 2011);
- Application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with ecological sustainable development and protection of biodiversity;
- Limit further loss of biodiversity and conserve endangered ecosystems.

Table 4-2: Management and conservation of biodiversity within the framework of NEMA.

<p>Chapter 4</p>	<ul style="list-style-type: none"> • Provides for the protection of species that are threatened or in need of national protection to ensure their survival in the wild; • To give effect to the Republic’s obligations under international agreements regulating international trade in specimens of endangered species; and • Ensure that the commercial utilization of biodiversity is managed in an ecologically sustainable way.
<p>Chapter 5 (Part 2) Section 73</p>	<p>A person who is the owner of land on which a listed invasive species occurs must:</p> <ol style="list-style-type: none"> a) Notify any relevant competent authority, in writing, of the listed invasive species occurring on that land; b) Take steps to control and eradicate the listed invasive species and to prevent it from spreading; and c) Take all required steps to prevent or minimise harm to biodiversity.
<p>Chapter 5 (Part 2) Section 75</p>	<ul style="list-style-type: none"> • Control and eradication of a listed invasive species must be carried out by means or methods that are appropriate for the species concerned and the environment in which it occurs. • Any action taken to control and eradicate a listed invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment. • The methods employed to control and eradicate a listed invasive species must also be directed at the offspring, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.

NEMBA’s permit system is further regulated in the NEMBA Threatened or Protected Species Regulations Government Notice R. 152 of 2007. The NEMBA Alien and Invasive Species List (Government Notice R 599 of 2014) define Alien and Invasive species that are regulated by the NEMBA Alien and Invasive Species Regulations (Government Notice 98 of 2014).



Relevance to the proposed Ndabakazi Interchange

The proponent must:

- Not cause a threat to any endangered ecosystems and must protect and promote biodiversity;
- Not remove or damage any protected species without a permit;
- Ensure that the site is cleared of alien vegetation using appropriate means;
- Implement an invasive species monitoring, control and eradication plan for land/activities under their control should be developed, as part of their environmental plans in accordance with Section 11 of NEMA.

4.1.6 NATIONAL WATER ACT (ACT NO. 36 OF 1998)

The National Water Act (NWA) provides for fundamental reform of the law relating to water resources in South Africa.

The purpose of the Act is “to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors—

- (a) meeting the basic human needs of present and future generations;
- (b) promoting equitable access to water;
- (c) redressing the results of past racial and gender discrimination;
- (d) promoting the efficient, sustainable and beneficial use of water in the public interest;
- (e) facilitating social and economic development;
- (f) providing for growing demand for water use;
- (g) protecting aquatic and associated ecosystems and their biological diversity;
- (h) reducing and preventing pollution and degradation of water resources;
- (i) meeting international obligations;
- (j) promoting dam safety;
- (k) managing floods and droughts.”

Section 21 of the NWA describes activities defined as a water use under the Act. These activities may only be undertaken subject to the application for, and issue of, a Water Use License (WUL) or general authorisation (GA). Water use activities include—

- (a) taking water from a water resource;
- (b) storing water;
- (c) impeding or diverting the flow of water in a watercourse;
- (d) engaging in a stream flow reduction activity contemplated in section 36;
- (e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- (f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- (g) disposing of waste in a manner which may detrimentally impact on a water resource;
- (h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- (i) altering the bed, banks, course or characteristics of a watercourse;
- (j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and



(k) using water for recreational purposes.”

Relevance to the proposed Ndabakazi Interchange

- Should any infrastructure be constructed within the 100m regulatory area of a river or drainage line or within the 500m regulatory area a wetland, a water use authorisation (WUA) will be required for those applicable activities. This will be discussed with the Department of Water and Sanitation (DWS) and reported on in the EIR;
- According to Section 19(1) of the NWA, “an owner of land, a person in control of land or a person who occupies or uses the land on which—
 - (a) Any activity or process is or was performed or undertaken; or
 - (b) Any other situation exists, which causes, has caused or is likely to cause pollution of a water resource, must take all reasonable measures to prevent any such pollution from occurring, continuing or recurring.”
- Appropriate measures must be taken to prevent the pollution of water courses and other water resources and riparian zones must be protected.

4.1.7 NATIONAL HERITAGE RESOURCES ACT (ACT NO. 25 OF 1999)

The protection of archaeological and paleontological resources is the responsibility of a provincial heritage resources authority and all archaeological objects, paleontological material and meteorites are the property of the State. “*Any person who discovers archaeological or paleontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority*”.

Relevance to the proposed Ndabakazi Interchange

- No person may alter or demolish any structure or part of a structure, which is older than 60 years or disturb any archaeological or paleontological site or grave older than 60 years without a permit issued by the relevant provincial heritage resources authority;
- No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter or deface archaeological or historically significant sites;
- The South African Heritage Resources Agency (SAHRA) and the Eastern Cape Provincial Heritage Authority (ECPHRA) must be informed of the project.

4.1.8 NATIONAL FORESTS ACT (ACT NO. 84 OF 1998)

The objective of this Act is to monitor and manage the sustainable use of forests. In terms of Section 12 (1) (d) of this Act and GN R. 1012 (promulgated under the National Forests Act), no person may, except with a licence:

- Cut, disturb, damage or destroy a protected tree; or



- Possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any forest product derived from a protected tree.

The list of protected trees, 1976 List of Protected Trees (Government Gazette No. 9542, Schedule A), in the 1998 National Forest Act (NFA), as amended in December 2016, should be consulted.

Relevance to the proposed Ndabakazi Interchange

- No forest or trees that form part of a forest or forest association may be damaged or destroyed without a permit;
- Development that comes within 50 metres of forest must be closely monitored during the construction phase;
- No protected tree species may be damaged or destroyed without a permit from the Department of Agriculture, Forestry and Fisheries (DAFF).

4.1.9 CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO. 43 OF 1983)

The Conservation of Agricultural Resources Act (CARA) aims to control over-utilisation of the natural agricultural resources to promote the conservation of soil, water sources and vegetation through the combat of weeds and invader plants. Regulations 15 and 16 under this Act, which relate problem plants, were amended in March 2001.

The Act provides a list of declared weeds and invader plants as well as indicators of bush encroachment. In terms of weeds and invader plants:

- A land user shall control any category 1 plants that occur on any land or inland water surface;
- No person shall, except for the purposes of a biological control reserve:
 - Establish, plant, maintain, multiply or propagate weeds and invader plants;
 - Import or sell propagating material of category weeds and invader plants; and
 - Acquire propagating material of weeds and invader plants.

These lists include:

- Combating of category 1 plants (Section 15A) according to CARA (Act No 43 of 1983); and
- Combating of category 2 plants (Section 15B) according to CARA (Act No 43 of 1983)

In addition, section 6 of the Act makes provisions for control measures to be applied to achieve the objectives of the Act. These measures relate to *inter alia*:

- Cultivation of virgin soil;
- Protection of “vleis”, marshes, water courses and water sources;
- The regulation of the flow pattern and run-off;
- The protection of natural vegetation in the area and;
- The restoration or reclamation of land which is eroded or disturbed.



Relevance to the proposed Ndabakazi Interchange

- An invasive species monitoring, control and eradication plan for land/activities under the control of the proponent should be developed as part of the Construction EMPR plan in accordance with CARA.

4.1.10 OCCUPATIONAL HEALTH AND SAFETY ACT (ACT NO. 85 OF 1993)

The objective of the Occupational Health and Safety Act (OHSA) is to provide for the health and safety of persons at work. In addition, the Act requires that, “*as far as reasonably practicable, employers must ensure that their activities do not expose non-employees to health hazards*”. The importance of the Act lies in its numerous regulations, many of which will be relevant to the proposed Ndabakazi Interchange. These cover, among other issues, noise and lighting.

Relevance to the proposed Ndabakazi Interchange

The proponent must be aware of the principles and broad liability and implications contained in the OHSA and mitigate any potential impacts.

4.1.11 OTHER RELEVANT LEGISLATION

Other legislation that may be relevant to the proposed development includes:

- The Environment Conservation Act No 73 of 1989 (ECA) Noise Control Regulations, which specifically provide for regulations to be made with regard to the control of noise, vibration and shock, including prevention, acceptable levels, powers of local authorities and related matters;
- Provincial Nature and Environmental Conservation Ordinance (No. 19 of 1974), which lists species of special concern which require permits for removal. Schedules 1 to 4 list protected and endangered plant and animal species;
- Spatial Planning and Land Use Management Act (SPLUMA) (Act 16 of 2013 – came into force on 1 July 2015) aims to provide inclusive, developmental, equitable and efficient spatial planning at the different spheres of the government. This act repeals national laws on the Removal of Restrictions Act, Physical Planning Act, Less Formal Township Planning Act and Development Facilitation Act;
- South African National Roads Agency Limited and National Roads Act (Act 7 of 1998; NRA);
- Public Finance Management Act (Act 1 of 1999; PFMA);
- Employment Equity Act (Act 55 of 1998; EEA);
- Labour Relations Act (Act 66 of 1995; LRA); and
- District and Local municipality Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs).

In addition to the above, the following spatial tools from the South African National Biodiversity Institute (SANBI) need to be taken into consideration:

- The South African Vegetation Map (Mucina and Rutherford);
- The Subtropical Thicket Ecosystem Programme (STEP);



- The Eastern Cape Biodiversity Conservation Plan (ECBCP); and
- The National Freshwater Ecosystem Priority Areas (NFEPA) project.

4.2 LISTED ACTIVITIES

In terms of Section Appendix 1; Content of a Basic Assessment Report of the EIA Regulations (2014, as amended), a Basic Assessment report must contain all the information that is necessary for the competent authority to consider and come to a decision on the application, and must, and must include:

- d) *A description of the scope of the proposed activity, including –*
- (i) *All listed and specified activities triggered;*
 - (ii) *A description of the activities to be undertaken, including associated structures and infrastructure.*

The construction of the Ndabakazi Interchange triggers the need for a Basic Assessment process under the NEMA EIA Regulations of 2014 (as amended) in Listing Notice 1 and Listing Notice 3 respectively. The listed activities that have been applied for are provided in Table 4-3 below.

Table 4-3: NEMA listed activities triggered by the proposed development

LISTED ACTIVITIES	APPLICABILITY
<p>Listing Notice 1: 12 (ii) (a) (c)</p> <p>The development of—</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</p> <p>(a) within a watercourse;</p> <p>(c) if no development setback exists, within 32 metres of a watercourse.</p>	<p>The renovation of existing bridges and culverts and the construction of a new bridge and of stormwater structures, is being proposed. The existing bridges culverts will be widened and/or replaced. Portions of National Route N2 near the Ndabakazi Interchange will be re-aligned. These activities will take place within the 32 meter watercourse and 500 m wetland buffers. The bridge and culvert construction will take place within watercourses.</p>
<p>Listing Notice 1: 19 (i)</p> <p>infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock</p> <p>of more than 10 cubic metres from</p> <p>(i) a watercourse.</p>	<p>The proposed bridges and culverts will require excavation of the river banks and the removal of materials from the river bed.</p>
<p>Listing Notice 1: 24 (ii)</p> <p>The development of a road</p> <p>(ii) with a reserve wider than 13, 5 metres, or where no reserve exists where the road is wider than 8 metres.</p>	<p>Segments of the National Route N2 near the Ndabakazi Interchange will be re-aligned and widened with a road reserve wider than 13.5 metres.</p>
<p>Listing Notice 1: 56 (i), (ii)</p>	<p>The existing National Route N2 near the Ndabakazi Interchange will be rehabilitated and widened to comply with the SANRAL safety regulations.</p>



<p>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-</p> <p>(i) where the existing reserve is wider than 13, 5 metres; and/or where no reserve exists, where the existing road is wider than 8 metres.</p>	
<p>Listing Notice 3: 12 a (ii), (iv)</p> <p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>a) Eastern Cape:</p> <p>(ii) Within critical biodiversity areas identified in bioregional plans; and/or</p> <p>(iv) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.</p>	<p>Although the proposed development is a linear development, the cumulative clearance of vegetation along the route could amount to an area of 300 square meters of indigenous vegetation from areas demarcated as Critical Biodiversity Areas (CBA) 2 and could affect areas that are currently zoned for use as public open space.</p>
<p>Listing Notice 3: 14 (ii) (a) (c) (a) (i) (ff) (ii) (aa)</p> <p>The development of –</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</p> <p>Where such development occurs –</p> <p>(a) within a watercourse; and/or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.</p> <p>a) Eastern Cape:</p> <p>(i) Outside urban areas:</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans</p> <p>(ii) Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space.</p>	<p>Sections of the road and bridge are situated within a CBA 2 and could affect areas that are currently zoned for use as public open space.</p>
<p>Listing Notice 3: 18(a) (i) (ee) (ii) (aa)</p> <p>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</p>	<p>Sections of the road are situated within a CBA 2 and could affect areas that are currently zoned for use as public open space.</p>



<p>(a) Eastern Cape:</p> <p>(i) Outside urban areas, in:</p> <p>(ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; and/or</p> <p>(ii) Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space.</p>	
<p>Listing Notice 3: 23 (ii) (a) (c) (a) (i) (ee)</p> <p>The expansion of –</p> <p>(ii) infrastructure or structures where the physical footprint is expanded by 10 square meters or more;</p> <p>Where such expansion occurs –</p> <p>(a) within a watercourse; and/or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.</p> <p>(a) Eastern Cape:</p> <p>(i) Outside urban areas, in:</p> <p>(ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<p>The existing bridges culverts will be widened and/or replaced. Portions of the National Route N2 near the Ndabakazi Interchange will be re-aligned. These activities will take place within the 32 meter watercourse and 500m wetland regulation buffers. The bridge and culvert construction will take place within watercourses.</p>

The competent authority, that must consider and decide on the application for authorisation in respect of the activities listed in Table 4-3 above, is the Department of Environmental Affairs (DEA). The DEA is the Competent Authority (CA) mandated to process all applications belonging to state owned companies. SANRAL, a state-owned company, is the applicant for this project.

It is important to note that in addition to the requirements for an authorisation in terms of the NEMA, there are be additional legislative requirements which need to be considered prior to commencing with the activity, these include:

- The National Heritage Resources Act (Act No. 25 of 1999; NHRA); and
- The National Water Act (Act No. 36 of 1998; NWA).

A Heritage and Archaeological Impact Assessment, as well as a desktop Paleontological Assessment, have been conducted for the study area.

Water Use License Applications (WULAs) will be applied for with the Department of Water and Sanitation (DWS) (Refer to Appendix B-8 for the DWS pre-application meeting minutes).



5 NEED AND DESIRABILITY

In terms of Appendix 1: Content of a Basic Assessment Report of the EIA Regulations (2014, as amended), a Basic Assessment Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

- f) *A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;*

According to the MLM Integrated Development Plan (IDP) (2016), road construction and improvement is considered as the prime infrastructural component that would assist in bringing about improved access for tourism, health facilities and agricultural developments within the MLM.

Upgrades and maintenance on a major regional road is a SANRAL mandate. As this road is currently under their jurisdiction, it is their sole mandate to ensure the proper functioning and maintenance of this road, amongst others.

Road improvements are stipulated in the Eastern Cape Provincial Spatial Development Framework (PSDF) to improve quality of service on existing roads such as relieving traffic congestion, improve road safety, improve overtaking opportunities, etc.

Table 5-1: Need and motivation for the proposed Ndabakazi Interchange

The road upgrade takes place substantially within the existing road reserve of the National Route N2 Section 17. Upgrades and maintenance on a major regional road is a SANRAL mandate (SANRAL takes responsibility for upgrades and maintenance of regional routes).
Road improvements are stipulated in the Eastern Cape Provincial Spatial Development Framework (PSDF) to improve quality of service on existing roads such as relieving traffic congestion, improve road safety, improve overtaking opportunities, etc.
The activity takes place within Section 17 of the existing National Route N2 road, at the Ndabakazi – R409 Intersection, near Butterworth, outside the urban edge.
The project is consistent with the MLM IDP and SDF.
There is no Environmental Management Framework (EMF). The proposed development will not compromise the integrity of the Eastern Cape Biodiversity Conservation Plan (ECBCP) which has been adopted by DEDEAT.
The project is not inconsistent with any other plans that we have knowledge of at this point.
The development is not a municipal competency. No water or sewerage infrastructure will be required.
The road upgrade is consistent with the Mquma LM IDP and SDF. The project will contribute to addressing the issue of road safety improvements at the Ndabakazi Interchange.
SANRAL is currently engaged with major upgrades on our national roads. The Eastern Cape provincial and municipal road authorities are improving cooperation, and are working towards joint planning and prioritisation of roads through service level agreements.



The activity takes place substantially within the existing road reserve of the National Route N2 Section 17.
The road upgrade will improve road safety and reduce road accidents and traffic congestion.
The project consists of the upgrade of an existing national route and will not negatively affect any person's rights.
The proposed activity will not contribute to any of the SIPS.
There will be job creation during the construction phase for skilled and semi-skilled workers as well as an opportunity for skills development. The road upgrade will result in a safer and better quality road for its users.
The aim of the proposed construction of the Ndabakazi Interchange is to improve the quality of the road section by relieving traffic congestion and improving road safety.
The project fits into the National Development Plan for 2030 under improved road safety and quality of service of provincial routes.

The following table provides an analysis of how the objectives of Integrated Environmental Management (IEM) have been considered in the Ndabakazi Interchange road upgrade.

GENERAL OBJECTIVES	DESCRIPTION
Promote the integration of the principles of environmental management set out in section 2 into the making of all decisions which may have a significant effect on the environment;	Alignment with NEMA principles described below (see Section 19 assessment below).
Identify, predict and evaluate the actual and potential impacts on the environment, socio-economic conditions and cultural heritage, the risks and consequences and alternatives and options for mitigation of activities, with a view to minimizing negative impacts, maximizing benefits and promoting compliance with the principles of environmental management set out in section 2;	Implicit in the current EIA process.
Ensure that the effects of activities on the environment receive adequate consideration before actions are taken in connection with them;	Implicit in the current EIA process.



GENERAL OBJECTIVES	DESCRIPTION
<p>Ensure adequate and appropriate opportunity for public participation in decisions that may affect the environment;</p>	<p>The current EIA process has included a comprehensive Public Participation Process, including:</p> <p>(a) Publicised the project through visible signage, press adverts, identification of local stakeholders through engagement with Mngquma Local Municipality, Ward Councillors and other government officials and parastatals.</p> <p>(b) Engagement with the public during public meeting and telephonic, postal and email correspondence.</p>
<p>Ensure the consideration of environmental attributes in management and decision-making which may have a significant effect on the environment; and</p>	<p>A comprehensive assessment of the significance of impacts has been conducted as part of the BAR.</p>
<p>Identify and employ the modes of environmental management best suited to ensuring that a particular activity is pursued in accordance with the principles of environmental management set out in section 23.</p>	<p>A comprehensive feasibility study, including consideration of environmental issues, was conducted prior to selecting alternatives routes and technologies for inclusion in this EIA assessment.</p>

The following table describes how the principles of environmental management as set out in section 2 of NEMA have been taken into account:

PRINCIPLE	DESCRIPTION	OUTCOME
<p>Shall apply alongside all other appropriate and relevant considerations, including the State's responsibility to respect, protect, promote and fulfil the social and economic rights in Chapter 2 of the Constitution and in particular the basic needs of categories of persons disadvantaged by unfair discrimination;</p>	<p>The onus is on the proponent to demonstrate to the authorising agency (DEA) that the State will not be abrogating its responsibility by authorising the proposed development</p>	<p>Complies</p> <p>The EIA process has been undertaken in order to provide the relevant decision-makers with the required information.</p> <p>The required EIA should provide sufficient information for the relevant authority to make a defensible and informed decision.</p>



PRINCIPLE	DESCRIPTION	OUTCOME
<p>Serve as the general framework within which environmental management and implementation plans must be formulated;</p>	<p>The onus is on the proponent to demonstrate to DEA that the NEMA principles will not be compromised.</p>	<p>Complies</p> <p>It is the opinion of this review that the proposed project does not conflict with NEMA principles in such a manner that it places undue risks on the natural or socio-economic environment.</p> <p>Mitigation measures that have been identified for possible impacts must be effectively implemented.</p>
<p>Serve as guidelines by reference to which any organ of state must exercise any function when taking any decision in terms of this Act or any statutory provision concerning the protection of the environment;</p>	<p>The onus is on the proponent to demonstrate to the authorising agency (DEA) that in providing environmental authorisation the principles of NEMA are duly addressed.</p>	<p>Complies</p> <p>The EIA process has been undertaken in order to provide the relevant decision-makers with the required information.</p> <p>The required EIA should provide sufficient information for the relevant authority to make a defensible and informed decision.</p>
<p>Serve as principles by reference to which a conciliator appointed under this Act must make recommendations; and</p>	<p>Not Applicable</p>	<p>Not Applicable</p>
<p>Guide the interpretation, administration and implementation of this Act, and any other law concerned with the protection or management of the environment.</p>	<p>Not Applicable</p>	<p>Not Applicable</p>



PRINCIPLE	DESCRIPTION	OUTCOME
<p>Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably</p>	<p>The EIA process must demonstrate that the needs of local people will be adequately addressed and that the development will serve the interests of the public equitably.</p>	<p>Complies</p> <p>The proposed project will not result in any undue or unacceptable impacts on the local socio-economic environment. Nor will any impacts be unfairly distributed.</p> <p>Recommendations made in the BAR must be adopted.</p>
<p>Development must be socially, environmentally and economically sustainable.</p>	<p>The EIA process must demonstrate that the development is socially, environmentally and economically sustainable.</p>	<p>Complies</p> <p>There is currently no indication that the proposed project would result in undue or environmental, social and economic impacts that would place the sustainability of local natural systems or the project at risk.</p> <p>Recommendations made in the BAR must be adopted.</p>

Sustainable development requires the consideration of all relevant factors including the following:

RELEVANT FACTORS	DESCRIPTION	OUTCOME
<p>That the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied;</p>	<p>The development should not result in a significant loss of biodiversity. Should any loss occur then the project should seek to minimise or remedy the impact or provide suitable off-sets.</p>	<p>Complies</p> <p>Disturbance of local ecosystems must be avoided or impacts must be mitigated.</p> <p>A rehabilitation plan will assist in reducing the impact and providing benefits in terms of the re-establishment of natural vegetation.</p> <p>The recommendations made in the Ecological Assessment and Environmental Management Programme must be adopted.</p>



RELEVANT FACTORS	DESCRIPTION	OUTCOME
<p>That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied;</p>	<p>Certain activities associated with the project carry risks in terms of pollution and environmental degradation. This includes:</p> <ul style="list-style-type: none"> Storm water run-off from the road surfaces. 	<p>Complies</p> <p>The BAR notes that impacts with regard to pollution and degradation of the environment can be managed and will not result in an unacceptable impact on the local environment.</p> <p>The recommendations made in the BAR must be adopted.</p> <p>Particular focus must be given to the Environmental Management Programme with regard to:</p> <ul style="list-style-type: none"> Monitoring of stormwater; Wetlands and watercourses; Alien Vegetation Management; and Erosion Management.
<p>That the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied;</p>	<p>The proponent would need to demonstrate that it would not impact on sites of valuable cultural and historical heritage.</p>	<p>Complies</p> <p>A Heritage & Archaeological Impact Assessment was conducted; please see the attached Heritage Assessment Report.</p> <p>Recommendations made in the Heritage Impact Assessment must be adopted.</p>
<p>That waste is avoided, or where it cannot be altogether avoided, minimised and re-used or recycled where possible and otherwise disposed of in a responsible manner;</p>	<p>Certain activities associated with the project carry risks in terms of pollution and environmental degradation.</p>	<p>Complies</p> <p>The BAR notes that impacts with regard to pollution and degradation of the environment can be managed and will not result in unacceptable impact on the local environment.</p> <p>The recommendations made in the BAR must be adopted.</p> <p>Particular focus must be given to the Environmental Management Programme.</p>



RELEVANT FACTORS	DESCRIPTION	OUTCOME
<p>That the use and exploitation of non-renewable natural resources is responsible and equitable, and takes into account the consequences of the depletion of the resource;</p>	<p>Not Applicable - the project does not involve the exploitation of non-renewable resources.</p>	<p>Not Applicable</p>
<p>That the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised.</p>	<p>The project should not involve the unsustainable use or renewable resources and ecosystems, nor should any related secondary impacts result in increased resource use.</p>	<p>Complies</p> <p>The proponent does not intend to and neither will they support the over-use of groundwater as a renewable resource.</p> <p>Mitigation measures must be effectively implemented, especially on-going monitoring.</p>

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6 ALTERNATIVES

In terms of Appendix 1; Content of a Basic Assessment Report of the EIA Regulations (2014, as amended), a Basic Assessment Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

- g) *A motivation for the preferred site, activity and technology alternative*
- h) *A full description of the process followed to reach the proposed preferred activity, site and location of the development footprint within the site, including:*
 - (i) *Details of the alternatives considered;*

One of the objectives of the EIA process is to investigate alternatives to the proposed project. There are several types of alternatives that are assessed in the EIA process, as detailed in the following sections.

6.1 TYPES OF ALTERNATIVES

Alternatives should include consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The no-go alternative must also in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed. The determination of whether site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment.

“Alternatives”, in relation to a proposed activity, is defined as different means of meeting the general purpose and requirements of the activity, which may include alternatives to; -

- a) the property on which or location where it is proposed to undertake the activity;
- b) the type of activity to be undertaken;
- c) the design or layout of the activity; or
- d) the option of not implementing the activity.

6.1.1 FUNDAMENTAL ALTERNATIVES

Fundamental alternatives are developments that are completely different from the proposed project and usually involve a different type of development (different activity other than the no-go option) on the proposed site, or a different location for the proposed development to take place. Such alternatives include:

- Alternative property or location where it is proposed to undertake the activity; and
- Alternative type of activity to be undertaken.

6.1.2 INCREMENTAL ALTERNATIVES

Incremental alternatives are changes or variations to the technical design of a project that provides different options to reduce or minimise any environmental impacts. There are several



incremental alternatives that will be refined and assessed further during the EIA Phase of the project, including:

- Alternative design or layout of the activity; and
- Alternative technology to be used in the activity.

6.1.3 NO-GO ALTERNATIVE

The EIA process is obligated to assess the status quo (i.e. the “No-Go” option). The No-Go alternative provides the assessment with a baseline against which predicted impacts resulting from the proposed development may be compared. A “No-Go” alternative has been assessed for the proposed development.

6.2 ALTERNATIVES ASSESSED FOR THE NDABAKAZI INTERCHANGE UPGRADE

6.2.1 Site Alternative

The preferred site alternative is the construction of the new Ndabakazi Interchange at the existing N2-R409 intersection. No other site alternatives have been assessed as the proposed development takes place on an existing national road. Therefore route/site alternatives are not deemed feasible.

6.2.2 Layout Alternative

Two layout alternative are proposed for the Ndabakazi Interchange and temporary diversion routes:

Layout Alternative 1 (preferred):	Coordinates
<p>The preferred layout consists of the construction of the N2 Ndabakazi Interchange as proposed, and the routing of the temporary traffic diversion roads are according to existing gravel roads, as much as practically possible.</p> <p>The temporary traffic diversion routes takes into consideration existing and safe access off the N2, as shown in the figure below.</p>	<p>Refer to Appendix E for the 250 m route coordinates of Layout Alternative 1</p>



Layout Alternative 1

Layout Alternative 2:

Layout Alternative 2 proposes an additional temporary traffic diversion route (orange route), as shown in the figure below.

This orange route is not considered favourable to its unsafe access from the N2.

Coordinates

Refer to **Appendix E** for the 250 m route coordinates of Layout Alternative 2



Layout Alternative 2



6.2.3 Technology Alternatives

The following technology alternatives are proposed:

Table 6-1: Technological Alternatives

TECHNOLOGICAL ALTERNATIVE 1 (PREFERRED):
Alternative road technology 1 – Asphalt (preferred). The main determining factors for selecting the type of technology were: <ul style="list-style-type: none"> • High skid resistance; • High luminance; • Rapid shedding of rainwater; and • Low traffic noise levels.
TECHNOLOGICAL ALTERNATIVE 2:
Alternative road technology 2 – Concrete. The main determining factor for not selecting alternative road technology 2 were: <ul style="list-style-type: none"> • The high cost.
TECHNOLOGICAL ALTERNATIVE 3:
Alternative road technology 3 – Gravel. The main determining factors for not selecting alternative road technology 3 were: <ul style="list-style-type: none"> • Less resistant to wear; • Low skid resistance; • Not suitable for low vehicles; and • High risk of damage to vehicles.

6.2.4 NO-GO Alternative

The No-go Alternative refers to the current status quo and the risks and impacts associated with it. This would mean the benefits of the project will not materialise (i.e. no job creation, no improved road safety etc.). The environment will remain relatively undisturbed and there would be no contribution to road safety at the Ndabakazi Interchange. The no-go alternative is thus not considered the preferred alternative in terms of this development.

6.3 SUMMARY OF ALTERNATIVES

Table 6-2 below summarises all the proposed alternatives for the proposed new Ndabakazi Interchange development.



Table 6-2: Summary of the proposed alternatives for the Ndabakazi Interchange.

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
Property or location This refers to the fundamental route options , and the environmental risks and impacts associated with such options.	Site Alternative 1 (only alternative)	<ul style="list-style-type: none"> - Located on an already existing national road. - The majority of the road upgrade will be confined to the current road reserve. - Easy access of the site as it is currently a used road. 	<ul style="list-style-type: none"> - The road will have to place “stop and goes” or some of traffic management during the construction phase of the proposed upgrades as the upgrades will disturb the free-flow of traffic on the route. - Temporary diversion roads will potentially disturb the surrounding bio-physical and social environment temporarily. 	YES	YES	
Layout This relates mostly to alternative ways in which the proposed development or activity can be physically laid out on the ground to minimise or reduce environmental risks or impacts.	Layout Alternative 1 – Upgrading, widening and realignment taking into consideration safe access of the N2 (preferred)	<ul style="list-style-type: none"> - Job creation - Safest N2 access for temporary traffic diversion roads - The upgrade of existing gravel roads for the use as temporary access roads (tared) will provide improved road conditions for the community. 	<ul style="list-style-type: none"> - Route transverses a drainage channel and wetland 	YES	YES	Layout Alternative 1 will be assessed in the impact assessment process
	Layout Alternative 2 – Unsafe access off the N2	<ul style="list-style-type: none"> - Job creation - The upgrade of existing gravel roads for the use as temporary access roads (tared) will provide improved road conditions for the community. 	<ul style="list-style-type: none"> - Route transverses a wetland - Greater safety risks to community from increased flow of traffic through the residential area 	NO	NO	



Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
Type of technology This refers to the fundamental technology options.	Technological Alternative 1 – Asphalt (preferred)	<ul style="list-style-type: none"> - High skid resistance; - High luminance; - Rapid shedding of rainwater; and - Low traffic noise levels. 	<ul style="list-style-type: none"> - Prone to cracking if improperly laid out - High maintenance requirements 	YES	YES	
	Technological Alternative 2 - Concrete	<ul style="list-style-type: none"> - Less prone to cracking and potholes - Durable and safe - Low maintenance requirements 	<ul style="list-style-type: none"> - The high cost. 	NO	NO	
	Technological Alternative 3 - Gravel	<ul style="list-style-type: none"> - Low cost 	<ul style="list-style-type: none"> - Less resistant to wear; - Low skid resistance; - Not suitable for low vehicles; and - High risk of damage to vehicles. 	NO	NO	
No-go option This refers to the current status quo and the risks and impacts associated to it.	No construction of the Ndabakazi Interchange	<ul style="list-style-type: none"> - The environment will remain relatively undisturbed. 	<ul style="list-style-type: none"> - No contribution towards road safety. - No temporary job opportunities. - Further deterioration of the national road 	YES	YES	The no-go option will be assessed in the impact assessment process



6.4 PREFERRED ALTERNATIVE

The removal of the non-feasible alternatives listed above leaves four (4) alternatives applicable to the proposed project:

- Site Alternative 1;
- Layout Alternative 1;
- Technology Alternative 1: Asphalt; and
- No-Go Option (land to remain undeveloped).

The assessment will therefore only consider these four alternatives. The No-Go option does not contribute improved road traffic safety or creating employment and is therefore not identified as the preferred alternative for this project. The preferred alternative is the construction of the proposed Ndabakazi Interchange with the temporary diversion routes taking into consideration safe access off the N2 the and proposes the least impactful routing on surrounding waterbodies, as much as practically possible (Layout 1).

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7 PUBLIC PARTICIPATION

In terms of Appendix 1; Content of a Basic Assessment Report of the EIA Regulations (2014, as amended), a Basic Assessment Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

- h) A full description of the process followed to reach the proposed preferred activity, site and location within the site, including –*
 - (ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents.*
 - (iii) A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;*

Public consultation is a legal requirement throughout the EIA process. Developers are required to conduct public consultation throughout the Basic Assessment process. Formal EIA documents are required to be made available for public review, which include the project brief, Draft and Final BARs, and the decision of the Competent Authority.

7.1 PUBLIC PARTICIPATION PROCESS

According to Regulation 41(2) of the NEMA EIA Regulations 2014 (as amended) “*the person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by:*

7.1.1 SITE NOTICE

- (a) fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of—*
 - (i) the site where the activity to which the application or proposed application relates is or is to be undertaken; and*
 - (ii) any alternative site.*

An appropriate site notice was placed near the existing N2 – R409 intersection on the 14 September 2018 (see Appendix B).

7.1.2 NEWSPAPER ADVERTISEMENT

- (b) placing an advertisement in—*
 - (i) one local newspaper; or*
 - (ii) any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;*



(c) placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii);

A newspaper advertisement will be placed in the Daily Despatch (Local Newspaper) in order to notify the general public of the proposed development and availability of the Draft BAR for public review. Refer to Appendix B for a copy of the advert. Proof of placement will be provided in Final BAR.

7.1.3 I&AP AND STAKEHOLDER NOTIFICATIONS

(d) giving written notice, in any of the manners provided for in section 47 D of the Act, to—

- (i) the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner and to any alternative site where the activity is to be undertaken;*
- (ii) owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;*
- (iii) the municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;*
- (iv) the municipality which has jurisdiction in the area;*
- (v) any organ of state having jurisdiction in respect of any aspect of the activity; and*
- (vi) any other party as required by the competent authority;*

Contact details of all stakeholders identified are available in Appendix B. Letters of notification and Background Information Documents (refer to Appendix B) were sent out via email on the 27 June 2019 (refer to Appendix B). In addition, sms notifications were sent out on the 27 June 2019 to all stakeholders without email addresses. All surrounding landowners and ward councillors have been notified of the proposed Ndabakazi Interchange development through SANRAL's established PLC (refer to Appendix B-6).

In addition, hard copies of the BID were distributed during the initial site visit on the 14 September 2018. All stakeholders and I&APs will be notified of the availability of the Draft BAR by means of email, sms/mail and via an advertisement placed in the newspaper.

Meetings were held on the 13 and 27 February 2019 with the local chiefs and representatives of the Amahlubi Traditional Council where a community resolution letter was signed regarding SANRAL's use of the land for the proposed development (refer to Appendix B-6).



7.1.4 STAKEHOLDER IDENTIFICATION AND REGISTERED I&APS

A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of—

- (a) all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;*
- (b) all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and*
- (c) all organs of state which have jurisdiction in respect of the activity to which the application relates.*

As such, a comprehensive I&AP register has been included in Appendix B of this report.

7.1.5 ISSUES RAISED BY I&APS

A summary of comments and concerns raised during the community resolution meetings (refer to 7.2.2 below) can be found in Appendix B-7: Comments and Responses Trail. No other comments have been received to date.

7.2 STAKEHOLDER ENGAGEMENT

7.2.1 DWS MEETING

A pre-application meeting was held with the Department of Water and Sanitation (DWS) regarding the proposed development. The purpose of the meeting was to determine the Water Use Licencing (WULA) requirements for the proposed construction of the Ndabakazi Interchange. Please refer to Appendix B-8 for a copy of the meeting minutes.

In summary, the following was concluded:

- Upgrades to existing culverts may be done so under SANRAL's existing general authorisation and adhere to Section 19 of the NWA. SANRAL must ensure that an effective erosion management plan is in place;
- New culvert structures within watercourses will require a (c) and (i) applications;
- New temporary roads which impact on wetlands or watercourses will require a water use license and must have the necessary method statements in place;
- Temporary road routes used must be least disturbing to the community; and
- The backfilling the Ndabakazi dam will not require any water use license applications, however it must be subject to approval by the community members.



7.2.2 COMMUNITY RESOLUTION

Two meetings were held with the local chiefs/representatives of the Ndabakazi and Cegcuana community on the 15 and 27th February 2019. A community resolution letter was signed regarding the use of tribal land for the proposed development. A copy of the community resolution letter, attendance register, and summary of comments and concerns raised during these meetings can be found in Appendix B-6 and Appendix B-7.

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8 DESCRIPTION OF THE ENVIRONMENT

In terms of Appendix 1; Content of a Basic Assessment Report of the EIA Regulations (2014, as amended), a Basic Assessment Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

- h) A full description of the process followed to reach the proposed preferred activity, site and location within the site, including –*
 - (iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;*

The following chapter outlines the biophysical features of the property portions on which the proposed Ndabakazi Interchange will be developed. In addition, the socio-economic baseline of the region is provided. The section draws on existing available information within the immediate area as well as municipal and local planning tools and any additional published and unpublished material. The biophysical baseline section will look at aspects relating to climate, topography, geology, soils, flora, and surface and groundwater resources, while the social baseline section will address the administrative and institutional structures, demographic profile and economy.

8.1 CLIMATE

The nearest available climate data for the Ndabakazi Interchange development was that of the adjacent town of Butterworth located 13 km to the north. Butterworth normally receives about 596mm of rain per year, with most rainfall occurring mainly during summer. The chart below (lower left) shows the average rainfall values for Butterworth per month. It receives the lowest rainfall (8mm) in June and the highest (89mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Butterworth range from 19.2°C in July to 25.6°C in February. The region is the coldest during July when the temperature drops to 6.2°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.

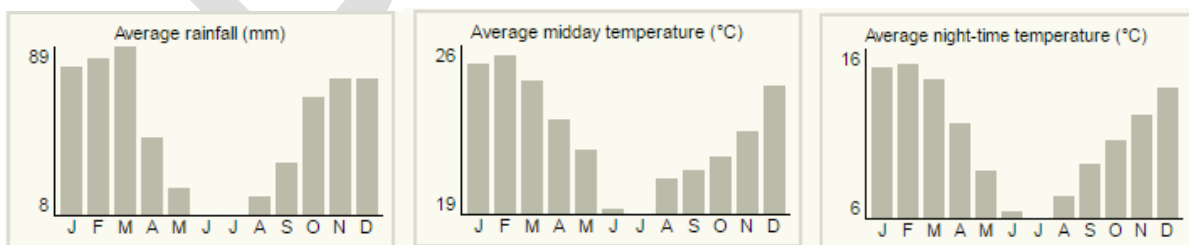


Figure 8-1: Monthly rainfall and temperature data for Butterworth (SA Explorer, 2019).



8.2 TOPOGRAPHY

Figure 8-2 below indicates the topography of the surrounding environment for the N2 Ndbakazi Interchange using 5 m contour lines. The topography of the area where the proposed Ndbakazi Interchange will be located ranges from 735 m to 770 m. Steeper gradients can be found to the east and west of the existing N2 along drainage channels.

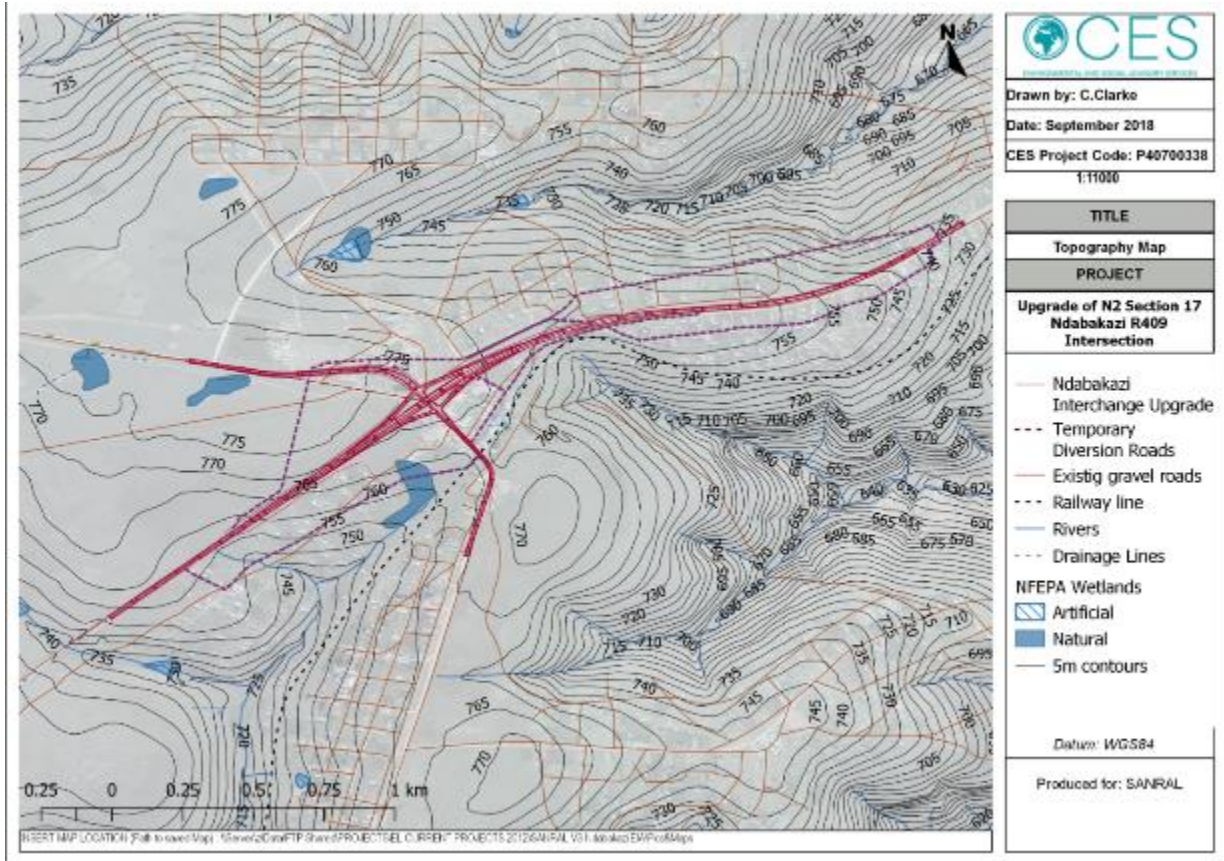


Figure 8-2: Contour Map of the study area.

8.3 GEOLOGY

Mudstones of the Tarkastad and Adelaide Subgroups (Beaufort Group, Karoo Supergroup) underlie this area, with highly leached soils typical of the Fa land type. Jd Dolerite and Pa Mudstone dominate the study area (Figure 8-3).

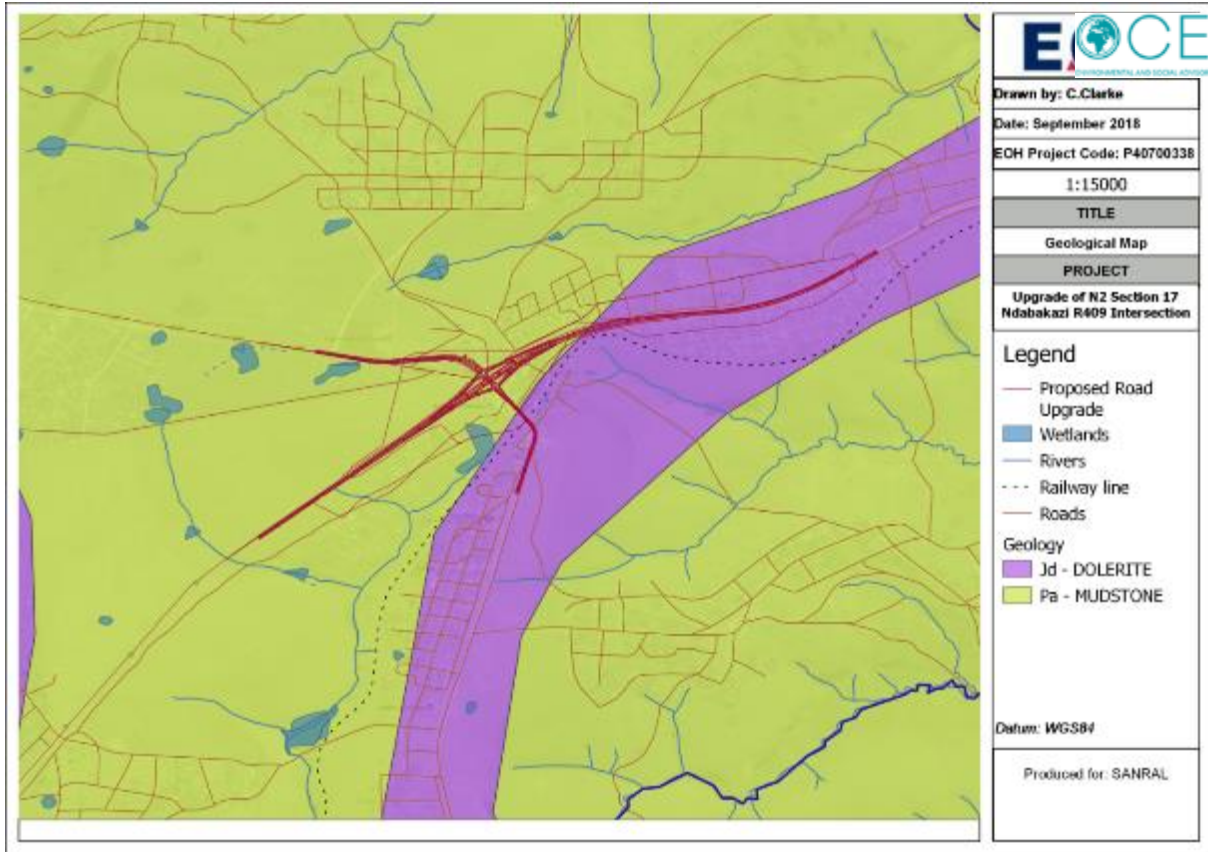


Figure 8-3: Geology of study area

8.4 SOILS

Soils have minimal development and are usually shallow on hard or weathering rock, with or without intermittent diverse soils. Mucina and Rutherford (2018) assert that erosion may pose a severe issue for the vegetation type overlain the study area.

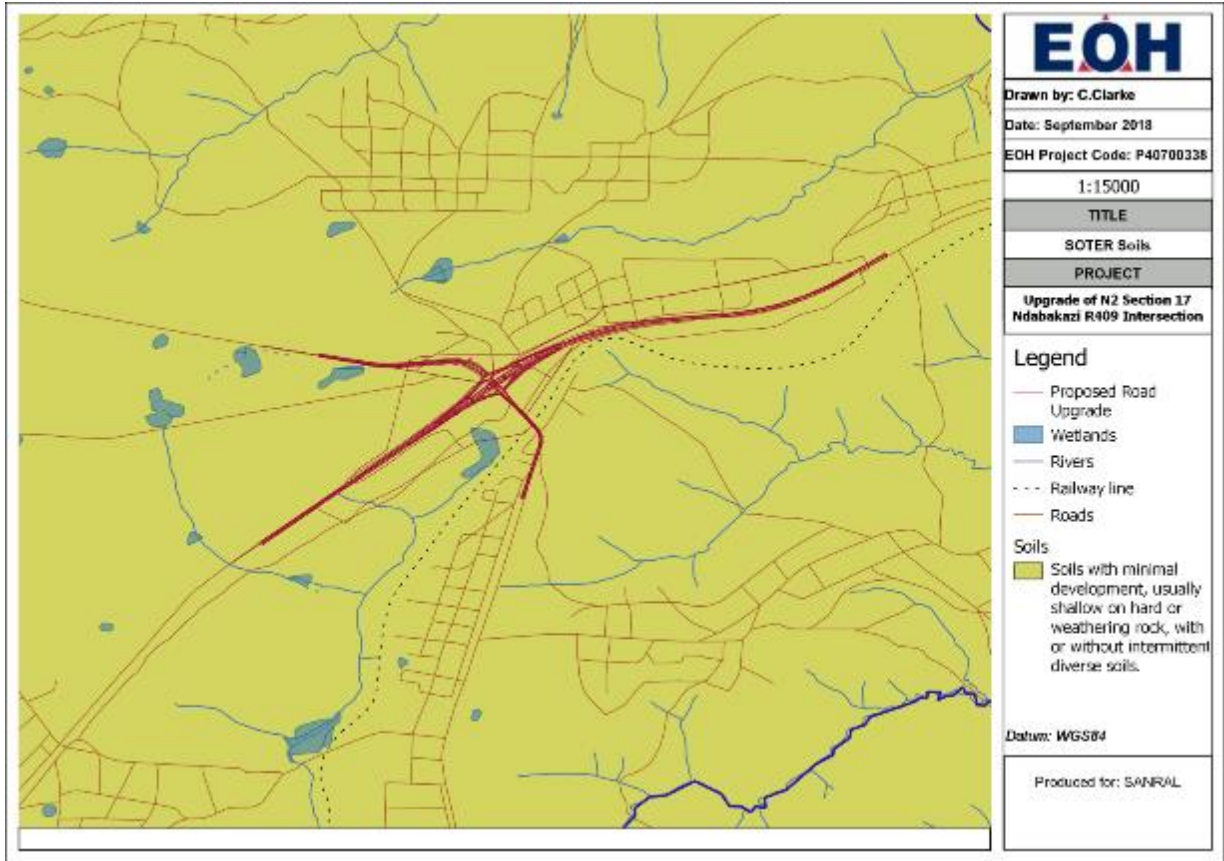


Figure 8-4: SOTER Soil association map of the study area.

8.5 SURFACE HYDROLOGY

The proposed construction of the Ndabakazi Interchange traverses some rivers, river tributaries and drainage lines as indicated in Figure 8-5 below. The road route, including temporary access roads also fall within numerous wetland buffers.

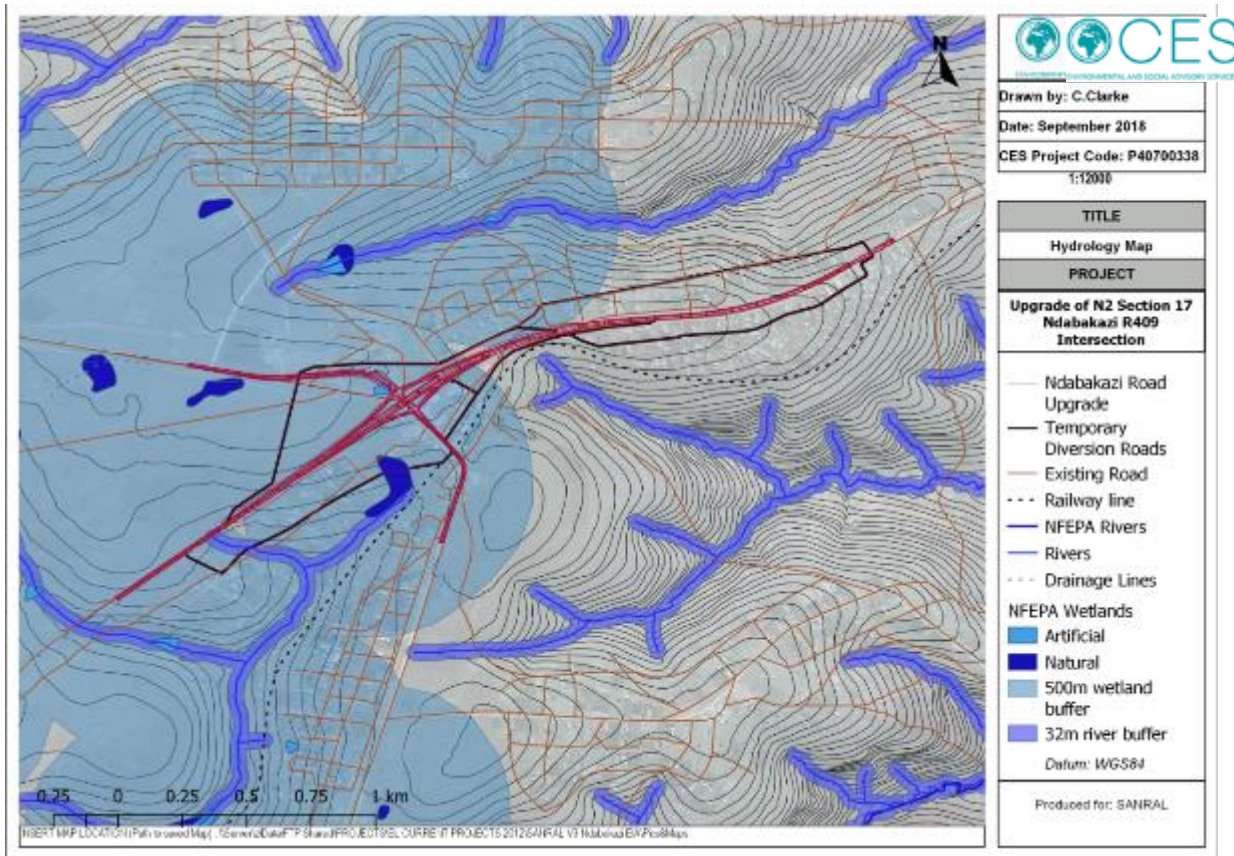


Figure 8-5: Hydrology Map of the study area.

As per the DWS pre-application meeting (see meeting minutes attached in Appendix B-6), new culvert structures and temporary access roads (which do not fall under SANRAL’s existing General Authorisation) which transverse watercourses and wetlands (or fall within the 500m wetland buffer) will require (c) and (i) water use license applications.

8.6 VEGETATION AND FLORISTICS

The following National & Provincial Plans are used to describe vegetation floristics that may potentially occur along the N2 and R409 road section:

- SANBI classification (Mucina and Rutherford, 2018)
- DAFF Forestry classification

8.6.1 SANBI CLASSIFICATION (MUCINA AND RUTHERFORD, 2018)

The study area falls within one vegetation type, namely the Mthatha Moist Grassland (Mucina & Rutherford, 2018). Bisho Thornveld is also found within the region and surrounds the development site.



Mthatha Moist Grassland

Mthatha Moist Grassland is distributed in the Eastern Cape Province along the plains between Mthatha and Butterworth parallel to the coastline and excluding the river valleys that intrude landwards into this unit.

The undulating plains and hills support species poor, sour, wiry grassland with *Eragrostis plana* and *Sporobolus africanus*, dominated by *Themeda triandra*. In terms of the conservation status, Mucina and Rutherford (2012) classify Mthatha Moist Grassland as an **ENDANGERED** vegetation type. The NSBA Conservation Target for this vegetation type is 23%. More than 40% of Mthatha Moist Grassland has been transformed for cultivation, plantations or dense rural settlements.

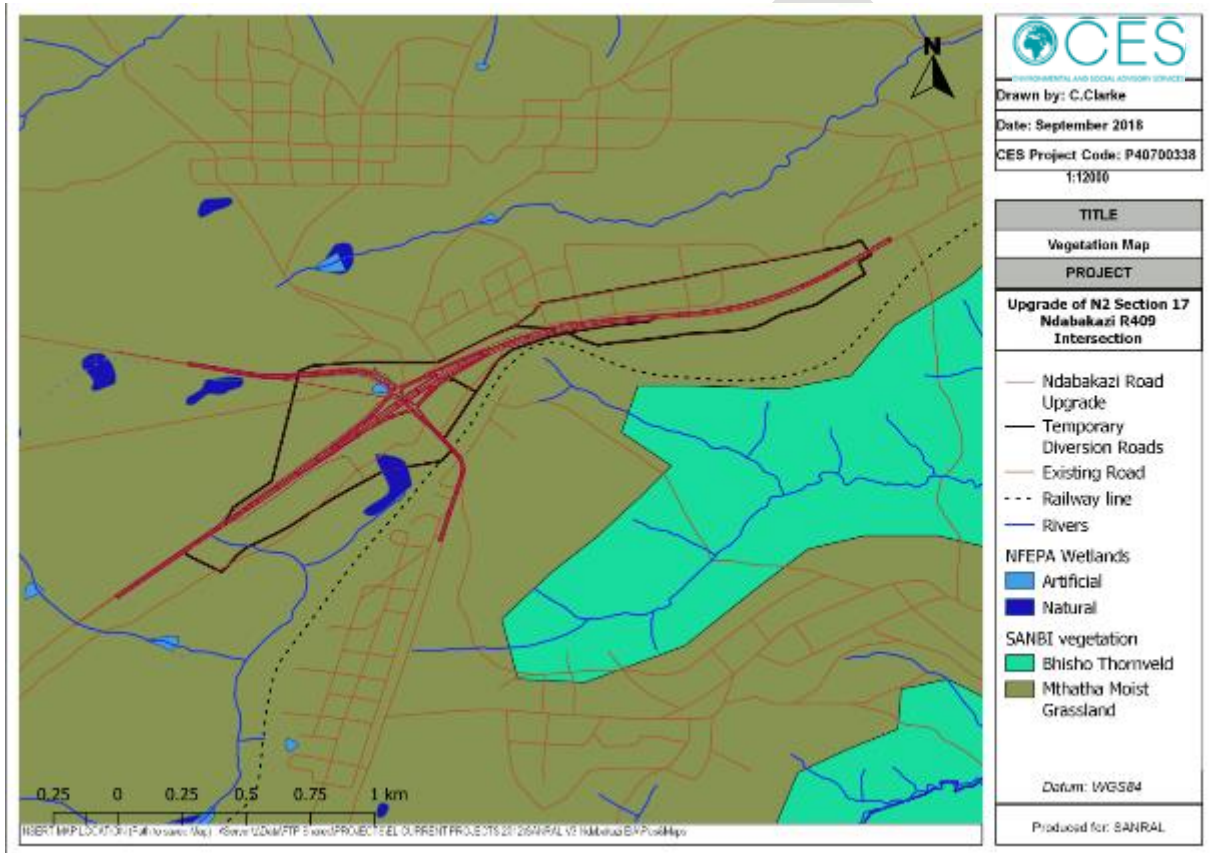


Figure 8-6: SANBI Vegetation Map of the study area.

8.6.2 FOREST CLASSIFICATION

No natural forest will be impacted by the proposed road development.

8.7 LAND USE

The current land uses in the vicinity of the Ndabakazi Interchange are explained in Table 8-1 below and depicted in Figure 8.8 on the following page.



Table 8-1: Land uses in the vicinity of the road upgrade.

LAND USE TYPE	COLOR ID (as in Figure 8-7)	AFFECTED BY ROAD UPGRADE
Cultivated land/agricultural land	Yellow	No
Wetlands	Dark Blue & Light Blue	Yes
Ndabakazi Dam	Light Blue	Yes
Existing Roads	Dark Brown	Yes
Rivers and tributaries	Blue lines	Yes
Existing Railway Track	Black dotted line	Maybe
Low Urban Density	Purple	Yes
Grassland	Green	Yes

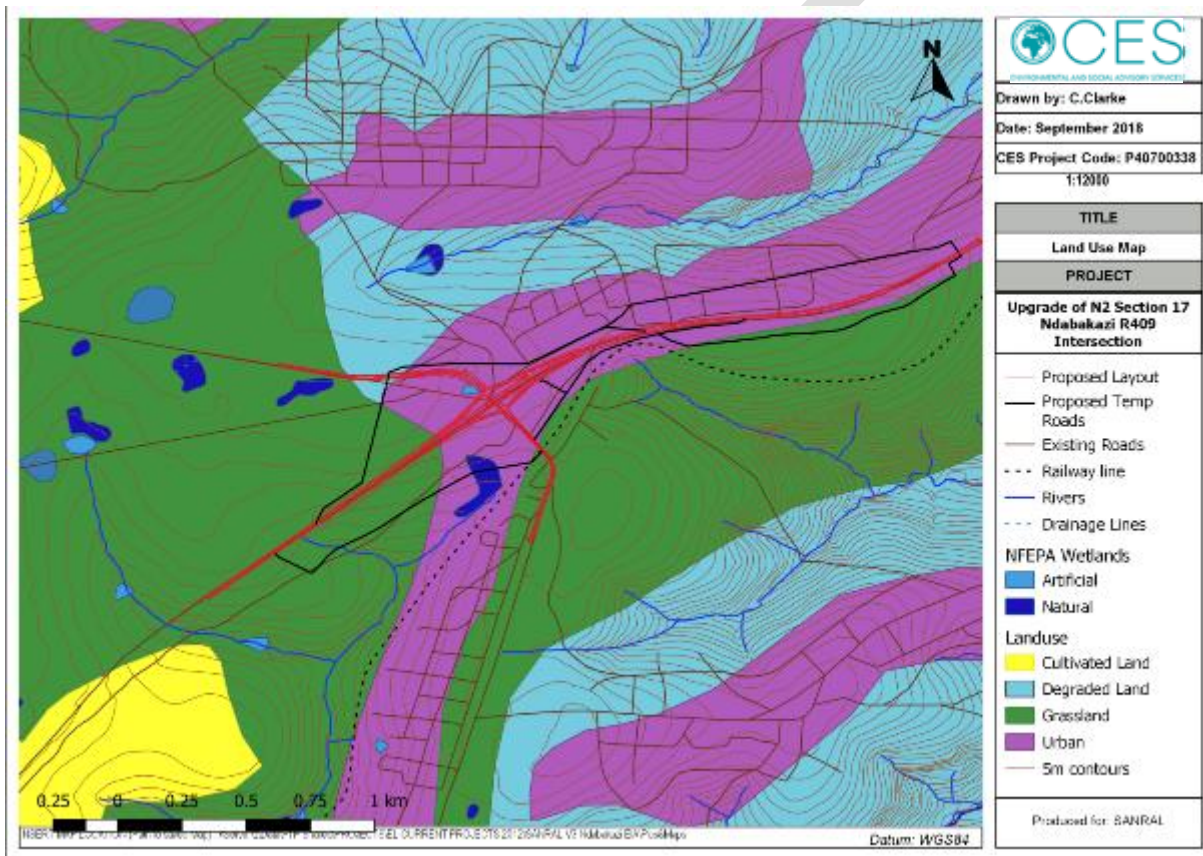


Figure 8-7: Land Use Map of the study area.

8.8 BIODIVERSITY CONSERVATION

South Africa's policy and legislative framework for biodiversity is well developed, providing a strong basis for the conservation and sustainable use of biodiversity. South Africa is one of the few countries in the world to have a Biodiversity Act and a National Biodiversity Institute.

Key components of the national policy and legislative framework for biodiversity include:

- The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997)
- The National Environmental Management: Biodiversity Act (Act 10 of 2004)



- The National Environmental Management: Protected Areas Act (Act 57 of 2003)
- The National Protected Area Expansion Strategy (NPAES) (2008)

8.8.1 PROTECTED AREAS

There are no known National, Provincial or locally protected areas found within the general study area. In addition, the proposed Ndbakazi Interchange does not fall within any National Protected Expansion Areas as per NPAES (2008).

According to NEMBA (2004), Mthatha Moist Grassland is classified as having a **VULNERABLE** ecosystem threat status.

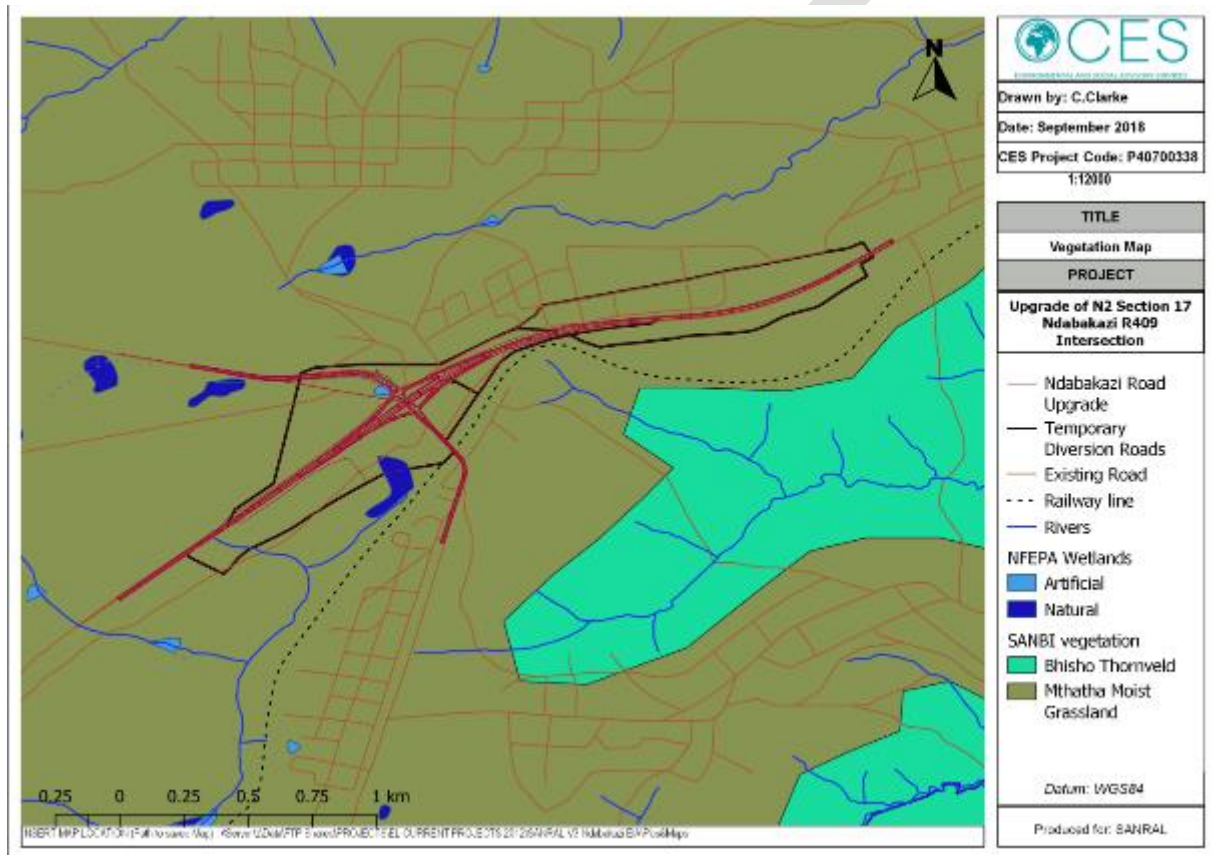


Figure 8-8: NEMBA Threatened Ecosystems Map of the study area.

8.8.2 EASTERN CAPE BIODIVERSITY CONSERVATION PLAN (ECBCP)

In addition to national legislation, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act No. 108 of 1996). The relevant biodiversity plan in the Eastern Cape is the Eastern Cape Biodiversity Conservation Plan (ECBCP) (2007).

The main outputs of the ECBCP are the identification of “critical biodiversity areas” or 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 (CBA3) = Functional Landscapes
- BLMC 4 (CBA 4) = Towns & Settlements, Woodlots & Plantations, Cultivated Land

The ECBCP maps CBAs based on extensive biological data and input from key stakeholders. Critical Biodiversity Areas (CBA 1 and 2), as defined by the ECBCP, form the foundation areas where conservation is priority. These areas provide essential ecosystem services. CBA Areas provide the spatial framework for future spatial development planning, particularly indicating those areas where development needs to be avoided or at best, carefully managed. The ECBCP, although mapped at a finer scale than the National Spatial Biodiversity Assessment (Driver *et al.*, 2005) is still, for the large part, inaccurate and "coarse". 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). Despite these short-comings, 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.

The Ndabakazi Interchange (Figure 8-9) falls within terrestrial areas that are classified as CBA 2. Furthermore, a portion of the proposed intersection upgrade falls within Aquatic areas classified as CBA 2 (Figure 8-10).

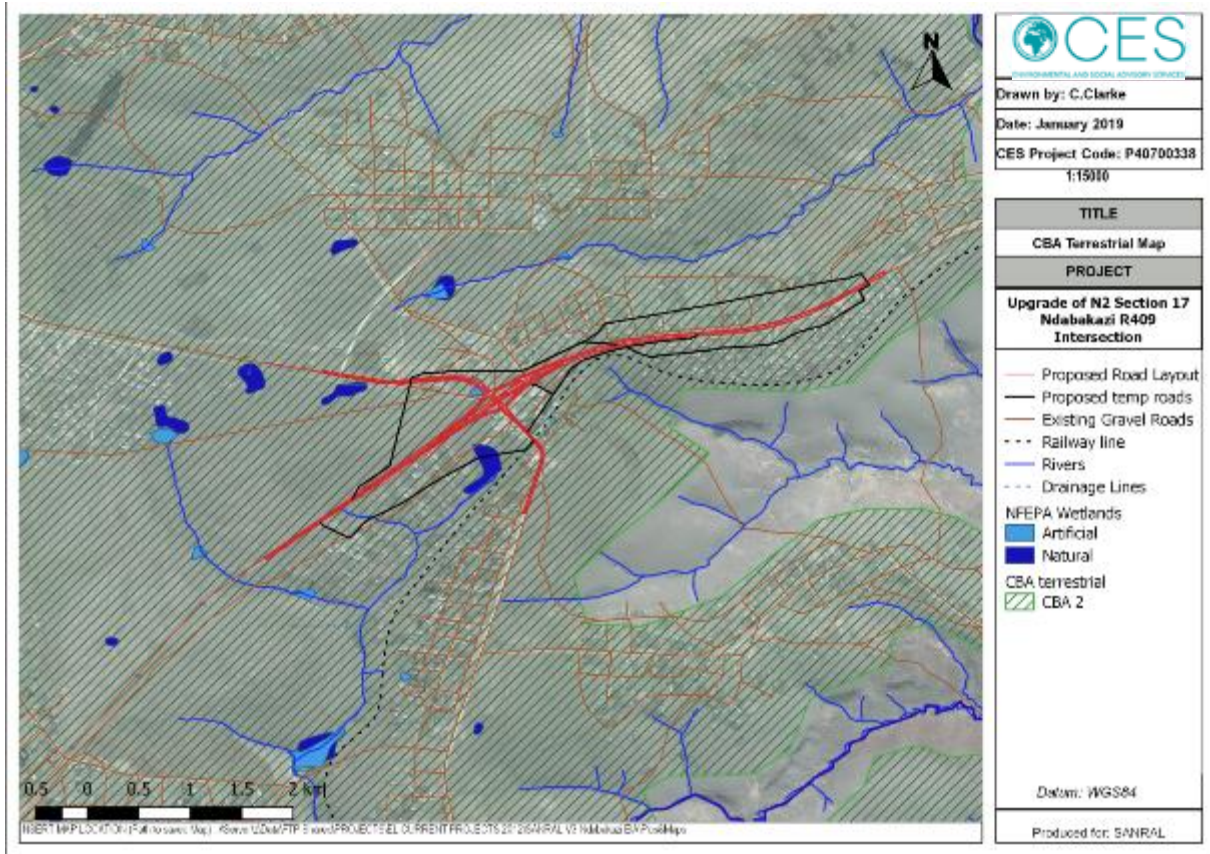


Figure 8-9: Terrestrial CBA Map of the study area.

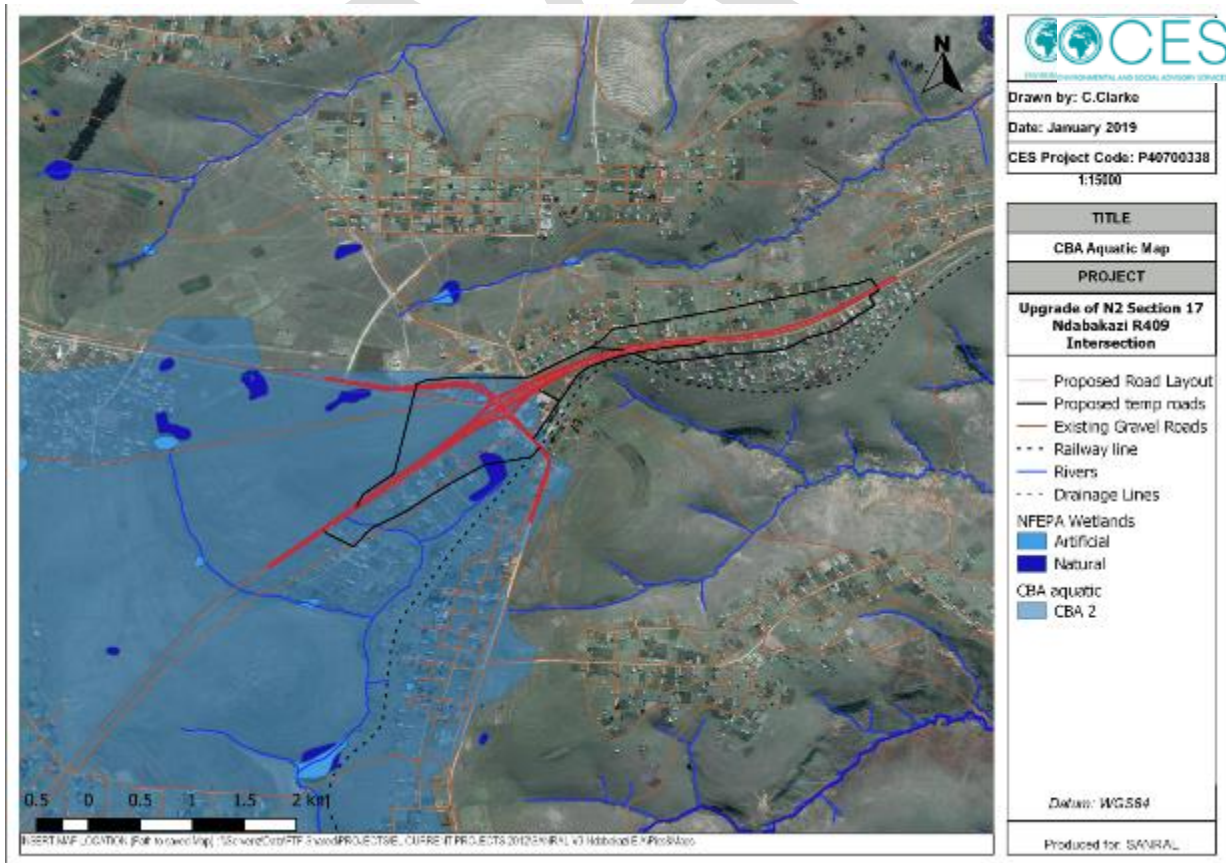


Figure 8-10: Aquatic CBA Map of the study area.



8.8.3 CONSERVATION STATUS OF PLANT SPECIES: RARE, ENDANGERED OR THREATENED SPECIES

The following list of potential plant Species of Conservation Concern (SCC's) were derived from current literature for vegetation found in the area as well as the international IUCN Red Data list, the South African Red Data List, DAFF protected trees, PNCO, and CITES. The results are summarised in Table 8-2.

It is unlikely for any of the SCC species listed below to occur onsite as the site is predominantly an urban area which is highly disturbed and surrounded by agricultural land and rural developments.

Table 8-2: List of potential plant SCC that may be found onsite (Source: POSA Website)

FAMILY	SPECIES	RED DATA	PNCO
ASPHODELACEAE	<i>Haworthia cymbiformis var. setulifera</i>	NE	PNCO (Protected)
CRASSULACEAE	<i>Crassula arborescens subsp. undulatifolia</i>	Critically rare	PNCO (Protected)
GESNERIACEAE	<i>Streptocarpus meyeri</i>	LC	PNCO (Protected)
IRIDACEAE	<i>Gladiolus ochroleucus</i>	LC	PNCO (Protected)
ORCHIDACEAE	<i>Disa crassicornis</i>	LC	PNCO (Protected)
	<i>Eulophia streptopetala</i>	LC	PNCO (Protected)
SCROPHULARIACEAE	<i>Diascia racemulosa</i>	LC	PNCO (Protected)

As identified and discussed within the Ecological Impact Assessment (Appendix D3), a patch of *Aloe maculata* was found on site (refer to section 10.3.3 and Figure 10-2 below). These Aloes are protected under the Provincial Nature and Environmental Conservation Ordinance (No. 19 of 1974). This Ordinance protects Endangered (Schedule 3) and Protected (Schedule 4) Species. A permit from the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) (the Provincial Authority) is required for the removal or destruction of species listed in the Schedules prior to construction.

8.8.4 ALIEN INVASIVE SPECIES

A list of potential alien invasive floral species that may be found onsite are summarised in Table 8-3 below.



Table 8-3: List of potential Alien Invasive Species that are likely to be found onsite (Source: POSA Website)

FAMILY	SPECIES	CONSERVATION STATUS	CARA	NEMBA: ALIEN INVASIVES
Asteraceae	<i>Xanthium spinosum</i>	Invasive	1	1b
Fabaceae	<i>Acacia mearnsii</i>	Invasive	2	2
	<i>Acacia melanoxylon</i>	Invasive	2	2
	<i>Acacia saligna</i>	Invasive	2	1b

As per the NEMBA Alien and Invasive Species List (Government Notice R 599 of 2014), the applicant must ensure that the site is cleared of alien vegetation using appropriate means. An invasive species monitoring, control and eradication plan must be implemented as part of the EMP.

8.9 SOCIO-ECONOMIC PROFILE

The socio-economic profile of the broader study is detailed below.

8.9.1 POPULATION

The National Route N2 Section 17 falls within the Mquma Local Municipality which has a total population of approximately 252 390 people. Over 81 % of the population of Mquma Local Municipality lives in rural areas, villages and on farms. The population is spread amongst 31 wards with approximately 69 732 households. The average household consists of 3.5 people. The municipality comprises of 53.3 % female and 46.7 % males. About 56.7 % of the population falls between 15-64 years, whilst 9 % are in the pension group (over 65 years) and only 34.3 % are younger than 15 years (StatsSA, 2011).

8.9.2 EMPLOYMENT

Approximately 55.8 % of the Mquma Local Municipality population are employed as per the 2011 Statistics South Africa (StatsSA) survey resulting in an unemployment rate of 44.2 %. This is a marked improvement from 62.5 % in 2001. Of the 20 464 economically active youth (15 – 34 years) in the area, 55.7 % are unemployed.

8.9.3 LEVEL OF EDUCATION

There are a total of 7 schools within the Mquma Local Municipality area, of which 2 are primary, 3 are secondary and 2 are combined schools. There has been an improvement in the overall percentage of schooling received, as indicated in Table 8-4 below.

Table 8-4: Education levels of the Mquma Local Municipality (StatsSA, 2011).

EDUCATION LEVEL	2011	2001
	PERCENTAGE	PERCENTAGE
No schooling	1.7	8



EDUCATION LEVEL	2011	2001
	PERCENTAGE	PERCENTAGE
Some primary	48.6	18
Completed primary	7.2	7
Some secondary	32.7	44
Grade 12/Matric	6.3	19
Higher	0.8	4
Other	2.8	1

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9 SENSITIVITY ANALYSIS

The following section provides a detailed assessment of the sensitivity of the study area.

9.1 CONSERVATION AND SPATIAL PLANNING TOOLS

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

The following tools identified as relevant to the project are summarised below:

- SANBI Vegetation threat status;
- Land cover;
- Rivers and wetlands;
- NEMBA Protected Ecosystems; and
- ECBCP CBA's.

9.1.1 SANBI VEGETATION THREAT STATUS

Mthatha Moist Grassland (as identified in Mucina and Rutherford, 2018) occurs along portions of the road upgrade and development, which is classified as Endangered. Some vegetation has been completely transformed by cultivation and urban development and encroachment.

9.1.2 LAND COVER

Two applicable land covers were identified namely:

- Natural vegetation – Mthatha Moist Grassland
- Urban and developed areas.

Natural vegetation is mostly intact with a large degree of transformation in some areas. Alien and invasive vegetation was also observed. Urban areas have no biodiversity value as no natural vegetation remains.

9.1.3 RIVERS AND WETLANDS

Water is considered as a scarce resource in South Africa. All identified rivers (including drainages) and wetlands (artificial and natural) are protected by legislation and requires licencing from DWS to impact on them. The surrounding watercourses and wetlands within the study area are considered to be highly sensitive.



9.1.4 ECBCP CBA'S

The study area falls within a terrestrial CBA 2, with a portion falling within an aquatic CBA 2.

9.2 SENSITIVITY ALLOCATION

Sensitivity maps were developed based on the methodology presented in Table 9-1 below, for the study area. The allocation of criteria was based on both the desktop biophysical description of the site as well as observations made during the site visit. In addition, sensitive features identified by the specialists (refer to section 10.3 below) were included.

Table 9-1: Sensitivity criteria

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or habitat type in the region	Extensive throughout the region	Restricted to a particular region / zone	Restricted to a specific locality / site
3	Conservation status 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	Species of conservation concern - Presence and number	None, although occasional regional endemics	No Species of Conservation Concern, some indeterminate or rare endemics	One or more Species of Conservation Concern, or more than 2 endemics or rare species
5	Habitat fragmentation	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation
6	Biodiversity contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High diversity and species richness
7	Erosion potential 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
8	Rehabilitation 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



CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
9	Disturbance 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
10	Ecological function	Habitat widely represented in the landscape not specifically harbouring any unique habitat features...etc.	Intermediate role in ecological function	Key habitat involved in ecological processes (ecological corridors and network areas or key niche habitats)
11	Ecological Services	Little to no ecological services	Some ecological services.	Various ecological services. Areas should be conserved.

The proposed Ndakakazi Interchange largely falls on already developed land (within the road reserve). A small patch of *Aloes* found on the western side of the interchange have a **HIGH** sensitivity rating and should be avoided if possible. The Ndabakazi dam, located on the western side of the Interchange has been allocated a **MODERATE** sensitivity rating, as the community have expressed concerns over the backfilling of this dam, as it is an important water source to the community for various purposes. SANRAL is in negotiations with the local chiefs regarding this (refer to Appendix B-7 for a summary of the meetings held).

A small portion of the proposed temporary diversion road transverse areas of **HIGH** sensitivity. The primary reasons for the high sensitivity areas (red) in Figure 9.1 below are the presence of existing water bodies, (rivers, drainage lines and wetlands). In addition, identified sensitive heritage features have been allocated a **HIGH** sensitivity rating.

Portions of the proposed temporary diversion roads fall within undisturbed natural vegetated areas containing Mthatha Moist Grassland (Endangered) and has been allocated a **MODERATE** sensitivity rating. Portions of the temporary traffic diversion roads which pass through areas of disturbed Mthatha Moist Grassland have been allocated a **LOW** sensitivity rating.

Houses may also be affected by the proposed development by increased traffic diverted through the residential areas, however this can be adequately mitigated through implementation of the recommended mitigations.

Table 9-2: Sensitive assessment of the study area

SENSITIVE ENVIRONMENT	DESCRIPTION	RISK
Aquatic Environment	<ul style="list-style-type: none"> Watercourses Wetlands 	HIGH



SENSITIVE ENVIRONMENT	DESCRIPTION	RISK
Species of Conservation Concern	A patch of <i>Aloe maculata</i> was found on site	HIGH
Heritage and Archaeological Features	Identified heritage colonial buildings and burial sites within the study area	HIGH
Natural Vegetated Areas – Grassland; Conservation Status of Vegetation type	Natural occurring Mthatha Moist grassland; The SANBI Vegetation type, Mthatha Moist Grassland, is considered ENDANGERED and has a high degree of transformation (more than 40%).	MODERATE
Natural Vegetated Areas – Grassland	Degraded/disturbed areas of Mthatha Moist Grassland	LOW

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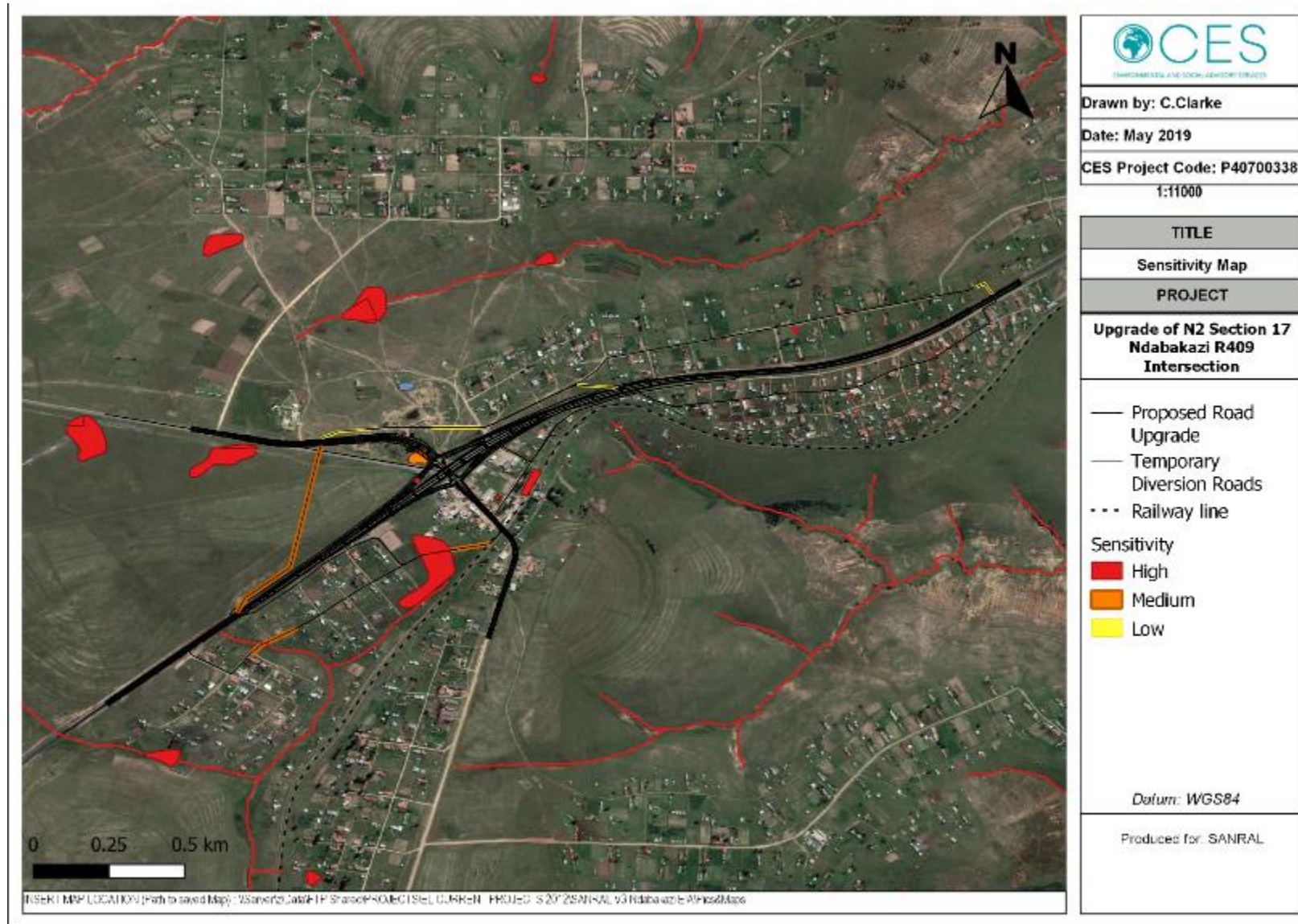


Figure 9-1: Sensitivity Map of the study area.



10 IMPACT ASSESSMENT

In terms of Appendix 1; Content of a Basic Assessment Report of the EIA Regulations (2014, as amended), a Basic Assessment Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

- h) A full description of the process followed to reach the proposed preferred activity, site and location within the site, including –*
- (i) The impacts and risks which have informed the identification of each alternative, including the nature, significance, consequences, extent, duration and probability of such identified impacts, including the degree to which these impacts –*
 - Can be revised*
 - May cause irreplaceable loss of resources; and*
 - Can be avoided. Managed or mitigated*
 - (ii) The methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;*
 - (iii) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;*
 - (iv) The possible mitigation measures that could be applied and level of residual risk;*
 - (v) The outcome of the site selection matrix*
 - (vi) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and*
 - (vii) A concluding statement indicating the preferred alternatives, including preferred location of the activity.*

10.1 IMPACT ASSESSMENT METHODOLOGY

CES has developed a rating scale for the Basic Assessment process in accordance with the requirement outlined in Appendix 1 of the EIA Regulations (2014 as amended). Six factors are considered when assessing the significance of the identified issues, namely:

- **Significance** - Each of the below criterion are ranked with scores assigned, as presented in Table 9-2 to determine the overall significance of an activity. The total scores recorded for the effect (which includes scores for duration; extent; consequence and probability) and reversibility / mitigation are then read off the matrix presented in Table 9-1 to determine the overall significance of the issue. The overall significance is either negative or positive.



- **Consequence** - the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
- **Extent** - the spatial scale defines the physical extent of the impact.
- **Duration** - the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- **Probability** of the impact occurring - the likelihood of impacts taking place as a result of project actions arising from the various alternatives. 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 and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- **Reversibility / Mitigation** – The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable.

The four categories used are listed and explained in Table 10-1 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 10-1: Evaluation Criteria for Rating Impacts.

EFFECT	DURATION	
	Short term	Less than 5 years
	Medium term	Between 5-20 years
	Long term	More than 20 years
	EXTENT	
	Localised	The proposed site
	Study Area	The site and its immediate environs
	Regional	District / Municipal and Provincial level
	National	National and International level
	CONSEQUENCE	
	Slight	Slight impacts or benefits on the affected system(s) or party(ies)
	Moderate	Moderate impacts or benefits on the affected system(s) or party(ies)
	Severe/Beneficial	Severe impacts or benefits on the affected system(s) or party(ies)
	PROBABILITY	
Unlikely	The likelihood of these impacts occurring is slight (low probability)	
May Occur	The likelihood of these impacts occurring is possible (high probability)	
Definite	The likelihood is that this impact will definitely occur	
MITIGATION	MITIGATION	
	Easily Achievable	The impact can be easily, effectively and cost effectively mitigated
	Achievable	The impact can be effectively mitigated without much difficulty or cost
	Difficult	The impact could be mitigated but there will be some difficulty in ensuring effectiveness and/or implementation, and significant costs
	Very Difficult	The impact could be mitigated but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly

The above criteria are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the



issue. The overall significance is either negative or positive and will be classified as low, moderate or high (Table 10-2).

Table 10-2: Description Significance Ratings.

SIGNIFICANCE RATE	DESCRIPTION
LOW	The impacts on this issue are acceptable and mitigation, whilst desirable, is not essential. The impacts on the issue by themselves are insufficient, even in combination with other low impacts, to prevent the development being approved. Impacts on this particular issue will result in either positive or negative medium to short term effects on the social and/or natural environment.
MODERATE	The impacts on this issue are important and require mitigation. The impacts on this issue are, by themselves, insufficient to prevent the implementation of the project, but could in conjunction with other issues with moderate impacts, prevent its implementation. Impacts on this particular issue will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.
HIGH	The impacts on this issue are serious, and if not mitigated, they may prevent the implementation of the project (if it is a negative impact). Impacts on this particular issue would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment, and will result in severe effects or if positive, substantial beneficial effects.



10.2 IMPACT IDENTIFICATION

In terms of Appendix 1: Content of a Basic Assessment Report of the EIA Regulations (2014 as amended in 2017), a Basic Assessment Report must contain all the information necessary for a proper understanding of the process, informing all preferred alternatives, including location alternatives, the scope of the assessment, and the consultation process to be undertaken through the environmental impact assessment process, and must include:

j) *An assessment of each identified potentially significant impact and risk, including –*

- *Cumulative impacts;*
- *the nature, significance and consequences of the impact and risk;*
- *the extent and duration of the impact and risk;*
- *the probability of impact and risk occurring;*
- *the degree to which the impact and risk can be reversed;*
- *the degree to which the impact and risk may cause irreplaceable loss of resources; and*
- *the degree to which impact and risk can be avoided, managed or mitigated*

The technical scope (Table 10-3) maps the potential environmental impacts in each phase of the development and provides more detailed environmental issues and resulting impacts that have been identified for the following phases of the project development: planning and design, construction, operation and decommissioning.

Tables 10.7 to 10.12 assesses the impacts outlined in Table 10.3 below and provides relevant mitigation measures.



Table 10-3: Technical scope of the impacts identified during all phases of the proposed Ndabakazi Interchange

THEME	POTENTIAL ISSUES	SOURCE OF ISSUE	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTIONS
				PLANNING & DESIGN	CONSTRUCTION	OPERATIONAL	DECOMMISSIONING	
Environmental Policy	Legal and Policy Compliance	Non-compliance	SANRAL	X	X		X	Obtaining Authorisation from relevant Competent Authorities
Bio-physical	Scheduling of Construction	Inappropriate scheduling	Aquatic environments	X	X			Assessed in the Impact Assessment Section 10 and the Ecological Impact Assessment
	Changes to fluvial geomorphology and hydrology	Earthworks	Surrounding water courses	X	X	X		
	Material Stockpiling	Earthworks; pollution	Aquatic environment		X			
	Stormwater management	Inappropriate planning/ management	Aquatic environment	X	X	X	X	
	Erosion Management	Earthworks, vegetation clearance	Erosion prone areas in study area	X	X		X	
	Waste Management	Inappropriate planning/ management, construction rubble and litter	Study area and surrounds	X	X		X	
	Erosion rehabilitation plan	Inappropriate planning/ management	Erosion prone areas in study area	X		X	X	
Biological	Natural vegetation	Vegetation clearance	Flora in study area	X	X		X	Assessed in the Impact Assessment Section 10 and



THEME	POTENTIAL ISSUES	SOURCE OF ISSUE	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTIONS
				PLANNING & DESIGN	CONSTRUCTION	OPERATIONAL	DECOMMISSIONING	
								in the Ecological Impact Assessment
	Species of Conservation Concern (SCC)	Vegetation clearance	SCC in study area	X	X		X	Assessed in the Impact Assessment Section 10 and in the Ecological Impact Assessment
	Control of alien plant species	Inappropriate alien vegetation management plan	Disturbed areas	X	X		X	Assessed in the Impact Assessment Section 10 and in the Ecological Impact Assessment
Socio-economic	Job creation	Construction activities	Individuals		X		X	Assessed in the Impact Assessment Section 10
	Air pollution	Earthworks and Road traffic	Neighbouring community		X		X	
	Noise pollution	Earthworks and Road traffic	Neighbouring community		X		X	
	Visual	Presence of site	Neighbouring community		X		X	
	Health and Safety	Construction activities and equipment	Labourers		X		X	



THEME	POTENTIAL ISSUES	SOURCE OF ISSUE	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTIONS
				PLANNING & DESIGN	CONSTRUCTION	OPERATIONAL	DECOMMISSIONING	
	Sanitation and Water	Inadequate facilities on site	Watercourses		X		X	
	Management of hazardous substances	Cement, tar, fuel, bitumen, oil	Project site and waterbodies		X	X	X	
	Traffic	Construction activities	Traffic flow	X	X	X	X	
	Cultivated land	Construction activities	Land users	X	X		X	
Heritage and Archaeological Environment	Potential damage to Colonial Period structures	Earthworks, construction activities	Colonial Period structures	X	X		X	Assessed in the Heritage and Archaeological Assessment
	Potential damage to burial sites		Burial sites, local community	X	X		X	
Palaeontological Environment	Potential damage to fossils	Earthworks, construction activities	Palaeontological findings	X	X			Assessed in the Paleontological Assessment



10.3 SPECIALIST FINDINGS

The following specialist studies were conducted as part of the BAR. A summary of each specialist findings is listed below while the full specialist reports are found in Appendix D.

	SPECIALIST STUDIES	NAME OF SPECIALIST
Appendix D1	Palaeontological Impact Assessment	Dr Marion Bamford
Appendix D2	Heritage and Archaeological Impact Assessment	Mr Neels Kruger
Appendix D3	Ecological Impact Assessment	Mr Roy de Kock

The following sections provide a summary from each of the specialist studies listed above.

10.3.1 PALAEOLOGICAL IMPACT ASSESSMENT

The site for the Ndabakazi Interchange upgrade and extension lies on rocks of the Balfour Formation, Adelaide Subgroup, Beaufort Group of the Main Karoo Basin. The age is between 256 and 251 million years old. Based on the palaeontology and sedimentology the environment at the time was drying out and changing from floodplains and shallow sea(s) to meandering rivers. Vertebrate fossils occur in these sediments but are not abundant. The groups represented are fish, reptiles and therapsids of the Dicynodon Assemblage Zone. Fossil leaf impressions of the Glossopteris flora could also occur but they are scattered and rare.

From the palaeosensitivity map (Figure 3 in Appendix D3: Paleontological Impact Assessment Report), the area is indicated as predominantly highly sensitivity however the area has been extensively disturbed from urban activities. Surface occurrences of fossils are likely to be highly disturbed but below the surface there may be significant fossils.

Impact Identification and Assessment

Based on the nature of the project, surface activities are unlikely to impact upon the fossil heritage if preserved in the development footprint. Once excavations begin for the construction of diversions and infrastructure, there is a moderate chance of finding fossils. Fossils are known to occur in rocks of the Balfour Formation, but they are not common or abundant. A moderate negative impact rating has been assigned to the potential palaeontological impacts of the proposed development.

Conclusions and Recommendations

Based on experience and the lack of any previously recorded fossils from the area, it is possible that fossil vertebrates or plants could be preserved below the surface. A Fossil Chance Find Protocol must be implemented should fossils be found once excavations and construction has commenced. The fossils should be rescued, and a palaeontologist called to assess and collect a representative sample.



Should fossils be encountered on the surface, the following monitoring programme (Fossil Chance Find Protocol) must be implemented during excavations:

- When excavations begin, the rocks must be given a cursory inspection by the ECO or designated person. Any fossiliferous material (plants, insects, bone, and coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
- Photographs of similar vertebrates and fossil plants must be provided to the developer to assist in recognizing the fossils in the shales and mudstones (see Figures 4-7 in Appendix D3: Paleontological Impact Assessment Report). This information must be built into the EMPr's training and awareness plan and procedures.
- Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
- If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
- Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site, a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
- If no good fossil material is recovered, then the site inspections by the palaeontologist will not be necessary. Annual reports by the palaeontologist must be sent to SAHRA.
- If no fossils are found and the excavations have finished, then no further monitoring is required.

10.3.2 HERITAGE IMPACT ASSESSMENT

A few archaeological and historical studies have been conducted in this section of the Eastern Cape most of which infer a varied and rich heritage landscape. The literature shows traces of coastal Herder sites during the later Stone Ages with evidence of pastoralism, rock art as well as Iron Age farmer presence and a Colonial frontier denoting European farmer expansion. The vast landscape that encompasses the Ndabakazi Interchange Upgrade footprints seems to have been inhabited continuously for centuries in prehistoric and historical times, the remnants of which are visible in transformed agriculture and rural settlement areas.

Table 10-4 and Figure 10-1 below detail the heritage and grave sites which occur within the study area.



Table 10-4: Location of heritage features found within the study area.

Site Code	Coordinate S E	Short Description	Mitigation Action
EXIGO-NIU-BP01	S32.34362° E28.04748°	Burial Site	Site monitoring, avoidance, 100m conservation buffer, site management. Grave relocation subject to authorisations and permitting if impacted on.
EXIGO-NIU-BP02	S32.34469° E28.05224°	Burial Site	
EXIGO-NIU-BP03	S32.34613° E28.04929°	Burial Site	
EXIGO-NIU-HP01	S32.34982° E28.03709°	Historical Period Site	Site monitoring, avoidance, 50m conservation buffer. Phase 2 Study and destruction permitting if impacted on.
EXIGO-NIU-HP02	S32.34922° E28.03807°	Historical Period Site	

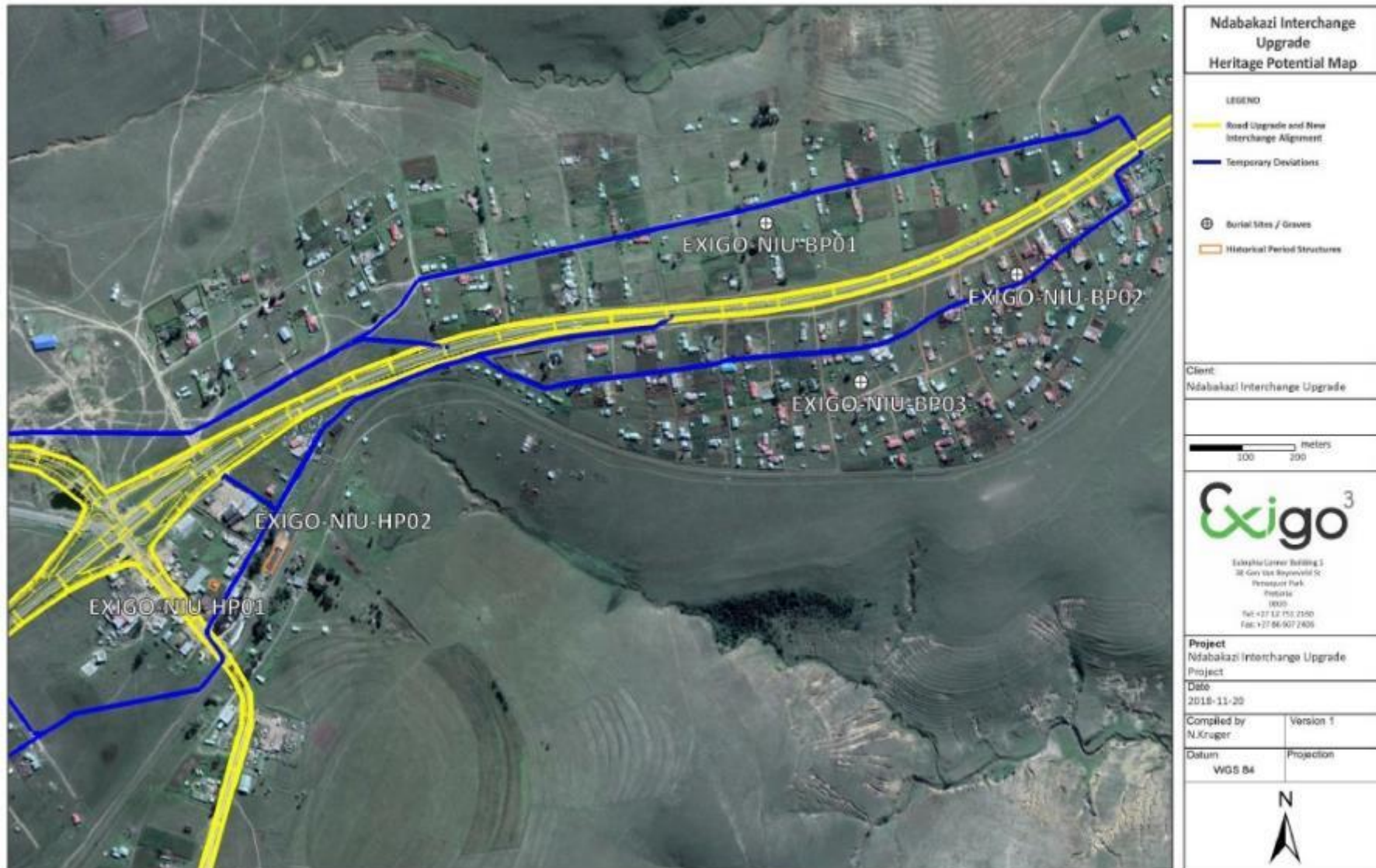


Figure 10-1: Heritage and grave sites located within the study area



Impact Identification and Assessment

The following impacts were identified:

Table 10-5: Heritage and Archaeological impacts identified

IMPACTS	PROJECT PHASES				IMPACT RATING (POST MITIGATION)
	PLANNING & DESIGN	CONSTRUCTION	OPERATION	DECOMMISSIONING	
Potential damage to Colonial Period structures: Site Exigo-NIU-HP01, Site Exigo-NIU-HP02	X	X		X	LOW NEGATIVE
Potential damage to burial sites: Site Exigo-NIU-BP01 - Site Exigo-NIU-BP03	X	X		X	LOW NEGATIVE

Refer to section 10.4 below for the detailed impact ratings.

Conclusions and Recommendations

The following general recommendations are made based on general observations in the proposed Ndabakazi Interchange Upgrade area pertaining to a number of identified occurrences of heritage potential:

- According to the South African Heritage Resources Agency Information System (SAHRIS) Palaeo Map, portions of the project area fall within a potentially sensitive fossiliferous zone and a Palaeontological Assessment is recommended for the project, subject to review and recommendations by the relevant heritage authorities. Should fossil remains, such as fossil fish, reptiles or petrified wood, be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.
- Two sites containing Historical / Colonial Period buildings (Site Exigo-NIU-HP01, Site Exigo-NIU-HP02) have the potential to provide an understanding of architectural, industrial and social developments in the Ndabakazi landscape and the receptors are rated as medium significance. The sites occur in the proximity of temporary road alignments and it is primarily recommended that a conservation buffer of at least 20 m around the sites be implemented in order to avoid impact. However, should impact on the sites prove inevitable, the structures should be adequately documented by means of Phase 2 Specialist Studies. Such studies



should minimally include the mapping, documentation and possible sampling of the sites in order to conserve the historical fabric of the heritage resources. The necessary alteration and destruction permits should be obtained from the relevant Heritage Resources

- Authorities prior to site sampling and destruction. Generally, the sites should be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains.
- Graves and burials identified within close proximity of temporary road alignments (Site Exigo-NIU-BP01, Site Exigo-NIU-BP02 and Site Exigo-NIU-BP03) are of high significance and these sites might be impacted on by the proposed project. In all of these cases, the graves are situated within the Ndabakazi settlement around or very close to homesteads and dwellings. As a primary measure, the Burial Grounds and Graves (BGG) Unit of SAHRA requires a 100m conservation buffer for all burials and as such, it is recommended that temporary road alignments proposed for areas around these burials be redesigned to avoid encroaching on the required conservation buffers. In addition, it is recommended that these burials be fenced off with wire or palisade fencing placed no closer than 2 m from the burials. Access gates should be erected, and access control should be applied to the sites. A heritage Site Management Plan (SMP) should be compiled for the burials to stipulate conservation measures, responsible persons and chance find procedures for further heritage mitigation. The developer should carefully liaise with the heritage specialist, SAHRA as well as local communities and possible affected parties with regards to the management and monitoring of any human grave or cemetery in order to detect and manage negative impact on the sites. Should impact on any human burial prove inevitable, full grave relocations are recommended for these burial grounds. This measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum B of Appendix D2).
- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended, and the archaeological specialist should be notified immediately
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that the possibility of undetected archaeological remains occurring elsewhere in the project area should not be excluded. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.



10.3.3 ECOLOGICAL IMPACT ASSESSMENT

A site investigation was conducted on the 14 September 2018 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.

Based on site investigations, the areas adjacent to the proposed N2 Ndbakazi - Interchange consists of grassland situated on flat areas. The entire area is currently used as commonage for domestic grazing and is considered degraded grassland impacted by grazing. The proposed development area is almost entirely surrounded by existing development, classified as low-urban density.

Table 10-6 below lists plant species which were identified during the ecological site investigation:

Table 10-6: Plant species identified within the study area

GRAMINOIDS (GRASSES)	HERBS
<i>Themeda triandra</i>	<i>Senecio coronatus</i>
<i>Eragrostis plana</i>	<i>Helichrysum rugulosum</i>
<i>Sporobolus africanus</i>	<i>Indigofera hedyantha</i>
SUCCULENTS	ALIEN INVASIVES
<i>Aloe maculata</i>	<i>Solanum mauritianum</i>



Figure 10-2: *Aloe maculata* found within the study area (GPS coordinates: S 32o 20.945' E 28o 2.049').



A patch of *Aloe maculata* was found on site (as shown in Figure 10-2 above). These Aloes are protected under the Provincial Nature and Environmental Conservation Ordinance (No. 19 of 1974). This Ordinance protects Endangered (Schedule 3) and Protected (Schedule 4) Species. A permit from the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) (the Provincial Authority) is required for the removal or destruction of species listed in the Schedules prior to construction.

No amphibians, reptiles, terrestrial invertebrates, birds and nesting areas as well as large mammals were observed onsite. Small mammals such as rodents, ground squirrels, bats and a variety of insects and reptiles are expected to occur on site. There might be some animal species associated with the wetland areas.

Various existing water bodies were found on site. Two natural bench flat wetlands are in close proximity to the proposed development (Figure 10-3 below). A temporary access road is proposed to pass through one of the natural bench flat wetlands on the eastern side of the proposed development, however, this has been discussed with DWS and will be subject to a water use license application (refer to Appendix B-6). A man-made dam (old borrow pit) is located to the west of the existing N2-R409 interchange. Several non-perennial drainage channels are located to the east of the proposed development.

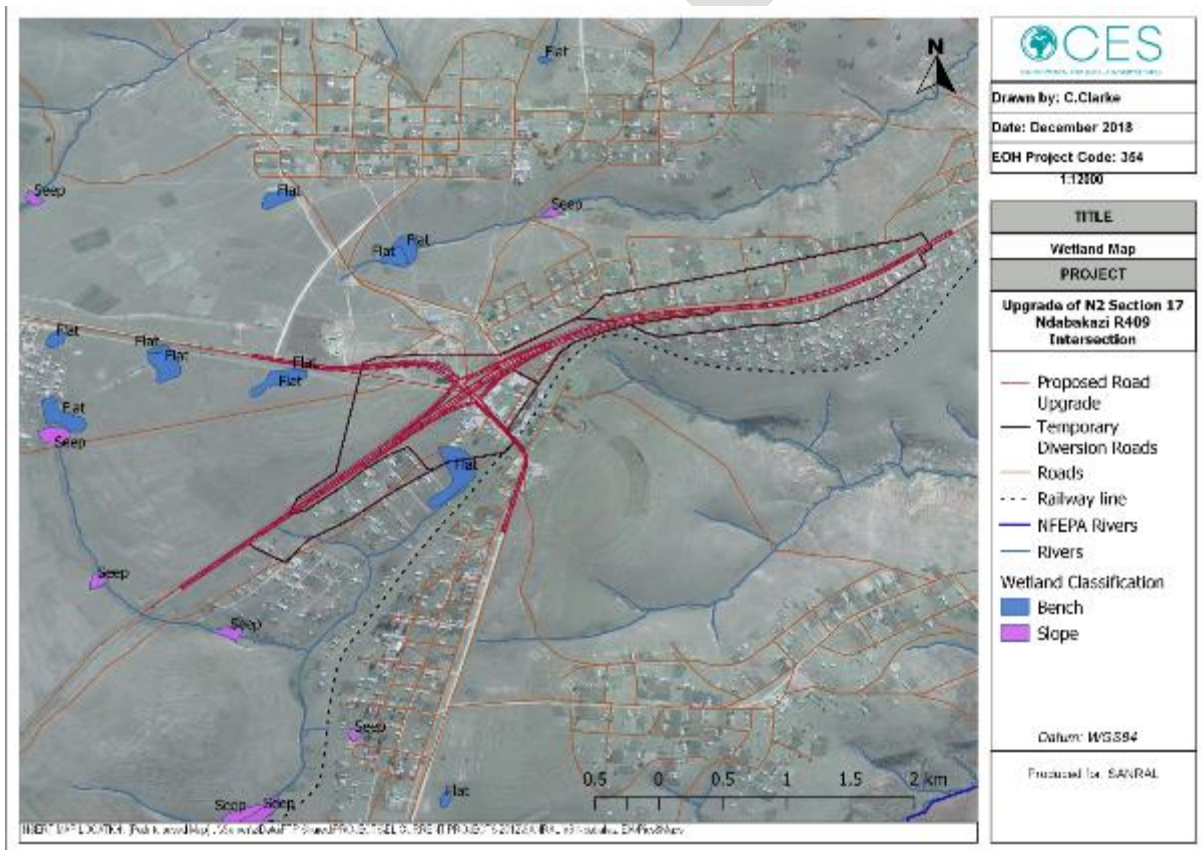


Figure 10-3: Types of wetlands identified within the study area



Impact Identification and Assessment

All water bodies are considered highly sensitive and as such are considered as “No-Go Areas”. No further loss of natural areas and no further impacts must be allowed in these areas. If any development is proposed in these areas (such as temporary access roads), authorisation must be obtained from the DWS for any construction which takes place inside or within 32 m of any water body including wetlands. Temporary access roads through wetland/watercourses (photo 2) must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed.

The following ecological impacts were identified:

Table 10-7: Ecological impacts identified

IMPACTS	IMPACT RATINGS	
	PRE-MITIGATION	POST-MITIGATION
PLANNING & DESIGN PHASE		
Changes to fluvial geomorphology and hydrology: During the planning and design phase, the inappropriate design of stormwater management infrastructure and culverts may cause the degradation of watercourses, wetlands and associated natural habitats and sensitive aquatic systems.	MODERATE NEGATIVE	LOW NEGATIVE
Loss of natural vegetation: During the planning and design phase, the inappropriate design of the road upgrade will lead to the unnecessary loss of natural vegetation.	MODERATE NEGATIVE	LOW NEGATIVE
Loss of Species of Conservation Concern (SCC): During the planning and design phase the inappropriate design and alignment of the Ndabakazi Interchange will lead to the loss of identified and unidentified plant and animal SCC.	HIGH NEGATIVE	MODERATE NEGATIVE
Control of alien plant species: During the planning and design phase, inadequate planning for the removal and management of alien vegetation could result in the invasion of alien vegetation in both terrestrial and riparian areas during the construction and operation phase.	HIGH NEGATIVE	MODERATE NEGATIVE
CONSTRUCTION PHASE		
Changes to fluvial geomorphology and hydrology: During the construction phase activities within licensed watercourses/drainage channels may impede the flow of watercourses, affecting the local hydrology, should it not be undertaken in the correct manner.	HIGH NEGATIVE	MODERATE NEGATIVE



Loss of natural vegetation: During the construction phase, the clearing of natural vegetation for construction will lead to the loss of natural vegetation.	MODERATE NEGATIVE	LOW NEGATIVE
Loss of Species of Conservation Concern (SCC): During the construction phase the clearing of natural vegetation may lead to the destruction of habitats and the loss of identified and unidentified plant SCC.	MODERATE NEGATIVE	LOW NEGATIVE
Control of alien plant species: During the construction phase, poor continuous rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow for alien vegetation species to expand.	MODERATE NEGATIVE	LOW NEGATIVE
OPERATION PHASE		
Changes to fluvial geomorphology and hydrology: During the operational phase, inadequate management and maintenance of stormwater infrastructure and culverts may cause the degradation of watercourses, wetlands and associated natural habitats and sensitive aquatic systems.	MODERATE NEGATIVE	LOW NEGATIVE
DECOMMISSIONING PHASE		
Control of alien plant species: During the decommissioning phase, poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow for alien vegetation species to expand.	MODERATE NEGATIVE	LOW NEGATIVE

Conclusions and Recommendations

As the proposed Ndabakazi Interchange development will largely involve the upgrade the existing N2-R409 Interchange (as well as existing temporary roads), the impact on the natural surrounding vegetation will be minimal.

The ecological impacts of all the aspects of the proposed Ndabakazi Interchange development were considered and deemed to be ecological acceptable, provided that the mitigation measures provided within the Ecological Impact Assessment Report (and below) are implemented:

- The road engineer must ensure that appropriate stormwater structures are designed in line with both SANRAL and DWS requirements.
- Any upgraded culverts must be designed in such a manner so as not to impede or divert base flows or increase upstream flood inundation.
- If any planned construction takes place inside or within 32 m of any watercourse, authorisation must be obtained from DWS.



- The design and layout of the road must have as minimal impact on the natural vegetation as possible.
- A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area.
- All plant SCC (aloes) must be relocated to outside the construction footprint prior to commencement of activities.
- The relevant permits must be obtained from the competent authority in order to remove any SCC.
- During the planning and design phase a Rehabilitation, Alien Vegetation Management Plan must be compiled to reduce the establishment and spread of undesirable alien plant species.
- The construction within licensed water crossings should be as minimal as practically possible.
- Construction must adhere to the conditions of the Water Use License.
- All work within the watercourses and drainage channels should be completed during the dry season, when flows are at their lowest, if possible.
- Temporary access roads through wetland/watercourses must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed.
- The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is no unnecessary loss of natural vegetation outside the approved road upgrade footprint.
- Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken.
- All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them.
- Identified SCC's (aloes) must be relocated immediately outside of the construction and operational footprint.
- Search and rescue must be undertaken by a professional and qualified botanist.
- The contractor's staff must not poach or trap wild animals.
- The contractor's staff must not harvest any natural vegetation.
- All temporarily impacted areas must be rehabilitated back to their original condition.
- Only topsoil from the immediate area must be used for rehabilitation.
- All temporarily impacted areas must be restored as per the Rehabilitation Management Plan.
- The Storm Water & Contingency Management Plan must be implemented, and infrastructure monitored and maintained by SANRAL.
- All temporarily impacted areas must be rehabilitated back to their original condition.
- Only topsoil from the immediate area must be used for rehabilitation.
- All temporarily impacted areas must be restored as per the Rehabilitation Management Plan.



10.4 IMPACT RATINGS

All issues and impacts identified in Section 10.2 and 10.3 above are assessed according to the assessment matrix as described in Section 10.1 and summarised in Table 10-8 to Table 10-13 below.

As only one Site Alternative is applicable to the proposed development, only Layout Alternative 1 (preferred), Technological Alternative 1 (preferred) and the No-Go Alternative were assessed further below.

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10.4.1 PLANNING AND DESIGN PHASE

Table 10-8: Assessment of impacts during the Planning and Design Phase

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
PLANNING & DESIGN PHASE: FOR ALL ALTERNATIVES									
ENVIRONMENTAL POLICY									
Relevant National Legislation and Policy	During the planning and design phase, non-compliance with the laws and policies of South Africa pertaining to the environment could lead to damage to the aquatic and terrestrial environment, unnecessary delays in construction activities, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.	Direct	Permanent	Long-term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The development must adhere to the relevant legislation and/or policy, e.g. ECBCP, Municipal By-laws, SDFs, etc. All legal matters pertaining to permitting must be completed prior to any construction activity. All necessary Water Use Licences must be in order for any construction activities within 100 m of a watercourse and within 500 m of a wetland. The relevant permits must be obtained from the competent authority in order to remove any protected plant species. 	LOW NEGATIVE
BIO-PHYSICAL									
Scheduling of construction	During the planning and design phase, inappropriate construction scheduling that does not take into account the seasonal requirements of the aquatic environment,	Indirect Cumulative	Localised	Medium Term	Possible	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Wherever possible, construction activities should be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	e.g. allowing for unimpeded flood events, could lead to short-term (and potentially long-term) impacts on the aquatic environment such as excessive sediment mobilization, etc.							<ul style="list-style-type: none"> When not possible, sediment traps must be used to ensure the watercourses are not negatively impacted by construction activity. 	
Changes to fluvial geomorphology and hydrology	During the planning and design phase, the inappropriate design of stormwater management infrastructure and culverts may cause the degradation of watercourses, wetlands and associated natural habitats and sensitive aquatic systems.	Direct Cumulative	Localised	Long Term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The road engineer must ensure that appropriate stormwater structures are designed in line with both SANRAL and DWS requirements. Any upgraded culverts must be designed in such a manner so as not to impede or divert base flows or increase upstream flood inundation. If any planned construction takes place inside or within 100m of any watercourse, authorisation must be obtained from DWS. 	LOW NEGATIVE
Stormwater Management	During the planning and design phase, the inappropriate design of storm water infrastructure will lead to stream sedimentation and erosion of the surrounding area.	Direct Cumulative	Localised	Long Term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> Appropriate stormwater structures must be designed to minimise erosion and sedimentation of watercourses. All infrastructure situated on slopes must incorporate 	MODERATE NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								stormwater diversion. <ul style="list-style-type: none"> Flood attenuation and a Storm Water Management Plan must be drawn up by a qualified engineer and approved by DEA, the ECO and DWS. Stormwater design must be in line with SANRAL and DWS requirements. 	
Erosion Management	During the planning and design phase, inadequate planning for the management of erosion could lead to erosion in the study area and surrounding areas.	Indirect	Localised	Long Term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> A Rehabilitation, Alien Vegetation and Erosion Management Plan must be compiled during the planning and design phase of the proposed development 	LOW NEGATIVE
Waste Management	During the planning and design phase, inadequate planning for the management of construction rubble and litter, and identification of licensed waste facilities could lead to pollution in the study area and surrounding areas.	Indirect	Localised	Short Term	Possible	Moderate	MODERATE NEGATIVE	<ul style="list-style-type: none"> A Waste Management Plan must be compiled during the planning and design phase of the proposed development 	LOW NEGATIVE
Erosion Rehabilitation	During the planning and design phase, inadequate planning for rehabilitation could lead to degradation of the study area and surrounding areas.	Indirect	Localised	Long Term	Possible	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> An Erosion Rehabilitation Plan must be compiled during the planning and design phase of the proposed development 	LOW NEGATIVE
BIOLOGICAL									



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Loss of natural vegetation	During the planning and design phase, the inappropriate design of the road upgrade will lead to the unnecessary loss of natural vegetation.	Direct, Indirect, Cumulative	Project Level	Long Term	Definite	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The design and layout of the road must have as minimal impact on the natural vegetation as possible. 	LOW NEGATIVE
Loss of Species of Conservation Concern (SCC)	During the planning and design phase, the inappropriate design and alignment of the Ndabakazi Interchange will lead to the loss of identified and unidentified plant and animal SCC.	Direct	Project Level	Permanent	Definite	Moderately severe	HIGH NEGATIVE	<ul style="list-style-type: none"> A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area. All plant SCC must be relocated to outside the construction footprint prior to commencement of activities. The relevant permits must be obtained from the competent authority in order to remove any SCC. 	MODERATE NEGATIVE
Control of alien plant species	During the planning and design phase, inadequate planning for the removal and management of alien vegetation could result in the invasion of alien vegetation in both terrestrial and riparian areas during the construction and operation phase.	Indirect	Localised	Long Term	Probable	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> During the planning and design phase a Rehabilitation, Alien Vegetation Management Plan must be compiled to reduce the establishment and spread of undesirable alien plant species. 	MODERATE NEGATIVE
SOCIO-ECONOMIC									
Traffic	During the planning and design phase, inadequate planning for	Direct	Localised	Short term	Definite	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> A Traffic Management Plan must be compiled 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	the management of traffic through the project area may result in a magnitude of impacts, such as increased dust generation, noise pollution, and increased public safety risks.							prior to the commencement of the construction phase detailing appropriate mitigation measures	
Cultivated Land	During the planning and design phase, inappropriate design of the road upgrade will lead to the unnecessary loss of cultivated land.	Direct	Localised	Long Term	Possible	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is no unnecessary loss of cultivated land outside the approved road upgrade footprint. 	LOW NEGATIVE
HERITAGE AND ARCHAEOLOGICAL									
Potential damage to Colonial Period structures	During the planning and design phase, inadequate consideration of the cultural, heritage and archaeological environment will lead to destruction of cultural, heritage and archaeological features.	Direct	Project level	Short term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The ECO and Contractor must be made aware of the location of all burial and heritage features on site. Such sites must be avoided. Should the identified heritage buildings be unavoidable, a Phase 2 Heritage Study and the necessary heritage permits must be applied for and obtained from the relevant heritage authority. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Potential damage to burial sites	During the planning and design phase, inadequate consideration of the cultural, heritage and archaeological environment will lead to destruction of cultural, heritage and archaeological features.	Direct	Project level	Short term	Probable	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The ECO and Contractor must be made aware of the location of all burial and heritage features on site. Such sites must be avoided. Should the identified burial sites be unavoidable, grave relocation will be subject to authorisations and permitting by the relevant heritage authority. 	LOW NEGATIVE
PALAEONTOLOGICAL									
Palaeontological Environment	During the planning and design phase, inadequate provisions and planning made towards the paleontological monitoring programme, may lead to destruction of fossils.	Direct	Localised	Short term	Unsure	Slight	MODERATE NEGATIVE	<ul style="list-style-type: none"> Provisions must be made for a Fossil Chance Find Protocol to be implemented during the construction phase should fossils be encountered. 	LOW NEGATIVE



10.4.2 CONSTRUCTION PHASE

Table 10-9: Assessment of impacts during the Construction Phase

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
CONSTRUCTION PHASE: FOR ALL ALTERNATIVES									
ENVIRONMENTAL POLICY									
Relevant National Legislation and Policy	During the construction phase, the failure of the contractor to implement mitigation measures specified in the EMPr and EA could result in fines, overall project failure or delays in construction and undue disturbance to the natural environment.	Direct	Study Area	Long-term	Possible	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The developer must employ an independent Environmental Control Officer (ECO) for the construction phase to ensure that construction is implemented according to specifications in the EA and EMPr. Copies of all applicable licenses, permits and managements plans (EA, EMPr, Water Use Licenses, Permits, etc.) must be available on-site at all times. Environmental Awareness Training must be included in site meetings/talks with all workers. 	LOW NEGATIVE
BIO-PHYSICAL									
Scheduling of construction	During the construction phase, inappropriate construction scheduling that does not take into account the seasonal requirements of the aquatic environment, e.g. allowing for unimpeded flood events, could lead to short-term (and potentially long-term) impacts on the aquatic environment	Indirect	Project Area	Medium term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Wherever possible, construction activities should be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	such as excessive sediment mobilization, etc.								
Changes to fluvial geomorphology and hydrology	During the construction phase, activities within licensed watercourses/drainage channels may impede the flow of watercourses, affecting the local hydrology, should it not be undertaken in the correct manner.	Direct Cumulative	Localised	Medium term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The construction within licensed water crossings should be as minimal as practically possible. Construction must adhere to the conditions of the Water Use License All work within the watercourses and drainage channels should be completed during the dry season, when flows are at their lowest, if possible. Temporary access roads through wetland/watercourses must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed. 	MODERATE NEGATIVE
	During the construction phase, inappropriate activities/ encroachment into wetland (natural and artificial) areas could affect the water quality and integrity of the wetlands.	Direct, Indirect	Project level	Medium term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> During the construction phase no stockpiles should be placed within 50 m of a watercourse or wetland system. No ablution facilities must be located within 50 m of a watercourse or wetland system. Construction must adhere to the conditions of the Water Use License. 	LOW NEGATIVE
Material Stockpiling	During the construction phase, stockpiling of construction materials close to watercourses	Direct Indirect Cumulative	Localised	Medium term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> No construction material must be stored within 50 m of a 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	could result in erosion and mobilisation of the materials into the nearby watercourses/wetlands, resulting in sedimentation and a decrease in water quality and aquatic habitat.							watercourse or wetland system.	
Stormwater Management	During the construction phase, the inappropriate routing of stormwater will lead to stream sedimentation, adversely affecting the aquatic environment.	Direct	Localised	Short term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The Storm Water & Contingency Management Plan must be implemented and monitored by the ECO. An Erosion and Sediment Management Plan must be implemented to minimize the ingress of sediment-laden stormwater into the rivers/ wetlands and monitored by an ECO. 	LOW NEGATIVE
Erosion Management	During the construction phase, inadequate provision for the management of erosion could lead to erosion of the study area and surrounding areas.	Indirect	Localised	Long Term	Possible	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The Erosion Management Plan must be implemented during construction. 	LOW NEGATIVE
Waste Management	Litter on site may attract vermin, detract from the visual appeal of the area, and pollute the surrounding areas. Construction rubble left onsite could pollute the area and encourage the growth of opportunistic alien vegetation.	Direct	Localised	Short Term	Possible	Slight	MODERATE NEGATIVE	<ul style="list-style-type: none"> Construction rubble must be disposed of in predetermined, demarcated spoil dumps. The ECO must monitor the sanitation of the work sites as well as the Contractor campsite for litter and waste. All waste must be removed from the site and transported to the 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								closest licenced landfill site.	
BIOLOGICAL									
Loss of natural vegetation	During the construction phase, the clearing of natural vegetation for construction will lead to the loss of natural vegetation.	Direct Cumulative	Project level	Medium term	Definite	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is no unnecessary loss of natural vegetation outside the approved road upgrade footprint. Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken. 	LOW NEGATIVE
Loss of Species of Conservation Concern (SCC)	During the construction phase, the clearing of natural vegetation may lead to the destruction of habitats and the loss of identified and unidentified plant SCC.	Direct Indirect Cumulative	Localised	Permanent	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them. Identified SCC's must be relocated immediately outside of the construction and operational footprint. Search and rescue must be undertaken by a professional and qualified botanist. The contractor's staff must not poach or trap wild animals. The contractor's staff must not harvest any natural vegetation. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Control of alien plant species	During the construction phase, poor continuous rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow for alien vegetation species to expand.	Direct Indirect Cumulative	Localised	Long Term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated back to their original condition. Only topsoil from the immediate area must be used for rehabilitation. All temporarily impacted areas must be restored as per the Erosion Rehabilitation and Alien Vegetation Management Plan. 	LOW NEGATIVE
SOCIO-ECONOMIC									
Job creation	During the construction phase, the proposed development will create temporary employment opportunities.	Direct Indirect	Regional	Short Term	Probable	Moderately Beneficial	SOME BENEFITS	<ul style="list-style-type: none"> Where possible, individuals residing in proximity to the proposed road route upgrade should be contracted for unskilled and semi-skilled employment. 	BENEFICIAL
Air pollution	During the construction phase, dust (air) pollution caused by grading and levelling exposed land can cause a nuisance to nearby traffic and neighbouring residential areas.	Direct	Localised	Short Term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Cleared surfaces must be dampened whenever possible, especially during dry and windy conditions, to avoid excessive dust generation. Any soil excavated, and not utilised for rehabilitation, must be removed from site or covered and no large mounds of soil may be left behind after construction. 	LOW NEGATIVE
Noise pollution	During the construction phase, noise pollution could potentially be a nuisance to neighbouring residential areas.	Direct	Localised	Short Term	Probable	Slight	LOW NEGATIVE	<ul style="list-style-type: none"> Construction activity close to residential settlements, which includes the movement of construction vehicles, 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								should be restricted to normal working hours (7:00am – 17:00pm).	
Visual	During the construction phase, temporary construction related structures and activities may impact on the aesthetic appearance of the project area.	Direct	Project Level	Short Term	Probable	Slight	LOW NEGATIVE	<ul style="list-style-type: none"> The site camp must be decommissioned and the area rehabilitated once construction has been completed. All waste, materials and equipment must be removed from site. The project area is to be kept tidy and free of litter, where possible. 	LOW NEGATIVE
Health and Safety	During the construction phase, inadequate attention to fire safety awareness and fire safety equipment could result in runaway fires, an unsafe working environment and the loss of property.	Direct Indirect	Project level	Short Term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The contractor must ensure that operational firefighting equipment is present on site at all times as per Occupational Health and Safety Act. All construction foremen must be trained in fire hazard control and firefighting techniques. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. No open fires will be allowed on site unless in a demarcated area identified by the ECO. No smoking near flammable substances. All cooking shall be done in demarcated areas considered safe in terms of runaway or uncontrolled fires. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								<ul style="list-style-type: none"> The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process. 	
	During the construction phase, the inappropriate use of equipment and machinery on site may result in worker injuries or loss of life.	Direct Indirect	Project level	Short Term	Possible	Very severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The contractor must ensure that workers adhere to all safety regulations as per Occupational Health and Safety Act. Appropriate PPE must be worn by workers at all time. Regular training/talks must be given to all workers on site regarding safe working procedures. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process. 	LOW NEGATIVE
	During the construction phase, the location of the construction site and associated activities may present safety risks to the local community should access control and appropriate signage/demarcation not be in place.	Direct Indirect	Project level	Short Term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> Appropriate warning signs must be in place to notify the public regarding construction activities. The construction site and camp must have access control and be demarcated, where possible. Designated pedestrian walkways must be made available. 	LOW NEGATIVE
	During the construction phase, increased flow of construction and vehicular traffic through neighbouring community areas will present a	Direct Indirect	Project level	Short Term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> Appropriate warning signs must be in place to notify the public regarding construction activities. 	MODERATE NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	safety risk to the local community							<ul style="list-style-type: none"> Appropriate measures must be put in place to reduce the speed of construction and road traffic through community areas. 	
Management of hazardous substances	During the construction phase, improper management (usage and storage) of hazardous substances such as cement, tar bitumen, fuel and oil may result in spillages occurring leading to site contamination.	Direct Cumulative	Localised	Short Term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act 85 of 1993 and the SABS Code of Practise must be adhered to. This applies to solvents and other chemicals possibly used during the construction process. The individual(s) that will be handling hazardous materials must be trained to do so. All hazardous chemicals must be stored properly in a secure, bunded and contained area. Concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport to the stormwater system is the greatest. Concrete must only be mixed in the area demarcated for this purpose and on an impermeable surface. 	MODERATE NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								<ul style="list-style-type: none"> Oil trays must be placed under construction machinery to avoid soil contamination. Should a spill occur, the individual responsible for or the individual who discovers the petrochemical spill must report the incident to the Project Coordinator, ECO and/or Contractor as soon as reasonably possible. The immediate response must be to contain the spill. The ECO must determine the precise method of treatment of polluted soil. This could involve the application of oil absorbent materials or oil-digestive 	
Sanitation and Water	During the construction phase, failure to provide adequate onsite sanitation and clean drinking water may result in runoff transferring contaminants into the surrounding environment.	Direct	Localised	Short Term	Possible	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Adequate sanitary and ablutions facilities must be provided for construction workers. The facilities must be serviced regularly to reduce the risk of surface or groundwater pollution. Contaminated wastewater must be managed by the Contractor to ensure the existing water resources on the site are not contaminated. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								<ul style="list-style-type: none"> All wastewater from general activities in the camp must be collected and removed from the site for appropriate disposal at a licensed facility. 	
Traffic	During the construction phase, construction vehicles will impact the traffic flow.	Direct	Localised	Short Term	Definite	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> A Traffic Management Plan, prepared by SANRAL or the appointed engineers, must be implemented during construction. 	LOW NEGATIVE
Cultivated Land	During the construction phase, the vegetation clearing and earthworks may potentially impact on the surrounding cultivated land.	Direct Cumulative	Project level	Short term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> No construction related activities should take place outside of the development footprint. 	LOW NEGATIVE
HERITAGE AND ARCHAEOLOGICAL									
Potential damage to Colonial Period structures	During the construction phase, the sensitive heritage sites identified could be damaged or destroyed by construction activities.	Direct	Project level	Short term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Frequent monitoring of the identified heritage features by the ECO and Contractor must take place. Such sites must be avoided and a 50 m conservation buffer applied. Should the identified heritage buildings be unavoidable, a Phase 2 Heritage Study and the necessary heritage permits must be applied for and obtained from the relevant heritage authority. 	LOW NEGATIVE
Potential damage to burial sites	During the construction phase, the sensitive burial sites identified could be damaged or destroyed by construction activities.	Direct	Project level	Short term	Probable	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Frequent monitoring of the identified burial sites by the ECO and Contractor must take place. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								<ul style="list-style-type: none"> Such sites must be avoided and a 100 m conservation buffer applied. Should the identified burial sites be unavoidable, grave relocation will be subject to authorisations and permitting by the relevant heritage authority. 	
PALAEONTOLOGICAL									
Palaeontological Environment	During the construction phase, inadequate monitoring may lead to destruction of fossils.	Direct	Localised	Short term	Unsure	Slight	MODERATE NEGATIVE	<ul style="list-style-type: none"> A Fossil Chance Find Protocol (as per the Paleontological Report) must be implemented if fossils are found once excavations and construction have commenced. The fossils should be rescued and a palaeontologist called to assess and collect a representative sample. Before the fossils are removed from the site, a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits. 	LOW NEGATIVE



10.4.3 OPERATIONAL PHASE

Table 10-10: Assessment of impacts during the Operational Phase

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
OPERATIONAL PHASE: FOR ALL ALTERNATIVES									
BIO-PHYSICAL									
Changes to fluvial geomorphology and hydrology	During the operational phase, inadequate management and maintenance of stormwater infrastructure and culverts may cause the degradation of watercourses, wetlands and associated natural habitats and sensitive aquatic systems.	Direct Cumulative	Localised	Medium term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The Storm Water & Contingency Management Plan must be implemented and infrastructure monitored and maintained by SANRAL. 	LOW NEGATIVE
Stormwater Management	During the operation phase, inappropriate routing of stormwater will lead to stream sedimentation.	Direct	Localised	Long Term	Probable	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> Stormwater infrastructure should be monitored post construction to ensure rivers and wetlands do not have changes in sediment levels caused by the ingress of sediment-laden stormwater. 	LOW NEGATIVE
Erosion Rehabilitation	During the operational phase inadequate provision for the management of erosion could lead to erosion of the study area and surrounding areas.	Indirect	Localised	Long Term	Possible	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> An Erosion Management Plan must be included as part of SANRAL's on-going maintenance plan. 	LOW NEGATIVE
SOCIO-ECONOMIC									
Management of hazardous substances	During the operational phase, normal vehicle traffic may lead to the spillage of toxic substances (such as heavy metals,	Direct Indirect	Localised	Long Term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> SANRAL must ensure that emergency response procedures are in 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	hydrocarbons, surfactants and oils) which may negatively impact the surrounding environment and biodiversity.							place for accidental spills as part of their on-ongoing maintenance plan.	
Traffic	The proposed development will contribute to improve road safety.	Direct	Project Level	Permanent	Definite	Beneficial	BENEFICIAL	<ul style="list-style-type: none"> No mitigation 	BENEFICIAL

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10.4.4 DECOMMISSIONING PHASE

Table 10-11: Assessment of impacts during the Decommissioning Phase

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
DECOMMISSIONING PHASE: FOR ALL ALTERNATIVES									
BIO-PHYSICAL									
Legal and Policy Compliance	During the decommissioning phase, the failure of the contractor to implement mitigation measures specified in the EMPr and EA could result in fines, overall project failure or delays in construction and undue disturbance to the natural environment.	Direct	Study Area	Long Term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The Environmental Control Officer (ECO) must monitor for the implementation of conditions and mitigation measures specified in the EMPr and EA. Copies of all applicable licenses, permits and managements plans (EA, EMPr, Water Use Licenses, Permits, etc.) must be available on-site at all times. 	LOW NEGATIVE
BIO-PHYSICAL									
Stormwater Management	During the decommissioning phase, inappropriate routing of stormwater will lead to stream sedimentation.	Direct	Localised	Long Term	Probable	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Stormwater infrastructure should be monitored during decommissioning to ensure rivers and wetlands do not have changes in sediment levels caused by the ingress of sediment-laden stormwater. 	LOW NEGATIVE
Erosion Management	During the decommissioning phase, inadequate provision for the management of erosion could lead to erosion of the study area and surrounding areas.	Direct	Localised	Long Term	Probable	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The Erosion Management Plan must be implemented during decommissioning. 	LOW NEGATIVE
Waste Management	During the decommissioning phase, litter on site may attract vermin, detract	Direct	Localised	Long Term	Probable	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The Waste Management Plan must be implemented 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	from the visual appeal of the area, and pollute the surrounding areas. Construction rubble left onsite could pollute the area and encourage the growth of opportunistic alien vegetation.							<ul style="list-style-type: none"> during decommissioning. The ECO must ensure that all temporary construction related structures, materials and waste are removed from site. 	
Erosion Rehabilitation plan	During the decommissioning phase inadequate provision for the management of erosion could lead to erosion of the study area and surrounding areas.	Indirect	Localised	Long Term	Possible	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The Erosion Management Plan must be implemented during decommissioning and included as part of SANRAL's on-going maintenance plan. 	LOW NEGATIVE
BIOLOGICAL									
Loss of natural vegetation	During the decommissioning phase, activities relating to site camp closure and rehabilitation of temporary access roads may lead to the loss of natural vegetation.	Direct Cumulative	Project level	Medium term	Definite	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> No decommissioning related activities should take place outside of the development footprint. Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken. 	LOW NEGATIVE
Loss of Species of Conservation Concern (SCC)	During the decommissioning phase, the clearing of natural vegetation may lead to the destruction of habitats and the loss of identified and unidentified plant SCC.	Direct Indirect Cumulative	Project level	Medium term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Identified SCC's must be avoided or relocated immediately outside of the construction and operational footprint (once the relevant permits have been obtained). The contractor's staff must not poach or trap wild animals. The contractor's staff must not harvest any natural vegetation. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Control of alien plant species	During the decommissioning phase, poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow for alien vegetation species to expand.	Direct Indirect Cumulative	Localised	Long Term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated back to their original condition. Only topsoil from the immediate area must be used for rehabilitation. All temporarily impacted areas must be restored as per the Rehabilitation Management Plan. 	LOW NEGATIVE
SOCIO-ECONOMIC									
Job creation	During the decommissioning phase, the proposed development will create temporary employment opportunities.	Direct Indirect	Regional	Short Term	Probable	Moderately Beneficial	SOME BENEFITS	<ul style="list-style-type: none"> Where possible, individuals residing in proximity to the proposed road route upgrade should be contracted for unskilled and semi-skilled employment. 	BENEFICIAL
Air pollution	During the decommissioning phase, dust (air) pollution caused by grading and levelling exposed land can cause a nuisance to nearby traffic and neighbouring residential areas.	Direct	Localised	Short Term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Cleared surfaces must be dampened whenever possible, especially during dry and windy conditions, to avoid excessive dust generation. Any soil excavated, and not utilised for rehabilitation, must be removed from site or covered and no large mounds of soil may be left behind after construction. 	LOW NEGATIVE
Noise Pollution	During the decommissioning phase, noise pollution could potentially be a nuisance to neighbouring residential areas.	Direct	Localised	Short Term	Probable	Slight	LOW NEGATIVE	<ul style="list-style-type: none"> Construction activity close to residential settlements, which includes the movement of construction vehicles, should be restricted to normal 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								working hours (7:00am – 17:00pm).	
Visual	During the decommissioning phase, temporary construction related structures and activities may impact on the aesthetic appearance of the project area.	Direct	Project Level	Short Term	Probable	Slight	LOW NEGATIVE	<ul style="list-style-type: none"> The site camp must be decommissioned, and the area rehabilitated once construction has been completed. All waste, materials and equipment must be removed from site. The project area is to be kept tidy and free of litter, where possible. 	LOW NEGATIVE
Health & Safety	During the decommissioning phase, inadequate attention to fire safety awareness and fire safety equipment could result in runaway fires, an unsafe working environment and the loss of property.	Direct Indirect	Project level	Short Term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The contractor must ensure that operational firefighting equipment is present on site at all times as per Occupational Health and Safety Act. All construction foremen must be trained in fire hazard control and firefighting techniques. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. No open fires will be allowed on site unless in a demarcated area identified by the ECO. No smoking near flammable substances. All cooking shall be done in demarcated areas considered safe in terms of runaway or uncontrolled fires. The level of firefighting equipment must be assessed and 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								evaluated through a typical risk assessment process.	
Management of hazardous substances	During the decommissioning phase, normal vehicle traffic may lead to the spillage of toxic substances (such as heavy metals, hydrocarbons, surfactants and oils) which may negatively impact the surrounding environment and biodiversity.	Direct Indirect	Localised	Long Term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> SANRAL must ensure that emergency response procedures are in place for accidental spills as part of their on-going maintenance plan. 	LOW NEGATIVE
Traffic	During the decommissioning phase, construction vehicles will impact the traffic flow.	Direct	Localised	Short Term	Definite	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> A Traffic Management Plan, prepared by SANRAL or the appointed engineers, must be implemented during decommissioning. 	LOW NEGATIVE
Cultivated Land	During the decommissioning phase, the vegetation clearing and earthworks may potentially impact on the surrounding cultivated land.	Direct Cumulative	Project level	Short term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> No decommissioning related activities should take place outside of the development footprint. 	LOW NEGATIVE
HERITAGE AND ARCHAEOLOGICAL									
Potential damage to Colonial Period structures	During the decommissioning phase, the sensitive heritage sites identified could be damaged or destroyed by construction activities.	Direct	Project level	Short term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Frequent monitoring of the identified heritage features by the ECO and Contractor must take place. Such sites must be avoided and a 50 m conservation buffer applied. 	LOW NEGATIVE
Potential damage to burial sites	During the decommissioning phase, the sensitive burial sites identified could be damaged or	Direct	Project level	Short term	Probable	Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Frequent monitoring of the identified burial sites by the ECO and Contractor must take place. 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	destroyed by construction activities.							<ul style="list-style-type: none"> Such sites must be avoided and a 100 m conservation buffer applied. 	

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10.4.5 NO-GO ALTERNATIVE

Table 10-12: Assessment and mitigation of impacts identified in the No-Go alternative.

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Proposed Ndabakazi Interchange	The No-Go Alternative will not result in any identified negative impacts on the receiving environment	Direct	Localised	Permanent	Definite	Moderately severe	BENEFICIAL	If the upgrade does not proceed then none of the negative impacts identified for the planning and design, construction and operational phases will take place.	BENEFICIAL
Job opportunities	The No-Go Option would not create any job opportunities	Direct	Localised	Short Term	Definite	Moderately severe	MODERATE NEGATIVE	No mitigation proposed	MODERATE NEGATIVE
Road Safety	The No-Go Option would result in the ongoing unsafe conditions at the Ndabakazi Interchange.	Direct	Project Level	Permanent	Definite	Moderately severe	MODERATE NEGATIVE	No mitigation proposed	MODERATE NEGATIVE

10.4.6 CUMULATIVE IMPACTS

Table 10-13: Assessment and mitigation of potential cumulative impacts.

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Biodiversity	The clearing of natural vegetation results in land transformation and habitat loss.	Cumulative	Regional	Medium term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The construction related activities should be limited to the construction footprint to ensure that there is no unnecessary loss of natural vegetation outside the approved road upgrade footprint. Sensitive areas, such as watercourses, 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								wetlands, and identified SCCs must be avoided as much as possible.	
Hydrology & Geohydrology	Surface water impacts, such as water surface and/or groundwater contamination and sedimentation (increased dust and sediment generation) may extend beyond the immediate project site.	Cumulative	Regional	Medium term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> An Erosion Management Plan must be developed and implemented to minimize the ingress of sediment-laden stormwater into the rivers, dams and/or wetlands. Sensitive areas, such as watercourses and wetlands must be avoided as much as possible. 	LOW NEGATIVE
	Changes to surface flow dynamics may have negative effects on the aquatic environment beyond the immediate project site.							<ul style="list-style-type: none"> Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act 85 of 1993 and the SABS Code of Practise must be adhered to. Storm Water Management Plan must be developed and implemented. The management plan must be drawn up by a qualified engineer and approved by DWS before implementation. 	
Soils	Local land capability may be reduced due to loss of topsoil,	Cumulative	Localised	Medium term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> An Erosion Management Plan 	LOW NEGATIVE



ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	erosion and soil contamination.							must be developed and implemented to minimize the ingress of sediment-laden stormwater into the rivers, dams and/or wetlands	
Traffic	Increased flow of traffic to the project site may deteriorate the surface condition of the surrounding roads and increase the risk to public safety within the project area.	Cumulative	Localised	Medium term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> A Traffic Management Plan must be developed and implemented to minimize the potential impacts from the increased flow of traffic through the project site 	LOW NEGATIVE



11 IMPACT STATEMENT

11.1 PREFERRED ALTERNATIVE

No site alternatives have been assessed as the proposed development takes place on an existing national road N2. Therefore route/site alternatives are not deemed feasible.

The preferred Layout Alternative 1 are deemed acceptable as it takes into consideration the location of existing watercourses, natural and artificial wetlands and proposes the least impactful alignment and construction of associated infrastructure for the upgrading, widening and realignment the Ndabakazi Interchange.

The main determining factors for selecting the type of technology were:

- High skid resistance;
- High luminance;
- Rapid shedding of rainwater; and
- Low traffic noise levels.

The preferred alternative hosts a total of **63 negative** (13 HIGH NEGATIVE, 46 MEDIUM NEGATIVE, and 4 LOW NEGATIVE) impacts and **4 positive** impacts pre-mitigation. Majority of the impacts (85 %) may be reduced to LOW NEGATIVE, with 15% being reduced to MEDIUM NEGATIVE and none remaining as HIGH NEGATIVE post-mitigation, provided the correct mitigation measures are implemented. The proposed development has two (2) beneficial impacts, job creation and improved road traffic safety.

11.2 NO-GO ALTERNATIVE

The No-go Alternative refers to the current status quo and the risks and impacts associated with it.

The No-Go alternative has two (2) negative impacts. The benefits of the project will not materialise (i.e. no job creation, no improved road safety, etc.). The environment will remain relatively undisturbed and there would be no contribution to improved road safety at the existing N2 Ndabakazi – R409 Interchange.

11.3 CUMULATIVE IMPACTS

The proposed Ndabakazi Interchange road upgrade may lead to potential cumulative impacts such as:

- The clearing of natural vegetation leading to the loss of the natural vegetation, SCC as well as habitat losses;
- Surface water impacts, such as water surface and/or groundwater contamination and sedimentation (increased dust and sediment generation) may extend beyond the immediate project site;



- Changes to surface flow dynamics may have negative effects on the aquatic environment beyond the immediate project site;
- Local land capability may be reduced due to loss of topsoil, erosion and soil contamination; and
- Increased flow of traffic to the project site may deteriorate the surface condition of the surrounding roads and increase the risk to public safety within the project area.

11.4 FATAL FLAWS

Even though small pockets of moderate to high sensitive areas were identified within the study area, these areas are not considered to represent a fatal flaw.

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12 RECOMMENDATIONS AND CONCLUSIONS

12.1 RECOMMENDATIONS

The following recommendations must be included into the final EMPr:

- The project construction site must be demarcated prior to commencement of activities on site. All areas outside the demarcation will be considered as No-Go areas during construction.
- A qualified, independent ECO must be appointed prior to commencement of any activity on site.
- All mitigation measures detailed in Table 12-1 to Table 12-4 below must be included into the EMPr.
- The following Management Plans must be developed prior to clearing and implemented during construction and operations of the proposed development. These management plans must be incorporated into the EMPr:
 - Traffic Management Plan;
 - Storm Water Management Plan;
 - Waste Management Plan;
 - Erosion Management Plan; and
 - Alien Vegetation Rehabilitation Management Plan.

12.2 MITIGATION MEASURES

All the mitigation measures provided below are to be implemented during the planning and design, construction, operational and decommissioning phases of the proposed upgrade of the Ndabakazi Interchange.

Table 12-1: Planning and design phase mitigation measures

PLANNING AND DESIGN PHASE	
ISSUE	MITIGATION MEASURES
Relevant National Legislation and Policy	<ul style="list-style-type: none"> • The development must adhere to the relevant legislation and/or policy, e.g. ECBCP, Municipal By-laws, SDFs, etc. • All legal matters pertaining to permitting must be completed prior to any construction activity. • In particular, all necessary Water Use Licences must be in order for any construction activities within 100 m of a watercourse and within 500 m of a wetland. • In particular, the relevant permits must be obtained from the competent authority in order to remove any protected plant species.
Scheduling of construction	<ul style="list-style-type: none"> • Wherever possible, construction activities should be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc.



PLANNING AND DESIGN PHASE	
ISSUE	MITIGATION MEASURES
	<ul style="list-style-type: none"> When not possible, sediment traps must be used to ensure the watercourses are not negatively impacted by construction activity.
Changes to fluvial geomorphology and hydrology	<ul style="list-style-type: none"> The road engineer must ensure that appropriate stormwater structures are designed in line with both SANRAL and DWS requirements. Any upgraded culverts must be designed in such a manner so as not to impede or divert base flows or increase upstream flood inundation. If any planned construction takes place inside or within 100m of any watercourse, authorisation must be obtained from DWS.
Stormwater management	<ul style="list-style-type: none"> Appropriate stormwater structures must be designed to minimise erosion and sedimentation of watercourses. All infrastructure situated on slopes must incorporate stormwater diversion. Flood attenuation and a Storm Water Management Plan must be drawn up by a qualified engineer and approved by DEA, the ECO and DWS. Stormwater design must be in line with SANRAL and DWS requirements.
Erosion Management	<ul style="list-style-type: none"> A Rehabilitation, Alien Vegetation and Erosion Management Plan must be compiled during the planning and design phase of the proposed development
Waste Management	<ul style="list-style-type: none"> A Waste Management Plan must be compiled during the planning and design phase of the proposed development
Erosion Rehabilitation	<ul style="list-style-type: none"> An Erosion Rehabilitation Plan must be compiled during the planning and design phase of the proposed development
Loss of natural vegetation	<ul style="list-style-type: none"> The design and layout of the road must have as minimal impact on the natural vegetation as possible.
Loss of Species of Conservation Concern (SCC)	<ul style="list-style-type: none"> A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area. All plant SCC must be relocated to outside the construction footprint prior to commencement of activities. The relevant permits must be obtained from the competent authority in order to remove any SCC.
Control of alien plant species	<ul style="list-style-type: none"> During the planning and design phase a Rehabilitation, Alien Vegetation Management Plan must be compiled to reduce the establishment and spread of undesirable alien plant species.
Alien Vegetation Rehabilitation Management Plan	<ul style="list-style-type: none"> During the planning and design phase an Alien Vegetation Rehabilitation and Management Plan must be compiled to reduce the establishment and spread of undesirable alien plant species during construction and operation.



PLANNING AND DESIGN PHASE	
ISSUE	MITIGATION MEASURES
Traffic	<ul style="list-style-type: none"> • A Traffic Management Plan must be compiled prior to the commencement of the construction phase detailing appropriate mitigation measures
Cultivated Land	<ul style="list-style-type: none"> • The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is no unnecessary loss of cultivated land outside the approved road upgrade footprint.
Potential damage to Colonial Period structures	<ul style="list-style-type: none"> • The ECO and Contractor must be made aware of the location of all burial and heritage features on site. Such sites must be avoided. • Should the identified heritage buildings be unavoidable, a Phase 2 Heritage Study and the necessary heritage permits must be applied for and obtained from the relevant heritage authority.
Potential damage to burial sites	<ul style="list-style-type: none"> • The ECO and Contractor must be made aware of the location of all burial and heritage features on site. Such sites must be avoided. • Should the identified burial sites be unavoidable, grave relocation will be subject to authorisations and permitting by the relevant heritage authority.
Palaeontological Environment	<ul style="list-style-type: none"> • Provisions must be made for a Fossil Chance Find Protocol to be implemented during the construction phase should fossils be encountered.

Table 12-2: Construction phase mitigation measures

CONSTRUCTION PHASE	
ISSUE	MITIGATION MEASURES
Relevant National Legislation and Policy	<ul style="list-style-type: none"> • The developer must employ an independent Environmental Control Officer (ECO) for the construction phase to ensure that construction is implemented according to specifications in the EA and EMPr. • Copies of all applicable licenses, permits and managements plans (EA, EMPr, Water Use Licenses, Permits, etc.) must be available on-site at all times. • Environmental Awareness Training must be included in site meetings/talks with all workers.
Scheduling of construction	<ul style="list-style-type: none"> • Wherever possible, construction activities should be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc.
Changes to fluvial geomorphology and hydrology	<ul style="list-style-type: none"> • The construction within licensed water crossings should be as minimal as practically possible. • Construction must adhered to the conditions of the Water Use License



CONSTRUCTION PHASE	
ISSUE	MITIGATION MEASURES
	<ul style="list-style-type: none"> All work within the watercourses and drainage channels should be completed during the dry season, when flows are at their lowest, if possible. Temporary access roads through wetland/watercourses must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed. During the construction phase no stockpiles should be placed within 50 m of a watercourse or wetland system. No ablution facilities must be located within 50 m of a watercourse or wetland system. Construction must adhere to the conditions of the Water Use License.
Material Stockpiling	<ul style="list-style-type: none"> No construction material must be stored within 50 m of a watercourse or wetland system.
Stormwater Management	<ul style="list-style-type: none"> The Storm Water & Contingency Management Plan must be implemented and monitored by the ECO. An Erosion and Sediment Management Plan must be implemented to minimize the ingress of sediment-laden stormwater into the rivers/ wetlands and monitored by an ECO.
Erosion Management	<ul style="list-style-type: none"> The Erosion Management Plan must be implemented during construction.
Waste Management	<ul style="list-style-type: none"> Construction rubble must be disposed of in predetermined, demarcated spoil dumps. The ECO must monitor the sanitation of the work sites as well as the Contractor campsite for litter and waste. All waste must be removed from the site and transported to the closest licenced landfill site.
Loss of natural vegetation	<ul style="list-style-type: none"> The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is no unnecessary loss of natural vegetation outside the approved road upgrade footprint. Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken.
Loss of Species of Conservation Concern (SCC)	<ul style="list-style-type: none"> All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them. Identified SCC's must be relocated immediately outside of the construction and operational footprint. Search and rescue must be undertaken by a professional and qualified botanist. The contractor's staff must not poach or trap wild animals. The contractor's staff must not harvest any natural vegetation.
Control of alien plant species	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated back to their original condition.



CONSTRUCTION PHASE	
ISSUE	MITIGATION MEASURES
	<ul style="list-style-type: none"> • Only topsoil from the immediate area must be used for rehabilitation. • All temporarily impacted areas must be restored as per the Erosion Rehabilitation and Alien Vegetation Management Plan.
Job creation	<ul style="list-style-type: none"> • Where possible, individuals residing in proximity to the proposed road route upgrade should be contracted for unskilled and semi-skilled employment.
Air pollution	<ul style="list-style-type: none"> • Cleared surfaces must be dampened whenever possible, especially during dry and windy conditions, to avoid excessive dust generation. • Any soil excavated, and not utilised for rehabilitation, must be removed from site or covered and no large mounds of soil may be left behind after construction.
Noise pollution	<ul style="list-style-type: none"> • Construction activity close to residential settlements, which includes the movement of construction vehicles, should be restricted to normal working hours (7:00am – 17:00pm).
Visual	<ul style="list-style-type: none"> • The site camp must be decommissioned and the area rehabilitated once construction has been completed. • All waste, materials and equipment must be removed from site. • The project area is to be kept tidy and free of litter, where possible.
Health and Safety	<ul style="list-style-type: none"> • The contractor must ensure that operational firefighting equipment is present on site at all times as per Occupational Health and Safety Act. • All construction foremen must be trained in fire hazard control and firefighting techniques. • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • No open fires will be allowed on site unless in a demarcated area identified by the ECO. No smoking near flammable substances. • All cooking shall be done in demarcated areas considered safe in terms of runaway or uncontrolled fires. • The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.
	<ul style="list-style-type: none"> • The contractor must ensure that workers adhere to all safety regulations as per Occupational Health and Safety Act. • Appropriate PPE must be worn by workers at all time. • Regular training/talks must be given to all workers on site regarding safe working procedures. • The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.
	<ul style="list-style-type: none"> • The contractor must ensure that workers adhere to all safety regulations as per Occupational Health and Safety Act. • Appropriate PPE must be worn by workers at all time.



CONSTRUCTION PHASE	
ISSUE	MITIGATION MEASURES
	<ul style="list-style-type: none"> • Regular training/talks must be given to all workers on site regarding safe working procedures. • The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process. • Appropriate warning signs must be in place to notify the public regarding construction activities. • Appropriate measures must be put in place to reduce the speed of construction and road traffic through community areas.
Management of hazardous substances	<ul style="list-style-type: none"> • Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act 85 of 1993 and the SABS Code of Practise must be adhered to. This applies to solvents and other chemicals possibly used during the construction process. • The individual(s) that will be handling hazardous materials must be trained to do so. • All hazardous chemicals must be stored properly in a secure, bunded and contained area. • Concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport to the stormwater system is the greatest. • Concrete must only be mixed in the area demarcated for this purpose and on an impermeable surface. • Oil trays must be placed under construction machinery to avoid soil contamination. • Should a spill occur, the individual responsible for or the individual who discovers the petrochemical spill must report the incident to the Project Coordinator, ECO and/or Contractor as soon as reasonably possible. • The immediate response must be to contain the spill. • The ECO must determine the precise method of treatment of polluted soil. This could involve the application of oil absorbent materials or oil-digestive
Sanitation and Water	<ul style="list-style-type: none"> • Adequate sanitary and ablutions facilities must be provided for construction workers. • The facilities must be serviced regularly to reduce the risk of surface or groundwater pollution. • Contaminated wastewater must be managed by the Contractor to ensure the existing water resources on the site are not contaminated. • All wastewater from general activities in the camp must be collected and removed from the site for appropriate disposal at a licensed facility.
Traffic	<ul style="list-style-type: none"> • A Traffic Management Plan, prepared by SANRAL or the appointed engineers, must be implemented during construction.



CONSTRUCTION PHASE	
ISSUE	MITIGATION MEASURES
Cultivated Land	<ul style="list-style-type: none"> No construction related activities should take place outside of the development footprint.
Potential damage to Colonial Period structures	<ul style="list-style-type: none"> Frequent monitoring of the identified heritage features by the ECO and Contractor must take place. Such sites must be avoided and a 50 m conservation buffer applied. Should the identified heritage buildings be unavoidable, a Phase 2 Heritage Study and the necessary heritage permits must be applied for and obtained from the relevant heritage authority.
Potential damage to burial sites	<ul style="list-style-type: none"> Frequent monitoring of the identified burial sites by the ECO and Contractor must take place. Such sites must be avoided and a 100 m conservation buffer applied. Should the identified burial sites be unavoidable, grave relocation will be subject to authorisations and permitting by the relevant heritage authority.
Palaeontological Environment	<ul style="list-style-type: none"> A Fossil Chance Find Protocol (as per the Paleontological Report) must be implemented if fossils are found once excavations and construction have commenced. The fossils should be rescued and a palaeontologist called to assess and collect a representative sample. Before the fossils are removed from the site, a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.

Table 12-3: Operational phase mitigation measures

OPERATIONAL PHASE	
Issue	Mitigation
Changes to fluvial geomorphology and hydrology	<ul style="list-style-type: none"> The Storm Water & Contingency Management Plan must be implemented and infrastructure monitored and maintained by SANRAL.
Stormwater Management	<ul style="list-style-type: none"> Stormwater infrastructure should be monitored post construction to ensure rivers and wetlands do not have changes in sediment levels caused by the ingress of sediment-laden stormwater.
Erosion Rehabilitation	<ul style="list-style-type: none"> An Erosion Management Plan must be included as part of SANRAL's on-going maintenance plan.
Management of hazardous substances	<ul style="list-style-type: none"> SANRAL must ensure that emergency response procedures are in place for accidental spills as part of their on-ongoing maintenance plan.
Traffic	<ul style="list-style-type: none"> No mitigation



Table 12-4: Decommissioning phase mitigation measures

DECOMMISSIONING PHASE	
ISSUE	MITIGATION MEASURES
Relevant National Legislation and Policy	<ul style="list-style-type: none"> The Environmental Control Officer (ECO) must monitor for the implementation of conditions and mitigation measures specified in the EMPr and EA. Copies of all applicable licenses, permits and managements plans (EA, EMPr, Water Use Licenses, Permits, etc.) must be available on-site at all times.
Stormwater Management	<ul style="list-style-type: none"> Stormwater infrastructure should be monitored during decommissioning to ensure rivers and wetlands do not have changes in sediment levels caused by the ingress of sediment-laden stormwater.
Erosion Management	<ul style="list-style-type: none"> The Erosion Management Plan must be implemented during decommissioning.
Waste Management	<ul style="list-style-type: none"> The Waste Management Plan must be implemented during decommissioning. The ECO must ensure that all temporary construction related structures, materials and waste are removed from site.
Erosion Rehabilitation plan	<ul style="list-style-type: none"> The Erosion Management Plan must be implemented during decommissioning and included as part of SANRAL's on-going maintenance plan.
Loss of natural vegetation	<ul style="list-style-type: none"> No decommissioning related activities should take place outside of the development footprint. Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken.
Loss of Species of Conservation Concern (SCC)	<ul style="list-style-type: none"> Identified SCC's must be avoided or relocated immediately outside of the construction and operational footprint (once the relevant permits have been obtained). The contractor's staff must not poach or trap wild animals. The contractor's staff must not harvest any natural vegetation.
Control of alien plant species	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated back to their original condition. Only topsoil from the immediate area must be used for rehabilitation. All temporarily impacted areas must be restored as per the Rehabilitation Management Plan.
Job creation	<ul style="list-style-type: none"> Where possible, individuals residing in proximity to the proposed road route upgrade should be contracted for unskilled and semi-skilled employment.
Air pollution	<ul style="list-style-type: none"> Cleared surfaces must be dampened whenever possible, especially during dry and windy conditions, to avoid excessive dust generation.



DECOMMISSIONING PHASE	
ISSUE	MITIGATION MEASURES
	<ul style="list-style-type: none"> Any soil excavated, and not utilised for rehabilitation, must be removed from site or covered and no large mounds of soil may be left behind after construction.
Noise pollution	<ul style="list-style-type: none"> Construction activity close to residential settlements, which includes the movement of construction vehicles, should be restricted to normal working hours (7:00am – 17:00pm).
Visual	<ul style="list-style-type: none"> The site camp must be decommissioned, and the area rehabilitated once construction has been completed. All waste, materials and equipment must be removed from site. The project area is to be kept tidy and free of litter, where possible.
Health and Safety	<ul style="list-style-type: none"> The contractor must ensure that operational firefighting equipment is present on site at all times as per Occupational Health and Safety Act. All construction foremen must be trained in fire hazard control and firefighting techniques. All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. No open fires will be allowed on site unless in a demarcated area identified by the ECO. No smoking near flammable substances. All cooking shall be done in demarcated areas considered safe in terms of runaway or uncontrolled fires. The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.
Management of hazardous substances	<ul style="list-style-type: none"> SANRAL must ensure that emergency response procedures are in place for accidental spills as part of their on-ongoing maintenance plan
Traffic	<ul style="list-style-type: none"> A Traffic Management Plan, prepared by SANRAL or the appointed engineers, must be implemented during decommissioning.
Cultivated Land	<ul style="list-style-type: none"> No decommissioning related activities should take place outside of the development footprint.
Potential damage to Colonial Period structures	<ul style="list-style-type: none"> Frequent monitoring of the identified heritage features by the ECO and Contractor must take place. Such sites must be avoided, and a 50 m conservation buffer applied.
Potential damage to burial sites	<ul style="list-style-type: none"> Frequent monitoring of the identified burial sites by the ECO and Contractor must take place. Such sites must be avoided, and a 100 m conservation buffer applied.



12.3 CONCLUSION

The following table provides a summary of the distribution of impacts for **Site Alternative 1** using **Layout Alternative 1** and **Technological Alternative 1** (preferred alternatives) in terms of High, Medium and Low significance, pre- and post-mitigation as well as the **No-Go Alternative**.

Table 12-5: Assessment of the final pre- and post-mitigation impact significance.

	PRE-MITIGATION				POST-MITIGATION			
	LOW	MODERATE	HIGH	POSITIVE	LOW	MODERATE	HIGH	POSITIVE
Planning and Design	0	11	4	0	12	3	0	0
Construction	2	17	6	1	22	3	0	1
Operation	0	3	1	1	4	0	0	1
Decommissioning	2	14	1	1	17	0	0	1
No-Go	0	2	0	1	0	2	0	1
TOTAL	4	47	12	4	56	8	0	4

As can be seen, the impacts identified pre-mitigation are Moderate or High Negative, with majority becoming Low Negative post-mitigation. All **HIGH** impacts could be mitigated to a **MODERATE** or **LOW** level with the implementation of appropriate mitigation measures. There is an equal distribution of positive impacts pre- and post-mitigation.

12.4 OPINION

It is the opinion of CES that **NO FATAL FLAWS** are currently associated with the proposed Ndabakazi Interchange and that all identified impacts can be adequately mitigated to reduce the risk or significance of impacts to an acceptable level.

It is the opinion of CES that the Basic Assessment Report contains sufficient information to allow DEA to make an informed decision.



13 APPENDICES

Appendix A: Declaration and CV of the EAP

Appendix B: Public Participation:

- B-1: I&AP Database
- B-2: Site Notice
- B-3: I&AP Notification Letter
- B-4: Background Information Document
- B-5: Proof of Notification
- B-6: Community Resolution Letter
- B-7 DWS Pre-Application Meeting Minutes

Appendix C: Environmental Management Programme (EMPr)

Appendix D: Specialist Reports

- D1: Paleontological Impact Assessment Report
- D2: Heritage and Archaeological Impact Assessment Report
- D3: Ecological Impact Assessment Report

Appendix E: Additional Information:

- E1: 250 m Ndabakazi Interchange and temporary diversion route coordinates

DRAFT



APPENDIX A: CURRICULUM VITAE OF THE EAP & PROJECT TEAM

DRAFT

CONTACT DETAILS

Name of Company	CES – Environmental and Social Advisory Services
Designation	East London Branch
Profession	Executive
Years with firm	17 (Seventeen) Years
E-mail	a.carter@cesnet.co.za
Office number	+27 (0)43 7267809 / 8313
Nationality	South African
Professional Body	SACNASP: South African Council for Natural Scientific Profession EAPSA: Environmental Assessment Practitioners Southern Africa IWMSA: Institute Waste Management Southern Africa TSBPA: Texas State Board of Public Accountancy (USA)
Key areas of expertise	<ul style="list-style-type: none">➤ Marine Ecology➤ Environmental and coastal management➤ Waste management➤ Financial accounting and project feasibility studies➤ Environmental management systems, auditing and due-diligence

PROFILE

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 (licensed in Texas) and holds a PhD in Plant Sciences. He is also a certified ISO14001 EMS auditor with the American National Standards Institute. Alan has been responsible for leading and managing numerous and varied consulting projects over the past 25 years.

**EMPLOYMENT
EXPERIENCE**

- October 2013 – Present: Executive (EOH Coastal & Environmental Services, East London, South Africa)
- January 2002 – September 2013: Director (Coastal & Environmental Services, East London, South Africa)
- January 1999 – December 2001: Manager (Arthur Andersen LLP, Public Accounting Firm, Chicago, Illinois USA)
- December 1996 – December 1998: Senior Accountant/Auditor (Ernst & Young LLP, Public Accounting Firm, Austin, Texas, USA.)
- January 1994 – December 1996: Senior Accountant/Auditor (Ernst & Young, Charteris & Barnes, Chartered Accountants, East London, South Africa)
- July 1991 – December 1994: Associate Consultant (Coastal & Environmental Services, East London, South Africa)
- March 1989 – June 1990: Data Investigator (London Stock Exchange, London, England, United Kingdom)

**ACADEMIC
QUALIFICATIONS**

- Ph.D. Plant Science (Marine) Rhodes University 1987
- B. Compt. Hons. Accounting Science University of South Africa 1997
- B. Com. Financial Accounting Rhodes University 1995
- B.Sc. Hons. Plant Science Rhodes University 1983
- B.Sc. Plant Science & Zoology Rhodes University 1982

COURSES

- *Environmental Management Systems Lead Auditor Training Course - American National Standards Institute and British Standards Institute (2000)*
- *ISO 14001:2015 Implementing Changes - British Standards Institute (2015)*
- *Numerous other workshops and training courses*

**CONSULTING
EXPERIENCE**

Environmental Impact Assessment, Feasibility and Pre-feasibility Assessments

- Managed numerous projects and prepared environmental impact assessment (EIA) reports in terms of relevant EIA legislation and regulations for development proposals including: Infrastructure projects: bulk water and waste water, roads, electrical, mining, ports, aquaculture, renewable energy (solar and wind), industrial processes, housing developments, golf estates and resorts, etc. (2002 – present).
- Projects have also included preparation of applications in terms of other statutory requirements, such as water-use and mining licence /permit applications.
- Managed projects to develop pre-feasibility and feasibility assessments for various projects, including various tourism developments, infrastructure projects, etc.
- Managed project for the East London Industrial Development Zone (ELIDZ) to develop a Conceptual Framework for a Mariculture Zone within the ELIDZ (2009).
- Managed pre-feasibility study to establish a Mariculture Zone within the Coega Industrial Development Zone (2014).
- Assisted City of Johannesburg in the process to proclaim four nature reserves in terms of relevant legislation (2015-2016).

- Acted as Environmental Control Officer (ECO) for numerous projects including solar and wind farms, roads, industrial processes, etc.

Strategic Environmental Assessment

- Managed Strategic Environmental Assessment (SEA) project toward the development of a Biofuel Industry in the Eastern Cape Province of South Africa (2014-2016)
- Managed Strategic Environmental Assessment (SEA) projects for two South African ports (2006 – 2007).
- Managed Strategic Environmental Assessment (SEA) projects for five (5) local municipalities in the Eastern Cape as part of the municipal Spatial Development Framework plans (2004 – 2005).
- Involved in the financial assessment of various land-use options and carbon credit potential as part of a larger Strategic Environmental Assessment (SEA) for assessing forestry potential in Water Catchment Area 12 in the Eastern Cape of South Africa (2006).

Climate change, emissions trading and renewable energy

- Provided specialist peer review services for National Department of Environmental Affairs relating to climate change impact assessments for large infrastructure projects (2017-2018).
- Conducted climate change impact assessment for a proposed coal-fired power station in Africa (2017-2018).
- Participated in the development of a web-based Monitoring & Evaluation (M&E) system for climate change Mitigation and Adaptation in South Africa for National Department of Environmental Affairs (DEA) (2015-2016).
- Managed project to develop a Climate Change Strategy for Buffalo City Metro Municipality (2013).
- Managed projects to develop climate change strategies for two district municipalities in the Eastern Cape Province (2011).
- Conducted specialist carbon stock and greenhouse gas emissions impact and life cycle assessment as part of the Environmental, Social and Health Impact Assessment for a proposed sugarcane to ethanol project in Sierra Leone (2009 - 2010) and a proposed Jatropha bio-diesel project in Mozambique (2009 - 2010).
- Managed project to develop the Eastern Cape Province Climate Change Strategy (2010).
- Managed project to develop a Transnet National Ports Authority Climate Change Risk Strategy (2009)
- Participated in a project to develop a Renewable Energy roadmap for the East London Industrial Development Zone (ELIDZ) (2013).
- Participated in a project for the East London Industrial Development Zone (ELIDZ) and Eastern Cape Government to prepare a Renewable Energy Strategy (2009).
- Contributed to the development of Arthur Andersen LLP's International Climate Change and Emissions Trading Services (2001).
- Conducted carbon credit (Clean Development Mechanism - CDM) feasibility assessment for a variety of renewable energy projects ranging from biogas to solar PV.
- Participated in the preparation of CDM applications for two solar PV projects

in the Eastern Cape.

Waste Management

- Managed project to develop Integrated Waste Management Plans for six local municipalities on behalf of the Sarah Baartman District Municipality in the Eastern Cape Province (2016).
- Managed project to develop Integrated Waste Management Plans for four local municipalities on behalf of Alfred Nzo District Municipality in the Eastern Cape Province (2015).
- Managed project to develop Integrated Waste Management Plans for eight local municipalities on behalf of Chris Hani District Municipality in the Eastern Cape Province (2011).
- Managed a project to develop a zero-waste strategy for a community development in the Eastern Cape Province (2010).
- Managed waste management status quo analysis for a District Municipality in the Eastern Cape Province (2003).
- For three consecutive years, managed elements of the evaluation of the environmental financial reserves of the three largest solid waste companies (Waste Management, Inc., Republic Services, Inc., Allied Waste, Inc.) and number of smaller waste companies in the USA as part of the annual financial audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.
- Managed elements of the evaluation of the environmental financial reserves of the largest hazardous waste company in the USA (Safety-Kleen, Inc.), as part of the audit process for SEC reporting purposes. Ensured compliance with RCRA and CERCLA environmental regulations.

Environmental Due Diligence and Business Risk

- Conducted environmental due diligence projects on behalf of the German Development Bank for a forestry pulp and paper operation in Swaziland (2010) and for a large diversified South African agricultural/agro-processing company (2011)
- Managed project for the Transnet National Ports Authority to identify the environmental risks and liabilities associated with the operations of the Port of Durban as part of a broader National initiative to assess business and financial risks relating to environmental management (2006).
- Managed project to determine the financial feasibility of various proposed tourism developments for the Kouga Development Agency in the Eastern Cape Province (2006)
- Contributed significantly to a study to determine the financial and environmental feasibility of three proposed tourism development projects at Coffee Bay on the Wild Coast (2004).
- Conducted sustainability and cost/benefit analysis of various waste water treatment options (including a marine pipeline at Hood Point) for the West Bank of East London (2004).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).
- Involved in the determination of the historical cost element of environmental remediation insurance claims for a number of multinational

- companies, including Dow Chemicals, Inc. and International Paper, Inc.
- Evaluated the environmental budgeting process of the US Army and provided best practice guidance for improving the process.

Policy and Guidelines

- Development of Administration / Application Fee Structure for the Reclamation of Land, Coastal Use Permits, Coastal Waters
- Discharge Permits, Dumping Of Waste at Sea, Off-Road Vehicle Regulations Promulgated in Terms of the National Environmental Management Act: Integrated Coastal Management Act (Act No. 24 Of 2008) (2017).
- Managed project to develop an Estuarine Management Plan for the Buffalo River Estuary for the National Department of Environmental Affairs (2017).
- Managed project to develop a Coastal Management Programme for Amathole District Municipality, Eastern Cape (2015 – 2016).
- Managed project to develop a sustainability diagnostic report as part of the development of the Eastern Cape Development Plan and Vision 2030 (2013).
- Managed project for the Department of Environmental Affairs and Tourism, Marine & Coastal Management to determine the cost implications associated with the implementation of the Integrated Coastal Management Act (2007).
- Managed project to develop a Conservation Plan and Municipal Open Space System (MOSS) for Buffalo City Municipality (2007)
- Managed project to develop a Sanitation Policy and Strategy for Buffalo City Municipality, Eastern Cape (2004 – 2006).
- Managed project to develop an Integrated Environmental Management Plan and Integrated Coastal Zone Management Plan for Buffalo City Municipality, Eastern Cape (2004 – 2005).
- Managed projects to develop and implement an Environmental Management System (EMS) for the Chris Hani and Joe Gqabi (formerly Ukhahlamba) District Municipalities in the Eastern Cape generally in line with ISO14001 EMS standards (2004 – 2005).
- Managed project to develop a State of the Environment Report and Environmental Implementation Plans for Amathole, Chris Hani, OR Tambo and Joe Gqabi District Municipalities in the Eastern Cape Province (2005 – 20010).
- Conducted analysis of permit fees and application processing costs for off-road vehicle use on the South African coastline for the Department of Environmental Affairs and Tourism, Marine & Coastal Management (2003).

Environmental auditing and compliance

- Conducted environmental legal compliance audit for various large Transnet Freight Rail facilities (2018).
- Managed projects to develop Environmental & Social Management Systems (ESMS) in line with IFC Performance Standards for three (3) wind farms in South Africa (2015-2018).
- Managed project to develop an Environmental & Social Management System (ESMS) in line with IFC Performance Standards for a telecoms company in Zimbabwe on behalf of the German Development Bank (2013)
- Participated in numerous ISO14001 Environmental Management System (EMS) audits for large South African corporations including SAPPI, BHP

Billiton, SAB Miller, Western Platinum Refinery, Dorbyl Group and others (2002 – present).

- Reviewed the SHE data reporting system of International Paper, Inc. (IP) for three successive years as part of the verification of the IP SHE Annual Report, which included environmental assessments of 12 IP pulp and paper mills located throughout the USA.
- Conducted Environmental Management System (EMS) reviews for a number of large US corporations, including Gulfstream Aerospace Corporation

Public financial accounting

- While with Ernst & Young LLP, (USA), functioned as lead financial auditor for various public and private companies, mostly in the technology business segment of up to \$200 million in annual sales. Client experience included assistance in a \$100 million debt offering, a \$100 million IPO and SEC annual and quarterly reporting requirements.
- Completed three years of articles (training contract) in fulfilment of the certification requirements of the South African Institute of Chartered Accountants which included auditing, accounting and preparation of tax returns for many small to medium sized commercial entities.

PUBLICATIONS

Refereed Publications

- Carter, A.R. 1985. Reproductive morphology and phenology, and culture studies of *Gelidium pristoides* (Rhodophyta) from Port Alfred in South Africa. *Botanica Marina* 28: 303-311.
- Carter, A.R. 1993. Chromosome observations relating to bispore production in *Gelidium pristoides* (Gelidiales, Rhodophyta). *Botanica Marina* 36: 253-256.
- Carter, A.R. and R.J. Anderson. 1985. Regrowth after experimental harvesting of the agarophyte *Gelidium pristoides* (Gelidiales: Rhodophyta) in the eastern Cape Province. *South African Journal of Marine Science* 3: 111-118.
- Carter, A.R. and R.J. Anderson. 1986. Seasonal growth and agar contents in *Gelidium pristoides* (Gelidiales, Rhodophyta) from Port Alfred, South Africa. *Botanica Marina* 29: 117-123.
- Carter, A.R. and R.H. Simons. 1987. Regrowth and production capacity of *Gelidium pristoides* (Gelidiales, Rhodophyta) under various harvesting regimes at Port Alfred, South Africa. *Botanica Marina* 30: 227-231.
- Carter, A.R. and R.J. Anderson. 1991. Biological and physical factors controlling the spatial distribution of the intertidal alga *Gelidium pristoides* in the eastern Cape Province, South Africa. *Journal of the Marine Biological Association of the United Kingdom* 71: 555-568.

Published reports

- Water Research Commission. 2006. Profiling Estuary Management in Integrated Development Planning in South Africa with Particular Reference to the Eastern Cape. Project No. K5/1485.
- Turpie J., N. Sihlophe, A. Carter, T. Maswime and S. Hosking. 2006. Maximising the socio-economic benefits of estuaries through integrated planning and management: A rationale and protocol for incorporating and

enhancing estuary values in planning and management. Un-published Water Research Commission Report No. K5/1485

Conference Proceedings

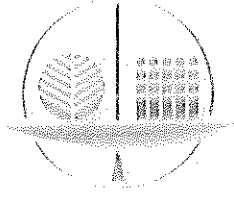
- Carter, A.R. 2002. Climate change and emission inventories in South Africa. Invited plenary paper at the 5th International System Auditors Convention, Pretoria. Held under the auspices of the South African Auditor & Training Certification Association Conference (SAATCA).
- Carter, A.R. 2003. Accounting for environmental closure costs and remediation liabilities in the South African mining industry. Proceedings of the Mining and Sustainable Development Conference. Chamber of Mines of South Africa, Vol. 2: 6B1-5
- Carter, A.R. and S. Fergus. 2004. Sustainability analysis of wastewater treatment options on the West Bank of East London, Buffalo City. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate: Pages 295-301.
- Carter, A., L. Greyling, M. Parramon and K. Whittington-Jones. 2007. A methodology for assessing the risk of incurring environmental costs associated with port activities. Proceedings of the 1st Global Conference of the Environmental Management Accounting Network.
- Hawley, GL, McMaster AR and Carter AR. 2009, Carbon, carbon stock and life-cycle assessment in assessing cumulative climate change impacts in the environmental impact process. Proceedings of the Annual National Conference of the International Association for Impact Assessment, South African Affiliate.
- Hawley, GL, McMaster AR and Carter AR. 2010. The Environmental and Social Impact Assessment and associated issues and challenges. African, Caribbean and Pacific Group of States (ACP), Science and Technology Programme, Sustainable Crop Biofuels in Africa.
- Carter, A.R. 2011. A case study in the use of Life Cycle Assessment (LCA) in the assessment of greenhouse gas impacts and emissions in biofuel projects. 2nd Environmental Management Accounting Network- Africa Conference on Sustainability Accounting for Emerging Economies. Abstracts: Pages 69-70.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

ALAN ROBERT CARTER

Date: January 2019



The Interim Certification Board
for
Environmental Assessment Practitioners
of
South Africa

Alan Robert Carter

was certified as an

**ENVIRONMENTAL ASSESSMENT
PRACTITIONER**

on this 1st day of March 2012


.....
Chairperson


.....
Secretary

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Alan Robert Carter

Registration number: 400332/04

is registered as a

Professional Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science

Effective 31 August 2004

Expires 31 March 2019



Batha

President

M. J. ...

Executive Director

CONTACT DETAILS

Name of Company	CES – Environmental and Social Advisory Services
Designation	East London Branch
Profession	Senior Environmental Consultant
Years with firm	1 (One) Year
E-mail	c.clarke@cesnet.co.za
Office number	+27 (0)43 7267809 / 8313
Nationality	South African
Professional Body	South African Council for Scientific Natural Professionals (SACNASP): Candidate Natural Scientist (500022/14)
Key areas of expertise	<ul style="list-style-type: none">➤ Climate Change➤ Environmental Authorisations (including MPRDA applications)➤ Environmental Management Plans➤ Environmental Compliance Monitoring➤ Geographic Information Systems➤ Licensing and Permit Applications➤ Feasibility Assessments➤ Public Participation Process

PROFILE

Caryn holds a M.Sc. Environmental Science (2012), B.Sc. Hon. Environmental Science (2010), and a B.Sc. Environmental Science and Economics (2009) from Rhodes University. Her M.Sc. thesis was titled “Responses to the linked stressors of Climate Change and HIV/AIDS amongst vulnerable rural households in the Eastern Cape, South Africa”. Her B.Sc. Hon. thesis investigated climate change perceptions, drought responses and views on carbon farming amongst commercial livestock and game farmers within the Great Fish River Valley, Eastern Cape, from which a paper was published in the African Journal of Range and Forage Science 2012, 29(1):13-23. Caryn has further completed a Carbon Footprint Analysis Course (2013).

Caryn’s expertise includes project management, environmental impact assessments including public participation, MPRDA applications, environmental compliance monitoring, various licensing and permit applications, feasibility assessments and GIS mapping. Caryn is a registered Candidate Natural Scientist under the South African Council for Natural Scientific Professions.

**EMPLOYMENT
EXPERIENCE**

- Environmental Consultant, Coastal and Environmental Services
August 2018 – current
- Environmental Consultant, Environmental Impact Management Services (EIMS)
March 2013 – September 2015

**ACADEMIC
QUALIFICATIONS**

- Rhodes University, 2012: M.Sc. (Environmental Science) with distinction
- Rhodes University, 2010: B.Sc. Hon. (Environmental Science) with distinction
- Rhodes University, 2009: B.Sc. (Environmental Science and Economics) with distinctions

COURSES

- *Terra Firma Academy, Johannesburg:*
“Carbon Footprint Analysis Course” (2013)

**CONSULTING
EXPERIENCE**

- Water Use Licensing for the Olivewood Gold Estate, Eastern Cape.
- Water Use Licensing for the Northern Cape Economic Development, Trade and Investment Promotion Agency (NCEDA) SEZ, Upington, Northern Cape.
- Environmental Sensitivity Assessment for the Lesotho Electricity Company 132 kV Mahlasela - Letseng Powerline, Lesotho.
- EIA, Water Use Licensing, and Coastal Discharge Permit for the Wild Coast Abalone Expansion, Eastern Cape.
- Conservation Management Plan for the CDC Wild Coast Mthatha SEZ, Eastern Cape.
- Basic Assessment and Mining License for the SANRAL Heidelberg to Lizmore road upgrade, Western Cape.
- Feasibility Assessment for the DAFF Multispecies Hatchery Development within the Eastern Cape.
- EIA for the proposed WildCoast SEZ Upper Ncise Aquaponics development, Mthatha Dam.
- Market Analysis for the DAFF Richards Bay Marine Cage Culture Aquaculture Feasibility Assessment.
- Basic Assessment for the proposed Eskom Lesokwana substation and associated powerlines, Gauteng.
- Basic Assessment and Water Use Licensing for the proposed SANRAL V3 Ndabakazi and R409 Interchange upgrade;
- Basic Assessment and Water Use Licensing for the proposed Kei Mouth Eco Estate.
- Public Participation for the Silver Wave Energy Exploration Rights;
- Integrated Water Use Licensing for Leiden Coal Mine;
- Integrated Water and Waste Management Plan for Vlakvarkfontein Coal Mine Consolidation;
- Environmental Impact Assessment for AOE Oil Production Right, Nanaga;
- Environmental Management Plan and compliance monitoring for the Noblesfontein Wind Energy Facility;
- Section 24G for the Tankatara Level Crossing to Coega Station service road

upgrade;

- Environmental Impact Assessment for BCMM Sunny South Housing Development;
- Environmental Impact Assessment for the AES Photovoltaic Solar Energy Facility near Aggeneys, Northern Cape;
- Vincent-Berea Local Spatial Development Framework (LSDF);
- Participatory Planning for Informal Settlements: National Upgrading Support Programme (NUSP);
- Basic Assessment for the formalisation of Mdantsane informal settlements;
- Water use License Applications for the formalisation of Mdantsane informal settlements;
- Basic Assessments for the Sidwadeni and Mngazi River Bridge and Access Road;
- Environmental Compliance Monitoring (ECO work) for Lusikisiki Waste Water Treatment Works;
- Environmental Compliance Monitoring for the East London Industrial Development Zone (ELIDZ) 1B West Infrastructure Services
- Environmental Compliance Monitoring for the reconstruction of Fleet Street, East London.
- Environmental Compliance Monitoring for the Sunny South Housing Development, East London.
- Numerous proposals, for example: Nelson Mandela Bay Metro Municipality's request for Environmental Consultant Services, Camdeboo Local Municipality's Integrated Waste Management Plan, Port St John's Environmental Management Plan, and the ELIDZ upgrade of Kemba electrical substation, Berlin, Eastern Cape; ELIDZ request for information; Transnet S24G Rectification process; Nyandeni Local Municipality's request for an Environmental Impact Assessment for the Ndayini Access Road.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

CARYN CLARKE

Date: January 2019



herewith certifies that

Caryn Lee Clarke

Registration number: 500022/14

is registered as a

Candidate Natural Scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science

Effective 23 July 2014

Expires 31 March 2019



A handwritten signature in black ink, appearing to read 'Botha'.

President

A handwritten signature in black ink, appearing to read 'M. J. ...'.

Executive Director

CONTACT DETAILS

Name of Company	EOH Coastal & Environmental Services
Designation	East London Branch
Profession	Principal Environmental Consultant
Years with firm	
E-mail	Roy.dekock@eoh.co.za r.dekock@cesnet.co.za
Office number	+27 (0)43 726 7809
Nationality	South African
Professional body	SACNASP: South African Council for Natural Scientific Profession LaRRSA: Land Rehabilitation Society of South Africa SAAB: South African Association of Botanists
Key areas of expertise	<ul style="list-style-type: none">➤ Terrestrial Ecology➤ Botanical specialist➤ Agricultural & Soil specialist➤ Conservation management➤ Biodiversity Assessment➤ Environmental management➤ Mine management (new applications, site closure and annual auditing compliance)➤ Financial accounting and project feasibility studies➤ Environmental management systems, auditing and due-diligence

PROFILE

Roy is a Principal 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 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, and Africa.

**EMPLOYMENT
EXPERIENCE**

- October 2012 – Current: Senior Environmental Consultant (EOH Coastal & Environmental Services)
- April 2010 – October 2012: Environmental Consultant (Coastal & Environmental Services)
- June 2008 – March 2010: Laboratory Technician (Nelson Mandela Metropolitan University)
- March 1995 – November 2003: Financial Advisor (ABSA Bank)

**ACADEMIC
QUALIFICATIONS**

M.Sc. Botany, NMMU, 2010
B.Sc. Hons. Geology, NMMU, 2008
B.Sc. Botany & Geology, NMMU, 2007
Diploma in Marketing, University of Witwatersrand, 2003
PHd Botany / Geology, Nelson Mandela University (current)

COURSES

Environmental Impact Assessment Course – Rhodes University (2010)

Attended numerous workshops through the Department of Environmental Affairs

**CONSULTING
EXPERIENCE**

Environmental Impact Assessment, Feasibility and Pre-feasibility Assessments

- *Project Management*
Managed numerous projects of various sizes including

budget management, client liason, timeframe targets, managing junior consultants and sub-consultants.

- *Report writing*
Prepared environmental impact assessment (EIA) reports in terms of relevant EIA legislation and regulations for development proposals including: Infrastructure projects: bulk water and waste water, roads, electrical, mining, ports, aquaculture, renewable energy (solar and wind), industrial processes, housing developments, golf estates and resorts, etc. (2010 – present).
Projects have also included preparation of applications in terms of other statutory requirements, such as water-use and mining license /permit applications.
- *Feasibility assessments*
Managed projects to develop pre-feasibility and feasibility assessments for various projects, including various tourism developments, infrastructure projects, etc.
- *Specialist studies*
Conducting specialist studies for various projects in both South Africa and the rest of Africa (Mozambique, Madagascar, Zambia, Malawi) including:
 - Ecological assessments
 - Agricultural and Soil potential
 - Land use assessments
 - Visual assessments
 - Biodiversity assessments
 - Botanical assessments

Managed the following EIAs:

- Eskom Melkhout 132kV Distribution EIA, Oyster Bay (2011)
- Bizana Mixed-use Development Scoping and full EIR, Bizana; Eastern Cape (2012)
- Toboshane Valley Estate EIA, East London (2011)
- Toboshane Valley Estate Visual Impact Assessment (2011)
- Lushington Park Windfarm Ecological Impact Assessment, East London (2011)
- Red Cap 66kV Power line EIA, St. Francis, Eastern

- cape (2011)
- ADM Sleeper site basic Assessment Report and Soil Contamination Assessment (2012)
- Eskom Mfinizo, Taweni and Hombe Basic Assessment Reports (2011).
- Tsolwana Road upgrade EIA, Tarkastad EIA (2012)
- Centane Road road upgrade EIA, Mazeppa Bay, Eastern Cape (2012)
- Innowind Peddie Solar facility EIA, Eastern Cape (2012)
- Upgrade of the R61 between Baziya and Umtata BAR (2012)
- SANRAL R61 Mthatha to Umngazi EIA (Current)
- Berlin Beef Feedlot EIA (2013)
- SANRAL N2 road upgrade between Tetyana & Sitebe Komkulu; Eastern Cape EIA (2013)
- Cedarville to Mt. Frere road upgrade EIA - Inzame Engineering (2014)
- Amatola District Municipality Office building EIA - Stutterheim (2014)
- ACSA Vegetation removal Management, East London, Eastern Cape (2015)
- DWS Lusikisiki Dam EIA, Eastern Cape (2015)
- ENEL ECO x 4 sites (Eastern Cape, Western Cape, Limpopo)(Current)
- NCEDA SEZ EIA, Upington, Northern Cape (Current)
- SANRAL Heidelberg N2 EIA, Western Cape (Current)
- SANRAL King Williams Town N2 EIA, Eastern Cape (2016)
- SANRAL R56 Matatiele EIA, Eastern Cape (2016)
- SANRAL R72 Birah ECO, Eastern Cape (Current)
- SANRAL N2 Caledon EIA, Western Cape (2016)
- SANRAL Komga R61 EIA, Eastern Cape (Current)
- SANRAL R63 Fort Beaufort EIA, Eastern Cape (Current)

Conducted specialist reports on the following projects:

- Stone Vegetation Assessment, Kaizers Beach

- (2010)
- Eskom 132kV Line Vegetation Assessment, Elloit-Ugie-Sappi (2010)
- Red Cap 66kV Power line Ecological Impact Assessment, St. Francis, Eastern cape (2011)
- N9 road upgrade in Middelburg EIA, Eastern Cape (2012)
- Ecological Impact Assessment in Hombe, Eastern Cape for a new Eskom 132kV power line (2012)
- Ecological Impact Assessment in Taweni, Eastern Cape for a new Eskom 132kV power line (2011)
- Ecological Impact Assessment in Mfinizo, Eastern Cape for a new Eskom 132kV power line (2011)
- Innowind Peddie Solar and Wind facility Agricultural Impact study, Eastern Cape (2012)
- Innowind Peddie Solar facility Visual Impact study, Eastern Cape (2012)
- Innowind Peddie Solar facility Ecological Impact study, Eastern Cape (2012)
- Innowind Qumbu Solar and Wind facility Agricultural Impact study, Eastern Cape (2012)
- Innowind Qumbu Solar facility Visual Impact study, Eastern Cape (2012)
- Kangankunde Rare Minerals mine, Malawi, Rehabilitation Management Plan and Mine Closure Plan (2011)
- Kenmare Moma Titanium mine, Mozambique, Weed Control Plan and Species of Special Concern Management Plan (2011)
- GS Cimentos limestone mine, Maputu, Mozambique, Rehabilitation Management Plan and Mine Closure Plan (2011)
- Upgrade of the R61 between Baziya and Umthatha Ecological Impact Assessment (2012)
- Amatola Water Bulk Water Pipeline Ecological Report - Port Alfred Borehole Extraction & Treatment (2012)
- Amatola Water Bulk Water Pipeline Ecological Report - Bushmansriver to Cannon Rocks (2013)
- Ndabakazi Mixed-use Development Ecological Report (2012)
- Ndabakazi Mixed-use Development Geotechnical

- Assessment (2012)
- Goba water pipeline, Katberg, Eastern Cape Vegetation Assessment (2012)
- SSI Botanical Compliance for EA (2012)
- Terra Wind Middleton Wind Energy Facility Agricultural Impact Assessment (2012)
- SANRAL R61 Mthatha to Baziya Environmental Sensitivity Report (2014)
- SANRAL N2 road upgrade between Tetyana & Sitebe Komkulu; Eastern Cape Ecological Assessment (C2014)
- SANRAL N2 road upgrade between Tetyana & Sitebe Komkulu; Eastern Cape Sensitivity Assessment (2014)
- Amatola District Municipality Office building Ecological Assessment - Stutterheim (Current)
- Amatola Water Bulk Water Pipeline Ecological Report - Cannon Rocks to Alexandria (2012)
- Ecofarm Sugar Cane expansion, Zambezia, Mozambique, Agricultural Assessment (2015)
- GS Cimmentos Mining, Maputo, Mozambique, Rehabilitation Plan (2016)
- ACSA East London Airport, Vegetation and forest removal (2015)
- SANRAL N2 Caledon EIA – Western Cape (2016)
- Triton Mining Agricultural Assessment – Ancuabe, Mozambique (2015)
- Tete Iron Ore Agricultural Assessemnt – Tete, Mozambique (2016)
- Tete Iron Ore RAP Land assessment - Tete, Mozambique (2017)
- Metal of Africa Graphite Mine – Agricultural Assessment – Pemba, Mozambique (2015)
- SANRAL Butterworth Ring Road – Ecological Assessment (2016)
- SANRAL iDutywa Ring Road - Ecological Assessment (2016)
- City of JHB Rietfontein Biodiversity Study, Gauteng (2017)
- City of JHB Little Falls Biodiversity Study, Gauteng (2017)
- City of JHB Ruimsig Biodiversity Study, Gauteng

- (2017)
- City of JHB Mellville Koppies Biodiversity Study, Gauteng (2017)
- Chalmers S24 Rehabilitation Plan – East London (2016)
- SANRAL Thabazimbi road upgrade – Ecological Study (2016)
- Delta East London Airport – Biodiversity Study (2017)
- Rumdel Vegetation S&R – N2 Tetyana, Eastern Cape (2017)
- Gibb Vegetation S&R – R72 Birah, Eastern Cape (2017)
- Lokisa Palmietvlei S24 Management – Plettenberg Bay, Western Cape (2017)
- NCEDA SEZ Ecological Assessment, Upington Northern Cape (2016)
- Amatola Water, Ndlambe Pipeline, Ecological Assessment, Port Alfred (Current)
- SANRAL Heidelberg N2, Western Cape, Agricultural Assessment (Current)

Renewable energy:

Managed various renewable energy projects including:

- Thomas River Windfarm EIA, Cathcart (2010)
- Chaba Windfarm EIA, Komga; Eastern Cape (2010)
- Lushington Park Windfarm EIA, East London (2011)
- Langa Solar Facility EIA, Berlin (2011)
- Red Cap Kouga WEF, Humansdorp (2013)
- Red Cap Gibson Bay WEF, Tsitsikamma (2015)

Conducted various specialist studies for renewable energy projects including:

- Innowind Grassridge WEF, Groundtruthing Report (2012)
- Red Cap Kouga WEF, Botanical Assessment (2012)
- Innowind Waainek WEF, Management Programmes (2012)

- Innowind Dassiesridge WEF, Agricultural Assessment (2015)
- Innowind Riverbank WEF, Micrositing and Management Plans (2015)
- RES Oyster Bay WEF, Micrositing and Management Plans (2015)
- Enel Gibson Bay WEF, Micrositing and Management Plans (2016)
- Golden Valley WEF, Management Plans (2015)
- G7 Rietkloof WEF, Agricultural Assessment (2016)
- G7 Brandvlei WEF, Agricultural Assessment (2016)

Mining projects:

Managed various mining applications to the DMR including:

- Hard rock quarry licence and EMP, Middelburg, Eastern Cape (2012)
- Cedarville to Mt. Frere road upgrade Mining licenses - Inzame Engineering (Current)
- Baziya 3 x quarries for SANRAL, Mthatha (2014)
- Tetyana 2 x quarries for SANRAL, Idutya (2015)
- Sand mine Borrow pit permit application, Port Alfred (2015)
- Centane Road borrow pit license applications, Mazeppa Bay, Eastern Cape (2013)
- EC Quarries, rock quarry outside East London License (2015)
- Laman Mining Rock quarry renewal of right (2015)
- SANRAL N2 Tetyana – Dumrana Quarry EIA & Mining, Eastern Cape (2016)
- SANRAL R56 Cedarville Quarry, Eastern Cape (Current)
- SANRAL R61 Komga Mining applications, Eastern Cape (Current)
- SANRAL Heidelberg Mining applications, Western Cape (Current)

Environmental auditing and compliance:

- TNPA Car Berth Dredging ECO, Port of East London (2010)

- Kenmare Moma Titanium mine, Mozambique. Development of Rehabilitation KPI's (2011)
- Eskom Zebra substation ECO, Cradock, Eastern Cape (2011)
- Tsolwana Road upgrade ECO, Tarkastad EIA (Current)
- Centane Road Upgrade ECO, Mazeppa Bay, Eastern Cape (Current)
- N9 road upgrade in Middelburg ECO, Eastern Cape (2015)
- Red Cap Kouga Windfarm ECO, St Francis Bay, Eastern Cape (2014)
- SANRAL R61 Mthatha to Umngazi road upgrade ECO, Eastern Cape (2015)
- Armstrong Transkei Schools Construction Environmental non-compliance & recommendations - Armstrong Engineering (2013)
- SANRAL All Saints to Mthatha road upgrade ECO. (Current)
- ENEL Paleisheuvel Solar farm ECO, Piketberg (Current)
- ENEL Tom Burke Solar farm ECO, Botswana border (Current)
- ENEL Gibson Bay Wind Farm ECO, Oyster Bay (Current)
- ENEL Nojoli Wind Farm ECO, Cookhouse (Current)
- Hatch-Goba R61 Mthatha to Port st Johns ECO (2017)

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

ROY DE KOCK

Date: 1st April 2017

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Roy de Kock

Registration number: 400216/16

is registered as a

Professional Natural Scientist

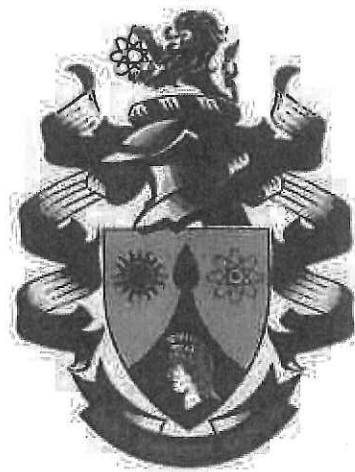
in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science

Effective **21 September 2016**

Expires **31 March 2019**



Botha

President

M. J. ...

Executive Director



APPENDIX B: PUBLIC PARTICIPATION MATERIAL

- B-1: I&AP Database
- B-2: Site Notice
- B-3: I&AP Notification Letter
- B-4: Background Information Document
- B-5: Proof of Notification
- B-6: DWS Pre-Application Meeting Minutes

DRAFT



B-1: I&AP Database

Name	Affiliation	Email address	CONTACT DETAILS			
			Phone number	Cell	Fax	Postal address
Land Owners	Property Description					
Mbulelo Simon Peterson	SANRAL SOC Ltd: Director: Southern Region		(041) 398 3244		(041) 492 0201	
Mr Sindile Tantsi	Mnquma Local Municipality Municipal Manager	stantsi@mnquma.gov.za				
M. Ntsonga	Mnquma Local Municipality - Portfolio Cllr (Infr)	-				
N. Magengelele	Mnquma Local Municipality – Ward 8	-		076 419 5191		
N. Mteke	Mnquma Local Municipality – Ward 12	-		083 428 1511		
Robert Phakathi	Transnet Soc LTD	Robert.Phakathi@transnet.net	011 583 0329			Po Box 36,Cape Town, 7979
Danie Pretorious	Province of the Eastern Cape	Danie.pretorious@dpw.ecape.gov.za	406 024 664			Private Bag X0022, Bhisho, 5605
Bahlekile Keikelame	Department of Rural Development and Land Reform	Bahlekile.Keikelame@drdlr.gov.za		082 377 8295		Po Box 1958, East London, 5200
Mazikabawo Luzipo	Chief of Amahlubi Traditional Council	-		0837453210		P O Box 16, Ndabakazi, 49620
Government	Organisation	Email	Landline	Cell	Fax	Postal
Mpho Monyai	Department of Environmental Affairs (DEA)	Mmonyai@environment.gov.za	0123999413			Private bag X 447 Pretoria, 0001. Environment House, 473 Steve Biko



Name	Affiliation	Email address	CONTACT DETAILS			
			Phone number	Cell	Fax	Postal address
						Road, Arcadia, Pretoria, 0001.
Lizna Fourie (Licensing)	Department of Water Affairs and Sanitation (DWS)	Fouriel4@dws.gov.za				
Mlondolozu Mbikwana	Department of Water Affairs and Sanitation (DWS)	MbikwanaM@dws.gov.za				
Briant Noncembu	DEDEA	Briant.Noncembu@dedea.gov.za				
Hlomela Hanise	DEDEA	Hlomela.Hanise@dedea.gov.za				
Mxolisi Dan Malgas	DAFF (Forestry)	MalgasMa@daff.gov.za				
Gwendoline Sgwabe	DAFF (Forestry)	GwendolineS@daff.gov.za				
Deidre Watkins	Department of Mineral Resources (DMR)	deidre.watkins@dmr.gov.za				
Mayan Mangia	National Dep. Of Public Works	mayan.mangia@dpw.gov.za				
Danie Pretorius	EC Department of Public Works	danie.pretorius@ecdpw.gov.za				
Nomzingisi Tukela	Department of Roads & Public Works (DRPW)	nomzingisi.tukela@dpw.gov.za				
Chris Magwangqana	Amathole DM Manager	chrisma@amathole.gov.za				
Pamela	Amathole District Municipality (ENV Manager)	pamela@amathole.gov.za		0867465917		
Ms Yolisa Mniki	Amathole District Municipality (Community services)	yolisam@amathole.gov.za		0723733045		
Luyanda Mafumbu	Amathole Environmental Manager	lmfumbu@amathole.gov.za				
Silumko Mahlasela	Mnquma Local Municipality	customercare@mnquma.gov.za				
Mr Makhaya Cecil Kibi	Mnquma Local Municipality - Community Services	kibimc@webmail.co.za		0797796841		
S Joni	Mnquma Local Municipality -Town Planning	khanyojoni@gmail.com		074 948 6799		
Miss Asanda Masinyane	Mnquma - Environmental Officer	amasinyane@mnquma.gov.za	0474014615			



Name	Affiliation	Email address	CONTACT DETAILS			
			Phone number	Cell	Fax	Postal address
E.Phumza	Department of Rural Development and Land Reform (DRDLR)	phumza.edi@drdlr.gov.za				
Zukile Pityi	Department of Rural Development and Land Reform (DRDLR)	zukile.pityi@drdlr.gov.za				
Organs of State	Organisation	Email	Landline	Cell	Fax	Postal
Angelina/ Thandokazi	ESKOM	shalanar@eskom.co.za ; myingwt@eskom.co.za ; siyongza@eskom.co.za ;		083 743 6713		
Nombuyiselo Manyika	ESKOM	manyiknp@eskom.co.za				
Dumisani Sibayi	SAHRA	dsibayi@sahra.org.za	021 462 4502			
Mzikayise L Zote	ECPHRA	mlzote@ecphra.org.za				
Mzolisi Matutu	ECPHRA	Mzolisi.Matutu@srac.ecprov.gov.za				
Mr Sello Mokhanya	ECPHRA	smokhanya@ecphra.org.za				
Gideon van Niekerk	TRANSNET	Gideon.vanNiekerk@transnet.net				
Teresa Koegelenberg	TRANSNET	Teresa.Koegelenberg@transnet.net				
Mark Moodaley	TRANSNET	Mark.moodaley@transnet.net				
Thandeka Nohoyeka	TRANSNET	Thandeka.nohoyeka@transnet.net				
Cobin Minnie	TRANSNET	Cobin.Minnie@transnet.net				
Nenekazi Songxaba	SANRAL	songxaban@nra.co.za	0413983200			
Key Stakeholders	Organisation	Email	Landline	Cell	Fax	Postal
Nenekazi Songxaba	SANRAL SOC Ltd: Environemntal Coordinator: Southern Region	SongxabaN@nra.co.za	041 398 3214			
Khulile Sigiti	Bosch Projects	siqiti@boschprojects.co.za		0783269947		



Name	Affiliation	Email address	CONTACT DETAILS			
			Phone number	Cell	Fax	Postal address
Thulani Ngidi	Bosch Projects	ngidiT@boschprojects.co.za	-	0785299229		
Mahesh Lockchunder	Raubex	Mahesh.l@raubex.com	-	0815975893		
MM. Luzipho	Traditional Leader: Amahlubi Tribal Authority	-	-			
Z. Lavisa	Traditional Leader: Amazizi Tribal Authority	Zolisalavisa@gmail.com	-	0825759693		
Z. Mbelani	Business Industry NAFCOC	Linomso2008@gmail.com	-	0635596700		
G. Sifumba	Taxi Industry	goodlucksifumba@gmail.com	-	0721981601		
M. Ntsonga	Mnquma Local Municipality	-	-			
A. Gomba	Bosch Projects	amishgomba@gmail.com	-	0730717473		
B. Khala	Ward 1 Councillor	-	-	0630781102		
L. Ntanjana	Ward 2 Councillor	-	-	0630288058		
M. Qwabe	Ward 4 Councillor	victormxoli@gmail.com	-	0825759087		
N. Sizani	Ward 6 Councillor	-	-	0783214457		
N. Fanti	Ward 7 Councillor	-	-	0729127219		
N. Magengelele	Ward 8 Councillor	-	-	0764195191		
N. Mbotho	Ward 9 Councillor	-	-	0728723436		
N. Mteke	Ward 12 Councillor	-	-	0834281511		
N. Ngwentce	Ward 22 Councillor	-	-	0781025455		
Yanda Mntwana	Bosch Projects	ymmntwana@yahoo.com	-	0711528678		
Bongekile Makhunga	Bosch Projects	makhungabongekile@gmail.com	-	0818190358		
Siphithemba Mpapela	Raubex	smpapela@gmail.com	-	0710609369		
Fezile Bebelele	ZBEMG	fezile@ZBEMG.co.za	-	0837430136		
Morne Botha	V3 Consulting	morne.botha@v3consulting.co.za	-	0834007016		
Zovuyo Guesthouse	Zovuyo Guesthouse	-	-	047 494 0225		
New Juju Hardware	New Juju Hardware	-	-	047 491 0030		



Name	Affiliation	Email address	CONTACT DETAILS			
			Phone number	Cell	Fax	Postal address
Ndabankulu Senior Secondary School	Ndabankulu Senior Secondary School	-	-			P.O.Box 43, Ndabakazi, 4962
Lengeni JS School	Lengeni JS School	-	-			Ndabakazi, 4962
Ndabakazi Post Office	Ndabakazi Post Office	-	-	0474940216		Station Street, Ndabakazi, Butterworth, Eastern Cape, 4962
MTN	MTN	Customercare@mtn.com	-			
Z.Nxozana	Amahlubi Tradiitonal Council	zukilenxozana@gmail.com	-	0736338018		
		nxozanazukile@gmail.com	-			
N.Sotini	Amahlubi Tradiitonal Council	-	-	0634350480		
N. Nqambi	Amahlubi Tradiitonal Council	-	-	0736827068		
L.S. Finini	Amahlubi Tradiitonal Council	-	-	0737182952		
H.S Kela	Ndabankulu SSS	ndabankuluseior@gmail.com	-	0823526182		
B.W. Mpuqa	Amahlubi Tradiitonal Council	bandilempuga55@gmail.com	-	0838682335		
S.E Mtintsilana	Amahlubi Tradiitonal Council	-	-	0736213460		
Ngwabini	Amahlubi Tradiitonal Council	-	-			
N.A Sizani	Amahlubi Tradiitonal Council	-	-	0760759424		
S. Quthu	Amahlubi Tradiitonal Council	-	-	0738568179		
D. Mendu	Cegcwana	-	-	0810399327		
M. Dubula	Cegcwana	-	-	0826843728		
W.M. Mahlangeni	Amahlubi Tradiitonal Council	-	-			
L. Ngwabeni	Amahlubi Tradiitonal Council	-	-	0837373449		
N. Nqambi	Amahlubi Tradiitonal Council	-	-	0736827068		



Name	Affiliation	Email address	CONTACT DETAILS			
			Phone number	Cell	Fax	Postal address
M. Fusa	Amahlubi Tradiitonal Council	-	-	0736338018		
S.E Mtintsilana	Amahlubi Tradiitonal Council	-	-	0736213460		
PLO	SANRAL	-	-	0730717473		
		-	-	0834755715		
C.M. Panade	Amahlubi Tradiitonal Council	-	-	0833749870		
Registered I&APs	Organisation	Email	Landline	Cell	Fax	Postal
Lubabalo Bambeni	Ithala Lezemfundo Pty Ltd	admin@ithala.co.za	-	0836836009		
Ayanda Mpambani	Lwethuma Environmental Consultant	a.kondile@ithala-ec.co.za	-	0792421312		
		mntase2001@yahoo.com	-			
		info@lwethuma.co.za	-			



B-2: Site Notice

NOTICE OF ENVIRONMENTAL IMPACT ASSESSMENT



Notice is hereby given in terms of Regulation 41(2) published in Government Notice No. R. 982 under Chapter 5 of the National Environmental Management Act (Act No. 107 of 1998: NEMA) of the application for Environmental Authorisation (EA) from the Department of Environmental Affairs (DEA).

Proponent and Location: South African National Roads Agency SOC Ltd. (SANRAL) is proposing the construction of the Interchange between Ndbakazi and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province.

Project Activities: The proposed development will consist of the construction of upgrading existing roads, N2 and R409, at the Ndbakazi intersection as well as the construction of an N2 bridge over the R409 and corresponding interchanges. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/ construction of drainage structures and vertical geometric improvements for the new N2 bridge.

Listed Activities:

The proposed project requires a **BASIC ASSESSMENT** due to the following listed activities:

- LISTING NOTICE 1: GN R. 327: 12 (ii) (a) (c); 19 (i); 24 (ii); and 56 (i), (ii)
- LISTING NOTICE 3: GN R. 324: 12 a (iii) and (iv); 14 (ii) (a) (c) (a) (i) (ff) (ii) (aa); 18(a) (i) (ee) (ii) (aa); and 23 (iii) (a) (c) (a) (i) (ee).

The proposed development will include a Water Use License Application as regulated by the National Water Act (Act No. 36 of 1998; NWA) and approval from the South African Heritage Resources Agency as regulated by the National Heritage Resources Act (No. 25 of 1999; NHRA).

EOH Coastal & Environmental Services has been commissioned to undertake the Environmental Impact Assessment. You are hereby invited to register as an Interested & Affected Party (I&AP). Please submit your name, contact information and any comments to the contact person below.

For more information, registration as an I&AP or submission of written comments contact by post, phone, fax or e-mail:

Ms Caryn Clarke| P O Box 8145, Nahoon, 5241| 25 Tecoma Street, Berea, 5214| Tel: 043 726 7809 | Fax: 043 726 8352 |

e-mail: c.clarke@cesnet.co.za

ISAZISO SOHLOLO LOKUCHAPHAZELEKA KOKUSINGQONGILEYO



Esi Saziso sikhutshwa malunga noMthetho wama-41(2) opapashwe kwiSaziso GN.R982 sikaRhulumente phantsi kweSahluko 5 soMthetho Wokulawula Indalo (Umthetho 107 ka 1998: NEMA) ngenjongo yokufaka isicelo Sokuhlola Ukuchaphazeleka Kwendalo kwisebe lokuSingqongileyo likaZwelonke.

Abenzi bophuhliso nendawo yophuhliso: I-arhente yezendlela yaseMzantsi Afrika (SANRAL) iceba ukuphucula wendlela kwisiphambuka esipha kathi koNdbakazi kunye no R409, kude kufuphi ne Gcuwa kumasipala weAmathole eMpuma Koloni.

Uphuhliso olucetywayo: Olu phuhliso luyakuquka ukuphuculwa kwendlela iN2 kwakunye no R409 kwisiphambuka iNdbakazi kwakunye nokwakhiwa kweBhulorho entsha kuso isiphambuka.

Okudweliswe ngumthetho: Olu phuhliso ludinga uphando lokuchaphazeleka kokusingqongileyo oluphangeleleyo nolungekho nzulu ngokoluhlu lwezinto ezidweliswe phantsi kwale mithetho:

- LISTING NOTICE 1: GN R. 327: 12 (ii) (a) (c); 19 (i); 24 (ii); and 56 (i), (ii)
- LISTING NOTICE 3: GN R. 324: 12 a (ii) and (iv); 14 (ii) (a) (c) (a) (i) (ff) (ii) (aa); 18(a) (i) (ee) (ii) (aa); and 23 (ii) (a) (c) (a) (i) (ee).

Olu phuhliso luyakuquka nokufakwa kwesicelo sokusetyenziswa kwamanzi ngexesha lophuhliso, ngokomthetho olawula amanzi ka Zwelonke (National Water Act; Act No. 36 of 1998; NWA). Kuyakufuneka nephepha-mvume kwi arhente ejongene namagugu nembali kaZwelonke (South African Heritage Resources Agency) ngokomthetho olawula imbali namagugu kaZwelonke (National Heritage Resources Act; No. 25 of 1999; NHRA).

Abakwa- EOH Coastal & Environmental Services baqashwe ukuba benze uhlobo lokuchaphazeleka kokusingqongileyo. Uyamenywa ukuba ubhalise njengomntu onomdla nochaphazelekayo. Noeda faka igama lakho inkcukacha esinokuhgami shelana ngazo nawe kunye nezimvo zakho kulo mntu ubhalwe ngezantsi.

Ngolwazi oluthe vetshe, ukubhalisa njengomntu onomdla okanye ochaphazelekayo, okanye ukuvakalisa izimvo zakho, qhagamishelana no:

Ms Caryn Clarke: P O Box 8145, Nahoon, 5241, Tel: 043 726 7809, Fax: 043 726 8352, Email: c.clarke@cesnet.co.za



A1 size site notice placed on fence alongside the National Route N2 near the Ndobakaz-R409 Intersection (32°20'57.09"S; 28°02'05.6"S)



A1 size site notice placed on fence alongside the National Route N2 near the Ndobakaz-R409 Intersection (32°20'57.09"S; 28°02'05.6"S)



Copy of Site notice placed at DH Café store located near the Ndobakaz-R409 Intersection (32°20'57.02"S; 28°02'10.09"S)



Copy of Site notice placed at DH Café store located near the Ndobakaz-R409 Intersection (32°20'57.02"S; 28°02'10.09"S)



Copy of Site notice placed inside the Ndabakazi Hardware store located near the Ndabakaz-R409 Intersection (32°20'57.22"S; 28°02'05.73"S)



Copy of Site notice placed inside the Ndabakazi Hardware store located near the Ndabakaz-R409 Intersection (32°20'57.22"S; 28°02'05.73"S)

DRAFT

**B-3: I&AP Notification Letter**

28 June 2019

Dear Stakeholder

NOTICE: PROPOSED CONSTRUCTION OF THE NDABAKAZI INTERCHANGE BETWEEN NDABAKAZI AND THE R409, NEAR BUTTERWORTH WITHIN THE AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE

Proponent: The South African National Roads Agency SOC Ltd. (SANRAL) is proposing the construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province. SANRAL has appointed V3 Consulting Engineers as Project Managers who have in turn subcontracted CES as the project Environmental Assessment Practitioner (EAP).

Activity: The proposed development will consist of the construction of upgrading existing roads, N2 and R409, at the Ndabakazi-R409 intersection as well as the construction of an N2 bridge over the R409 and corresponding interchanges. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2 bridge.

This letter of notification serves to inform you, in terms of Regulation 41(2) published in Government Notice No. R 326 under Chapter 5 of the National Environmental Management Act (No. 107 of 1998; NEMA, as amended) of the intent to submit an application for environmental authorisation to the National Department of Environmental Affairs (DEA) for the proposed road development. A General Authorisation will also be required from the Department of Water and Sanitation (DWS) in terms of the National Water Act (Act No. 36 of 1999).

Public Participation: A critical element of the Environmental Impact Assessment (EIA) is the Public Participation process. The objective is to contact, notify and inform as many stakeholders and members of the community, who may be interested and/or affected by the proposed interchange construction, so that any such party may fully participate in, interact with and inform the EIA process. As a stakeholder, your involvement in the public participation process is vital and thus it is very important for us, as the EAP, to maintain an open and inclusive channel of communication with you.

It would be greatly appreciated if you would provide us with the contact details of any other person(s) you are aware of, that would be interested in or affected by this development.

For more information, registration as an Interested and Affected Party (I&AP), or submission of written comments, please contact us within 30 days of this notice using the phone, fax, post or email details provided below:

CES
Attn: Caryn Clarke
PO Box 8145, Nahoon
East London, 5241

Tel: 043 726 7809
Fax: 043 726 8352
E-mail: c.clarke@cesnet.co.za

I look forward to hearing from you.

Kind regards,

Caryn Clarke

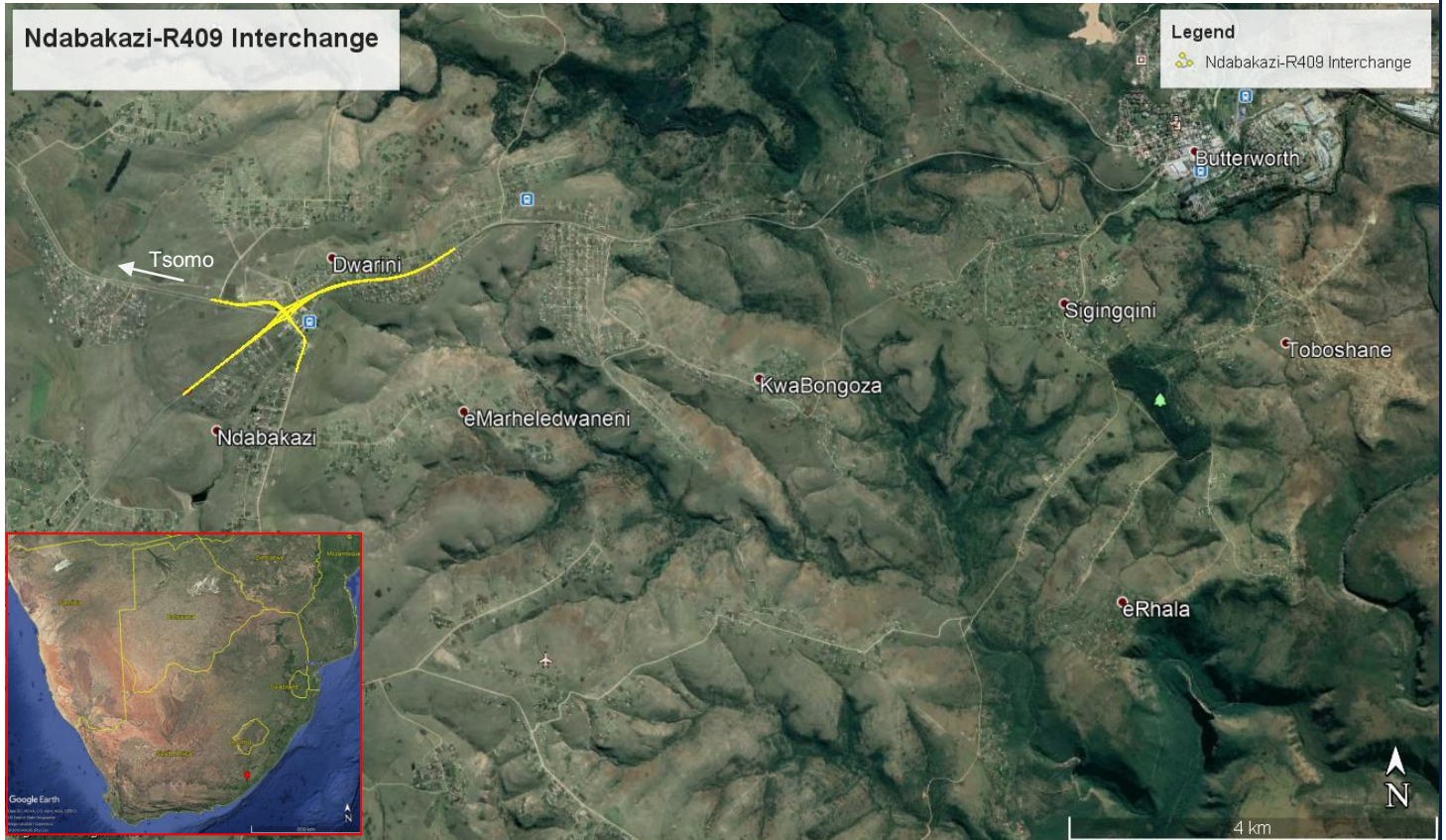


B-4: Background Information Document

DRAFT

BASIC ASSESSMENT: PROPOSED CONSTRUCTION OF THE NEW NDABAKAZI INTERCHANGE BETWEEN THE N2 AND THE R409, NEAR BUTTERWORTH WITHIN THE AMATHOLE DISTRICT MUNICIPALITY OF THE EASTERN CAPE PROVINCE.

BACKGROUND INFORMATION DOCUMENT (BID) & INVITATION TO COMMENT



Return address for comments:

Caryn Clarke

CES

25 Tecoma Street,

Berea, East London, 5214

P.O Box 8145,

Nahoon, East London, 5241

Tel: (043) 726 7809

Fax: (043) 726 8352

Email: c.clarke@cesnet.co.za



AIM OF THIS DOCUMENT

The purpose of this document is to ensure that **people that are interested in or affected by the proposed project** are **provided with information about the proposal, the process being followed and provided with an opportunity to be involved** in the Basic Assessment (BA) process for the proposed construction of the Interchange between Ndabakazi and the R409 near Butterworth, within the Amathole District Municipality of the Eastern Cape Province.

Registering as an **Interested and/or Affected Party (I&AP)** allows individuals or groups the opportunity to **contribute ideas, issues, and concerns relating to the project**. I&APs also have an opportunity to **review all of the reports and submit their comments** on those reports. All of the comments that are received will be included in the reports that are submitted to the Competent Authority (CA).

THE PROPONENT

The South African National Roads Agency SOC Limited (SANRAL) is an independent, statutory company registered in terms of the Companies Act. The South African government is the sole shareholder and owner of SANRAL. SANRAL provides finance, improves, manages and maintains the national road network in South Africa.

THE ENVIRONMENTAL ASSESSMENT PRACTITIONER

CES was established in 1990 as a specialist environmental consulting company and has considerable experience in terrestrial, marine and freshwater ecology, the Social Impact Assessment (SIA) process, State of Environment Reporting (SOER), Integrated Waste Management Plans (IWMP), Environmental Management Programme (EMPr), Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) processes. CES has been active in all of the above fields, and in so doing have made a positive contribution towards environmental management and sustainable development in the Eastern Cape, South Africa and many other African countries. We believe that a balance between development and environmental protection can be achieved by skilful, considerate and careful planning.

THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

According to the EIA regulations (2014, as amended) promulgated under the National Environmental Management Act (NEMA, Act No.107 of 1998) the potential impacts on the environment will have to be assessed in terms of the listed activities. The SANRAL Ndabakazi Interchange triggers listed activities (Table 1 below) in terms of the NEMA EIA Regulations (2014, as amended) as per Government Gazette R327 and R324, and as such requires the completion of a **Basic Assessment Report (BAR)** for the interchange construction which will be undertaken in accordance with Regulation 6 of the EIA Regulations (2014, as amended). The competent authority for this application will be the National Department of Environmental Affairs (DEA).

The proposed construction of the Ndabakazi Interchange occurs within 32 metres of a watercourse and within 500 metres of numerous wetlands. Water use licensing will therefore be required under a General Authorisation, in terms of the National Water Act (Act No.36 of 1998; NWA) from the Department of Water and Sanitation (DWS), for all of the water crossings identified.

Table 1: Listed Activities which require Environmental Authorisation for the proposed Ndabakazi-R409 Interchange construction

LISTING NOTICE 1: Activities require a Basic Assessment
LISTED ACTIVITIES
GN R. 327: 12 (ii) (a) (c) The development of: (ii) infrastructure or structures with a physical footprint of 100 square metres or more; (a) within a watercourse; and/or (c) if no development setback exists, within 32 metres of a watercourse.
GN R. 327: 19 (i) The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from: (i) a watercourse.

GN R. 327: 24 (ii)

The development of a road:

- (ii) with a reserve wider than 13, 5 metres, or where no reserve exists where the road is wider than 8 metres.

GN R. 327: 56 (i), (ii)

The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre:

- (i) where the existing reserve is wider than 13, 5 metres; and/or
- (ii) where no reserve exists, where the existing road is wider than 8 metres.

LISTING NOTICE 3: Activities require a Basic Assessment**Listed Activities****GN R. 324: 12 a (ii), (iv)**

The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan, in:

a) Eastern Cape:

- (ii) Within critical biodiversity areas identified in bioregional plans; and/or
- (iv) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.

GN R. 324: 14 (ii) (a) (c) (a) (i) (ff) (ii) (aa)

The development of :

- (ii) infrastructure or structures with a physical footprint of 10 square metres or more;

Where such development occurs:

(a) within a watercourse; and/or

- (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse, in:

a) Eastern Cape:

(i) Outside urban areas, in:

- (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans

(ii) Inside urban areas:

- (aa) Areas zoned for use as public open space.

GN R. 324: 18(a) (i) (ee) (ii) (aa)

The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre:

(a) Eastern Cape:

(i) Outside urban areas, in:

- (ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; and/or

(ii) Inside urban areas, in:

- (aa) Areas zoned for use as public open space.

GN R. 324: 23 (ii) (a) (c) (a) (i) (ee)

The expansion of:

- (ii) infrastructure or structures where the physical footprint is expanded by 10 square meters or more;

Where such expansion occurs:

(a) within a watercourse; and/or

- (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.

(a) Eastern Cape:

(i) Outside urban areas, in:

- (ee) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.

APPROACH TO THE EIA PROCESSES

The EIA process required for the proposed construction of the interchange between Ndabakazi and the R409, is a **Basic Assessment (BA)**. The illustration below indicates where we are currently in the BA process:

BASIC ASSESSMENT PROCESS

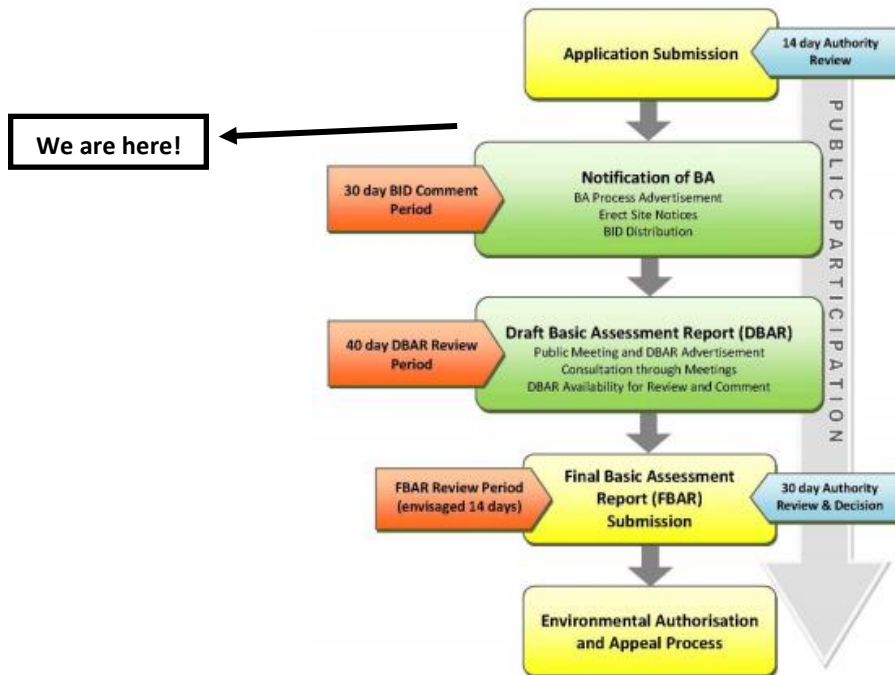


Figure 1. Process of the Basic Assessment

PROJECT DESCRIPTION

The proposed Ndbakazi Interchange is located along the National Route N2 Section 17 (km 23.4) at the interchange with the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province.

In particular, the project will consist of the following:

EXISTING ROADS:

- Increasing the road reserve width from 30m to a minimum of 50m wide;
- General widening of the existing road cross section for passing lanes and 3.0m surfaced shoulders. The main carriageway is 10.4m and needs to be increased to 20.8m; and
- Widening and/or new construction of existing drainage structures.

NEW INTERCHANGE (CALLED THE NDABAKAZI INTERCHANGE):

- Construction of a new bridge on the R409 over the N2;
- Substantial vertical geometric improvements will be required for the new N2/R409 bridge;
- Rehabilitation of pavement structure on existing alignment and construction of new pavement on new alignment, all for which suitable material will need to be sourced; and
- Cut faces requiring stabilisation.

TEMPORARY DEVIATIONS:

- Temporary traffic diversion routes will be used during the construction phase of the Ndbakazi Interchange;
- The temporary diversion routes will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndbakazi Interchange; and
- All temporary diversion routes will be surfaced (tarred).

POTENTIAL IMPACTS AND BENEFITS

CES will assess the impacts of the proposed activity on the environment. Impacts will be assessed for various alternatives; including the preferred alternative and the “No-Go” alternative. Impacts will be assessed for the planning and design phase, construction phase and operational phase.

HOW CAN YOU BE INVOLVED?

A Public Participation Process (PPP) is being conducted as part of the environmental process for the proposed construction of the Ndabakazi Interchange. The aim of the PPP is to allow everyone who is interested in, or likely to be affected by the proposed development to provide input into the process.

The Public Participation Process includes:

- Advertisement in The Daily Dispatch;
- On-site signage;
- Circulation of the BID (*this document*) to all identified I&APs and stakeholders;
- Commenting period;
- Review of the reports by all registered I&APs and stakeholders; and
- A public meeting (*If required*).

If you consider yourself an interested and/or affected person/party, it is important that you become and remain involved in the PPP. In order to do so, please follow the steps below in order to ensure that you are continually informed of the project developments and will ensure your opportunity to raise issues and concerns pertaining to the project.

STEP 1: Please register by responding to our notification and invitation, with your name and contact details (details provided on cover page and below). As a registered I&AP, you will be informed of all meetings, report reviews and project developments throughout the EIA process.

STEP 2: Register by returning the slip at the back of this document to CES.

STEP 3: Attend any meetings that may be held during the EIA process. As a registered I&AP, you will receive an invitation to attend such meetings.

CES is required to engage with all private and public parties that may be interested and/or affected by the proposed interchange construction, in order to distribute information for review and comment in a transparent manner.

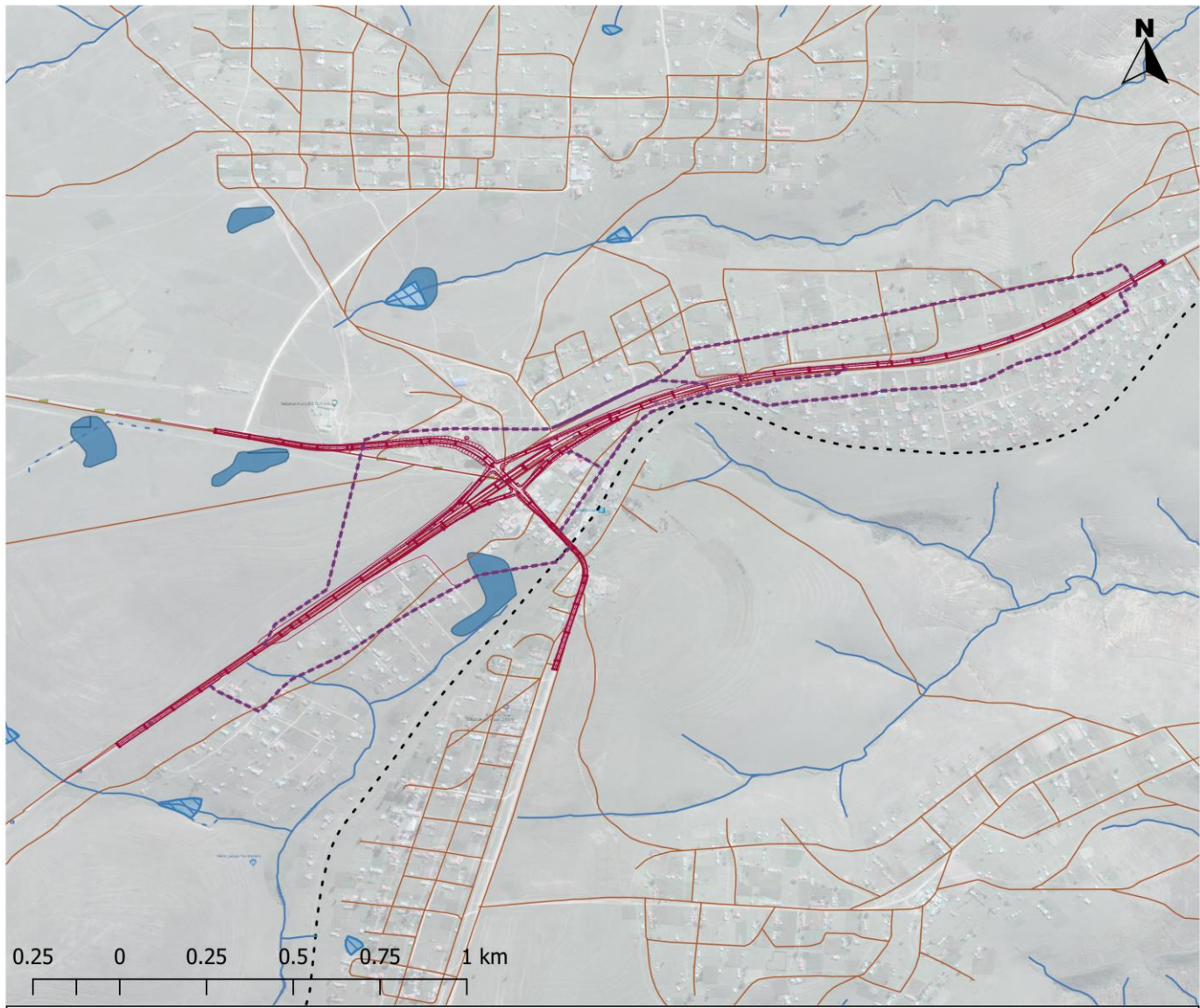
In the same light, it is important for I&APs to note the following:

1. In order for CES to continue engaging with you, please **ENSURE** that you register on our database by contacting the person below.
2. As the Basic Assessment process is regulated by specific review and comment timeframes, it is your responsibility to submit your comments within these timeframes.

Please send your enquiries and/or comments to:

Caryn Clarke
Senior Environmental Consultant

**25 Tecoma Street,
Berea, East London, 5214
P.O Box 8145,
Nahoon, East London, 5241
Tel: (043) 726 7809/8313
Fax: (043) 726 8352
Email: c.clarke@cesnet.co.za**



Drawn by: C.Clarke
Date: September 2018
CES Project Code: P40700338
 1:11000

TITLE
Locality Map
PROJECT
Upgrade of N2 Section 17 Ndabakazi R409 Intersection

- Ndabakazi Interchange Upgrade
- - - Temporary Diversion Roads
- Existig gravel roads
- - - Railway line
- Rivers
- - - Drainage Lines
- NFEPA Wetlands**
- ▨ Artificial
- Natural

Datum: WGS84

Produced for: SANRAL

INSERT MAP LOCATION (Path to saved Map) : \\Server\z\Data\FTP_Shared\PROJECTS\EL CURRENT PROJECTS 2012\SANRAL V3 Ndabakazi EIA\Pics&Maps

I hereby wish to register as an Interested and Affected Party (I&AP) for the proposed construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province.

Name & Surname:

Organisation:

Postal Address:

Email:

Phone #:

Fax #:

My initial comments, issues or concerns are:

Other individuals, stakeholders, organisations or entities that should be registered are:

Name & Surname:

Organisation:

Postal address:

Contact details:


Please return details to: **Caryn Clarke**: P.O. Box 8145, Nahoon, East London, 5241

Telephone: (043) 726 7809 | Fax: (043) 726 8352 | Email: c.clarke@cesnet.co.za



B-5: Proof of Notification

Advert copy – to be placed in Daily Dispatch (proof of placement will be provided in Final BAR)



ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

NOTICE OF BASIC ASSESSMENT

PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE BETWEEN THE N2 AND THE R409 NEAR BUTTERWORTH, WITHIN THE AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE.

Notice is hereby given in terms of Regulation 41(2) published in Government Notice No. R 326 under Chapter 5 of the National Environmental Management Act (No. 107 of 1998; NEMA) of the intent to submit an application for environmental authorisation to the National Department of Environmental Affairs (DEA).

Proponent, Activities and Location:

The South African National Roads Agency SOC Ltd. (SANRAL) is proposing the construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province.

The proposed Ndabakazi Interchange development will consist of upgrading the existing N2 and R409 roads at the intersection as well as the construction of a new bridge over the N2 with corresponding interchange ramps. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2/R409 bridge.

NEMA Listed Activities:

A Basic Assessment is triggered by the following listed activities:

- LISTING NOTICE 1: 12 (ii) (a) (c), 19 (j); 24 (ii); 56 (i), (ii)
- LISTING NOTICE 3: 12 a (ii) and (iv); 14 (ii) (a) (c) (a) (i) (ff) (ii) (aa); 18(a) (i) (ee) (ii) (aa); 23 (ii) (a) (c) (a) (i) (ee).

A General Authorisation will also be required from the Department of Water and Sanitation (DWS) in terms of the National Water Act (Act No. 36 of 1999).

CES has been appointed as the Environmental Assessment Practitioner (EAP) to undertake the Basic Assessment for the above-mentioned road development.

For more information, registration as an I&AP or submission of written comments contact by post, phone, fax or e-mail:

Contact details: Ms Caryn Clarke; PO Box 8145, East London, 5241;
Tel: 043 726 7809/8313; Fax: 043 726 8352;
E-mail: c.clarke@cesnet.co.za



Initial Notifications – email (27.06.2019):

Caryn Clarke

From: Caryn Clarke
Sent: 27 June 2019 11:47 AM
To: Robert.Phakathi@transnet.net; Danie.pretorius@dpw.escape.gov.za; Bahlekile.Keikelame@drdlr.gov.za; Mmonyai@environment.gov.za; Fouriel4@dws.gov.za; MbikwanaM@dws.gov.za; Briant.Noncembu@dedea.gov.za; Hlomela.Hanise@dedea.gov.za; MalgasMa@daff.gov.za; GwendolineS@daff.gov.za; deidre.watkins@dmr.gov.za; mayan.mangia@dpw.gov.za; danie.pretorius@ecdpw.gov.za; nomzingisi.tukela@dpw.gov.za; chrisma@amathole.gov.za; lmafumbu@amathole.gov.za; customercare@mnquma.gov.za; phumza.edi@drdlr.gov.za; zukile.pityi@drdlr.gov.za; shalanar@eskom.co.za; myingwt@eskom.co.za; siyongza@eskom.co.za; manyiknp@eskom.co.za; dsibayi@sahra.org.za; mlzote@ecphra.org.za; Mzolisi.Matutu@srac.ecprov.gov.za; smokhanya@ecphra.org.za; Gideon.vanNiekerk@transnet.net; Teresa.Koegelenberg@transnet.net; Mark.moodaley@transnet.net; Thandeka.nohoyeka@transnet.net; Cobin.Minnie@transnet.net; harold.kleber@transnet.net; songxaban@nra.co.za; siqiti@boschprojects.co.za; ngidiT@boschprojects.co.za; Mahesh.l@raubex.com; Zolisalavisa@gmail.com; Linomso2008@gmail.com; goodlucksifumba@gmail.com; amishgomba@gmail.com; victormxoli@gmail.com; ymmntwana@yahoo.com; makhungabongekile@gmail.com; smpapela@gmail.com; fezile@ZBEMG.co.za; morne.botha@v3consulting.co.za; Customercare@mtn.com; zukilenzoxana@gmail.com; nxozanazukile@gmail.com; ndabankuluse@mtn.com; bandilempuga55@gmail.com; admin@ithala.co.za; a.kondile@ithala-ec.co.za; mntase2001@yahoo.com; info@lwethuma.co.za
Cc: Roy De Kock; Caryn Clarke; Alan Carter; SongxabaN@nra.co.za; morne.botha@v3consulting.co.za
Subject: NOTICE OF BASIC ASSESSMENT PROCESS: PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE BETWEEN THE N2 AND THE R409 NEAR BUTTERWORTH, AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE
Attachments: LoN Ndabakazi interchange.pdf; BID Ndabakazi interchange_27.06.2019_CC.pdf

Dear Stakeholder

NOTIFICATION OF BASIC ASSESSMENT PROCESS: PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE BETWEEN THE N2 AND THE R409 NEAR BUTTERWORTH, AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE

Please find the Letter of Notification and Background Information Document (BID) for the aforementioned proposed SANRAL road development attached. All stakeholders will be notified of the availability of the Draft Basic Assessment Report (and how to access it) once available for 30-day public review.

If you have any queries or comments, please do not hesitate to contact me.

Kind regards



Caryn Clarke - M.Sc., *Cand.Sci.Nat.*
 Senior Environmental Consultant
 CES - Environmental and social advisory services
 25 Tecoma Street, Berea, 5214
 East London | Eastern Cape | South Africa
 Tel: +27 (43) 726 7809 | Cell: +27 (72) 118 6684
c.clarke@cesnet.co.za | www.cesnet.co.za

**Caryn Clarke**

From: Caryn Clarke
Sent: 27 June 2019 12:56 PM
To: stantsi@mnquma.gov.za; GwendolineS@daff.gov.za; pamela@amathole.gov.za; yolisam@amathole.gov.za; kibimc@webmail.co.za; khanyojoni@gmail.com; amasinyane@mnquma.gov.za
Cc: Caryn Clarke
Subject: NOTICE OF BASIC ASSESSMENT PROCESS: PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE BETWEEN THE N2 AND THE R409 NEAR BUTTERWORTH, AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE
Attachments: LoN Ndabakazi interchange.pdf; BID Ndabakazi interchange_27.06.2019_CC.pdf

Dear Stakeholder

NOTIFICATION OF BASIC ASSESSMENT PROCESS: PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE BETWEEN THE N2 AND THE R409 NEAR BUTTERWORTH, AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE

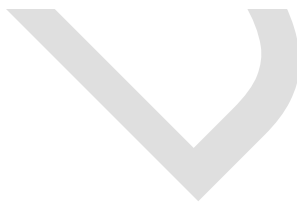
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Kind regards



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c.clarke@cesnet.co.za | www.cesnet.co.za





Initial Notifications – sms's:

DRAFT

Caryn Clarke

From: Louise Van Aardt
Sent: 27 June 2019 01:41 PM
To: Caryn Clarke
Cc: Muranda Altichiero
Subject: RE: RE: SANRAL NDABAKAZI P338: I&AP sms - SMS'S SENT

Hi Caryn

SMS's sent as requested.

Thank you

Message History Detail: Batch 963023693

Time submitted 2019-06-27 13:38:15.0

Total messages 90

Total credits 95.10

Delivery summary

Delivery to network failed	3.33%
Delivered to mobile	73.33%
Delivered upstream	23.33%

Recipient	Status	Credits	Completed time	BodyHelp
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+272810399327	Delivered upstream	2.50		Concatenated SMS (part 1 of 3):
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Dear Stakeholder, you are here by notified of CESs intent to submit an environmental applic

				ation for authorisation on behalf of SANRAL for the proposed co
+272810399327	Delivered upstream	2.50		Concatenated SMS (part 2 of 3):
				nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+272810399327	Delivered upstream	2.50		Concatenated SMS (part 3 of 3):
				rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27630288058	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3):
				Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27630288058	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3):
				nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27630288058	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3):
				rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.

+27630781102	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are here by notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27630781102	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3): struction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27630781102	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27634350480	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are here by notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27634350480	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3): struction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27634350480	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3):

rovince. For further informati
on, please contact Caryn at
043 726 7809, or c.clarke@cesn
et.co.za.

+27711528678 Delivered
upstream 1.00

Concatenated SMS (part 1 of
3):

Dear Stakeholder, you are here
by notified of CESs intent to
submit an environmental applic
ation for authorisation on
behalf of SANRAL for the propo
sed co

+27711528678 Delivered
upstream 1.00

Concatenated SMS (part 2 of
3):

nstruction of the new Ndabakaz
i Interchange between the N2
and the R409, near Butterworth
within the Amathole
District Municipality of the E
astern Cape P

+27711528678 Delivered
upstream 1.00

Concatenated SMS (part 3 of
3):

rovince. For further informati
on, please contact Caryn at
043 726 7809, or c.clarke@cesn
et.co.za.

+27723733045 Delivered to
mobile 1.00 2019-06-27
13:38:00

Concatenated SMS (part 1 of
3):

Dear Stakeholder, you are here
by notified of CESs intent to
submit an environmental applic
ation for authorisation on
behalf of SANRAL for the propo
sed co

+27723733045 Delivered to
mobile 1.00 2019-06-27
13:38:00

Concatenated SMS (part 2 of
3):

nstruction of the new Ndabakaz
i Interchange between the N2
and the R409, near Butterworth
within the Amathole

District Municipality of the Eastern Cape P

+27723733045	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27728723436	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27728723436	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3): nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27728723436	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27729127219	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co

+27729127219	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3): nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27729127219	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27730717473	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27730717473	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3): nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27730717473	Delivered upstream	1.00		Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27736213460	Delivered upstream	1.00		Concatenated SMS (part 1 of 3):

				Dear Stakeholder, you are here by notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27736213460	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3):
				nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27736213460	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3):
				rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27736338018	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3):
				Dear Stakeholder, you are here by notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27736338018	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3):
				nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27736338018	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3):
				rovince. For further information, please contact Caryn at

043 726 7809, or c.clarke@cesnet.co.za.

+27736827068	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are here by notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27736827068	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3): struction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27736827068	Delivered upstream	1.00		Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27737182952	Delivered upstream	1.00		Concatenated SMS (part 1 of 3): Dear Stakeholder, you are here by notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27737182952	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 2 of 3): struction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P

+27737182952	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27738568179	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27738568179	Delivered upstream	1.00		Concatenated SMS (part 2 of 3): nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
+27738568179	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
+27749486799	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
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+27749486799	Delivered to mobile	1.00	2019-06-27 13:38:00	<p>Concatenated SMS (part 3 of 3):</p> <p>rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.</p>
+27760759424	Delivered to mobile	1.00	2019-06-27 13:38:00	<p>Concatenated SMS (part 1 of 3):</p> <p>Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co</p>
+27760759424	Delivered to mobile	1.00	2019-06-27 13:38:00	<p>Concatenated SMS (part 2 of 3):</p> <p>nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P</p>
+27760759424	Delivered to mobile	1.00	2019-06-27 13:38:00	<p>Concatenated SMS (part 3 of 3):</p> <p>rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.</p>
+27764195191	Delivered upstream	1.00		<p>Concatenated SMS (part 1 of 3):</p> <p>Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on</p>

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+27781025455	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3): Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
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+27783214457	Delivered upstream	1.00		Concatenated SMS (part 1 of 3):
				Dear Stakeholder, you are here by notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
+27783214457	Delivered upstream	1.00		Concatenated SMS (part 2 of 3):
				nstruction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape P
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+27783269947	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3):
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+27783269947	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3):

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on, please contact Caryn at
043 726 7809, or c.clarke@cesn
et.co.za.

+27797796841 Delivered
upstream 1.00

Concatenated SMS (part 1 of
3):

Dear Stakeholder, you are here
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+27797796841 Delivered
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+27823526182 Delivered to
mobile 1.00 2019-06-27
13:38:00

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+27823526182	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 3 of 3): rovince. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.
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+27837373449	Delivered to mobile	1.00	2019-06-27 13:38:00	Concatenated SMS (part 1 of 3):

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+27867465917	Delivery to network failed	1.20		Concatenated SMS (part 1 of 3): Dear Stakeholder, you are hereby notified of CESs intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed co
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Records: 90

Kind regards



Louise Van Aardt

Head Office Secretary and Executive Assistant

CES - Environmental and social advisory services

67 African street

Grahamstown | Eastern Cape | South Africa

Tel: +27 (46) 622 2364 | fax: +27 (46) 622 6564 | Cell: +27 (78) 933 1483

info@cesnet.co.za | www.cesnet.co.za

From: Caryn Clarke

Sent: Thursday, 27 June 2019 12:53

To: Louise Van Aardt <info@cesnet.co.za>

Subject: RE: SANRAL NDABAKAZI P338: I&AP sms

Hi Louise,

This is the updated sms list if possible to send out today, if you can. To read:

Dear Stakeholder, you are hereby notified of CES's intent to submit an environmental application for authorisation on behalf of SANRAL for the proposed construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province. For further information, please contact Caryn at 043 726 7809, or c.clarke@cesnet.co.za.

Kind regards



Caryn Clarke - M.Sc., Cand.Sci.Nat.

Senior Environmental Consultant

CES - Environmental and social advisory services

25 Tecoma Street, Berea, 5214

East London | Eastern Cape | South Africa

Tel: +27 (43) 726 7809 | Cell: +27 (72) 118 6684

c.clarke@cesnet.co.za | www.cesnet.co.za



P.O. Box 10302
Ashwood
3605



P.O. Box 27158
Greenacres
Port Elizabeth
Tel: 041 363 0598
Fax: 041 363 7646

MINUTES OF PROJECT LIASON COMMITTEE MEETING No. 1

CLIENT	SOUTH AFRICAN NATIONAL ROADS AGENCY SOC LIMITED
PROJECT	SPECIAL MAINTENANCE ON NATIONAL ROUTE N2 SECTION 17 FROM TOLENI (KM 15.5) TO IBIKA (KM 44)
CONTRACT NO.	NRA N.002-170-2015/1C-CO
REFERENCE	13/5/4 – N.002-160-2015/2
CONTRACTOR	RAUBEX KZN
DATE OF MEETING	13 DECEMBER 2017
VENUE	ECDC OFFICES, BUTTERWORTH
FUTURE MEETINGS	11h00 on 7 February 2018 at the Site Office

MINUTES OF PROJECT LIASON COMMITTEE MEETING

CONTRACT NRA N.002-170-2015/1C-CO

SPECIAL MAINTENANCE ON NATIONAL ROUTE N2 SECTION 17 FROM
TOLENI (KM 15.5) TO IBIKA (KM 44)

DATE: 13 DECEMBER 2017

ITEM	ACTION																																																												
1. GENERAL MEETING INFORMATION																																																													
1.1 WELCOME																																																													
Ms. Amanda Gomba opened and welcomed everyone present in the meeting.																																																													
1.2 INTRODUCTIONS																																																													
1.2.1 Everyone was given the opportunity to introduce themselves.																																																													
1.2.2 The SANRAL Project team was introduced, and the roles confirmed as follows:																																																													
<table border="1"><thead><tr><th>Name</th><th>Company</th><th>Role</th></tr></thead><tbody><tr><td>Rob Damhuis (Absent)</td><td>SANRAL</td><td>Project Manager</td></tr><tr><td>Amanda Gomba</td><td>SANRAL</td><td>PLO</td></tr><tr><td>Alex Erens</td><td>Bosch Projects</td><td>Engineer</td></tr><tr><td>Ean Smit</td><td>Bosch Projects</td><td>Engineer's Representative</td></tr><tr><td>Khulile Siqiti</td><td>Bosch Projects</td><td>Assistant Engineer's Representative</td></tr><tr><td>Carlo Oliver</td><td>Raubex KZN</td><td>Contractor's Representative</td></tr></tbody></table>	Name	Company	Role	Rob Damhuis (Absent)	SANRAL	Project Manager	Amanda Gomba	SANRAL	PLO	Alex Erens	Bosch Projects	Engineer	Ean Smit	Bosch Projects	Engineer's Representative	Khulile Siqiti	Bosch Projects	Assistant Engineer's Representative	Carlo Oliver	Raubex KZN	Contractor's Representative																																								
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1.3 ATTENDANCE REGISTER																																																													
1.3.1 The attendance register was circulated in the meeting. See attached. The list of attendees and PLC representation is as follows:																																																													
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<p>1.4 APOLOGIES</p> <p>1.4.1 The SANRAL Project Manager, Rob Damhuis (SANRAL) was not able to attend the meeting and</p> <table border="1"> <thead> <tr> <th>Name</th> <th>Representing</th> <th>Role</th> <th>Email address</th> </tr> </thead> <tbody> <tr> <td>Rob Damhuis</td> <td>SANRAL</td> <td>Project Manager</td> <td>damhuisr@nra.co.za</td> </tr> <tr> <td>Mr. Magalakanqa</td> <td>Ward 22</td> <td>Councillor</td> <td></td> </tr> </tbody> </table>	Name	Representing	Role	Email address	Rob Damhuis	SANRAL	Project Manager	damhuisr@nra.co.za	Mr. Magalakanqa	Ward 22	Councillor																						
Name	Representing	Role	Email address																														
Rob Damhuis	SANRAL	Project Manager	damhuisr@nra.co.za																														
Mr. Magalakanqa	Ward 22	Councillor																															
<p>1.5 AGENDA - CHANGES AND ADOPTION</p> <p>1.5.1 Changes to the Agenda</p> <ul style="list-style-type: none"> • Item to be added for the adoption of the agenda • Ward 22 (km42) - In the Project Information Session Meeting prior to the PLC meeting, Mr Moses pointed out that km 42 encroaches on Ward 22 who was not included in the project area layout. <p>1.5.2 The agenda was adopted.</p>																																	
<p>2. <u>MATTERS ARISING FROM PREVIOUS MINUTES AND FEEDBACK</u></p> <p>2.1 As this was the first PLC meeting, there were no previous minutes</p>																																	
<p>3. <u>PROJECT PROGRESS REPORT/S</u></p> <p>3.1 CONTRACT COMMENCEMENT DATE</p> <p>3.1.1 It was noted that the contract commencement date is 10 January 2018 and the project duration is 14 months.</p> <p>3.1.2 Alex Erens presented a presentation that covered the following (refer attached):</p> <ul style="list-style-type: none"> • Establishment of the PLC, membership and role of the PLC • Employment of Labour • Involvement of Local Targeted Enterprise subcontractors on the contract, the procurement process the works to be allocated to local and non-local targeted enterprise subcontractors. <p>3.1.3 The Project Liaison Officer (PLO), Ms. Amanda Gomba, explained that SANRAL appoints the PLO and that they require their PLO to carry the duty of chairing the Public Liaison Committee (PLC) meeting.</p> <p>After a short discussion it was agreed that Ms. Gomba (PLO) who is the SANRAL representative is accepted as the chairperson for the PLC meeting.</p>																																	

ITEM	ACTION
<p>The PLC enquired about SANRAL's document that explains PLC nomination process, Miss Amanda Gomba to enquire from SANRAL and circulate.</p> <p>3.1.4 Project Liaison Committee Nominations</p> <p>The PLC agreed that that the selection of the PLC members was done procedurally and that they represent all the wards and organisations that should be represented at the PLC.</p> <p>The nomination forms for the PLC members must be completed.</p> <p>3.1.5 Project Liaison Committee Mandate</p> <p>The PLC requested that the SANRAL PLC constitution be tabled in the next meeting.</p>	<p>AG</p> <p>AG</p> <p>AG</p>
<p>4. <u>LABOUR MATTER (PLC/ Contractor/ Delegates)</u></p> <p>4.1 Process for employment of labour</p> <p>4.1.1 The ward councillors and PLC members agreed that labour will be appointed through the ward councillors and that each ward councillor will compile a labour list for their respective wards. The PLO will keep a consolidated list/database of the labour.</p> <p>4.1.2 The PLC agreed that labour appointed for the project will be allowed to work anywhere along the route and will not be restricted to work in a specific ward.</p> <p>4.1.3 The PLC agreed that labour numbers will be split equally between the wards.</p> <p>4.1.4 The PLC members undertook to inform the community about the suggestion and to compile the labour lists.</p> <p>4.1.5 The PLC enquired about the number of employment for the local labourers expected, in response Mr. Oliver said that there was currently no estimated number, but that they would initially need 15 to 20 people.</p>	<p>All</p> <p>All</p>
<p>5. <u>TRAINING (RE/ Contractor)</u></p> <p>5.1 Envisaged training plan</p> <p>5.1.1 The Contractor has not yet compiled the training plan. This will only be done once the contract has commenced and will be communicated to the PLC.</p>	<p>RO</p>
<p>6. <u>TARGETED ENTERPRISE SUBCONTRACTORS (EME'S AND QSE'S)</u></p> <p>6.1 Process for compiling the targeted enterprise subcontractors' database (pre-qualification)</p> <p>6.1.1 The PLC agreed with the process for compiling the database as explained in the presentation by Mr. Erens by means of a pre-qualification process.</p> <p>6.2 Works to be undertaken by Local Targeted Enterprise Subcontractors</p> <p>6.2.1 Refer to the presentation attached.</p> <p>6.3 Works to be undertaken by Non-Local Targeted Enterprise Subcontractors</p>	

ITEM	ACTION
<p>6.3.1 Refer to the presentation attached.</p> <p>6.4 Timeframes for procurement of Local Targeted Enterprise Subcontractors</p> <p>6.4.1 Refer to the presentation attached.</p>	
<p>7. <u>COMMUNITY ISSUES (Delegates)</u></p> <p>7.1 No issues were raised in the meeting.</p>	
<p>8. <u>WARD 22</u></p> <p>8.1 Mr Moses suggested in the project information session that the ward councillor of Ward 22, Mr. Magalakanqa, be notified and be invited in the next meeting. Ms. Gomba contacted Mr. Magalakanqa prior to the PLC meeting, who confirmed that the meeting must note an apology for him. Mr. Magalakanqa will be invited to future PLC meetings.</p> <p>8.2 Alex Erens confirmed that this was an oversight and that Ward 22 should be included.</p>	
<p>9. <u>DECISIONS/ RECOMMENDATIONS</u></p> <p>9.1 The following is a summary of the decisions taken in the meeting:</p> <p>9.1.1 It was agreed that Ms. Gomba (PLO) who is the SANRAL representative is accepted as the chairperson for the PLC meeting.</p> <p>9.1.2 The PLC agreed that that the selection of the PLC members was done procedurally and that they represent all the wards and organisations that should be represented at the PLC.</p> <p>9.1.3 The ward councillors and PLC members agreed that labour will be appointed through the ward councillors and that each ward councillor will compile a labour list for their respective wards. The PLO will keep a consolidated list/database of the labour.</p> <p>9.1.4 The PLC agreed that labour appointed for the project will be allowed to work anywhere along the route and will not be restricted to work in a specific ward.</p> <p>9.1.5 The PLC agreed that labour numbers will be split equally between the wards.</p> <p>9.1.6 The PLC members undertook to inform the community about the suggestion and to compile the labour lists.</p> <p>9.1.7 The PLC agreed with the process for compiling the database as explained in the presentation by Mr. Erens by means of a pre-qualification process.</p> <p>9.1.8 It was agreed that the Ward 22 councillor will be invited to the next PLC meeting.</p>	
<p>10. <u>CLOSURE</u></p> <p>10.1 The meeting was closed by the PLC chairperson at 15h30.</p>	

ITEM	ACTION
MINUTES CONFIRMED AS CORRECT (at the subsequent meeting)	
PLC Chairperson:	<u>Signature</u> <u>Date</u>
Contractor:	
Engineer:	

DISTRIBUTION LIST

Name	Representing	Role	Email address
Rob Damhuis	SANRAL	Project Manager	damhuisr@nra.co.za
Amanda Gomba	SANRAL	PLO	amishgomba@gmail.com
Alex Erens	Bosch Projects	Engineer	erensa@boschprojects.co.za
Ean Smit	Bosch Projects	Engineer's Representative	smite@boschprojects.co.za
Khulile Siqiti	Bosch Projects	Assistant Engineer's Representative	siqitik@boschprojects.co.za
Carlo Oliver	Raubex KZN	Contractor's Representative	Carlo.o@raubex.com
P. Kopo	COGTA	CDW	Phatheka.kopo@gmail.com
K.S. Buso	Mnquma LM	Traffic department	None
M. Ntshong	Mnquma LM	Portfolio Cllr (Infr)	None
Mbelani	NAFCOC		Linomso2008@gmail.com
D. Moses	SANRAL	PRO	Jojomoses41@gmail.com
S.G. Sifumba	Taxi Industry	None	None
Z. Lavisa	Traditional council		None
M.M. Luzipo	Traditional Leader	Traditional Leader	None
A. Butsheke	Ward 1	None	None
B. Khala	Ward 1	Councillor	None
L. Vuso	Ward 1	None	None
N.S. Mateke	Ward 12	Committee Member	None
L. Tyalisi	Ward 2	Committee member	None
Mr. Magalakanqa	Ward 22	Ward 22 councillor	
N. Sizani	Ward 6	Councillor	None
N.P. Magangele	Ward 8	Councillor	
A.N. Mateka	Ward 9	Councillor	None

ATTENDANCE REGISTER

TIME:09h00



PUBLIC LIAISON COMMITTEE MEETIN G NO 07

CONTRACT NO: NRA N.002-170-2015/1C-CO

NAME: SPECIAL MAINTANANCE ON NATIONAL ROUTE N2 SECTION 17 FROM TOLENI (KM15.5) TO IBIKA(KM44)

VENUE: TOLENI SITE OFFICE

NAME	COMPANY/DESINATION	TEL/CELL NO	E-MAIL ADDRESS	SIGNATURE
Khulile Siqiti	Bosch Projects	078 326 9947	siqiti@boschprojects.co.za	
Thulani Ngidi	Bosch Projects	078 529 9229	ngidiT@boschprojects.co.za	
Mahesh Lockchunder	Raubex	081 597 5893	Mahesh.l@raubex.com	
MM Luzipho	Traditional leader Amahlubi Tribal Authority			
Z.Lavisa	Traditional leader Tribal Authority	082 575 9693	Zolisalavisa@gmail.com	
Z Mbelani	Business Industry NAFCOG	063 559 6700	Linomso2008@gmail.com	
G. Sifumba	TaxIndustry	072 198 1601	goodlucksfumba@gmail.com	
M. Ntsonga	Mnquma Municipality	83 9 2813		

**B-6: COMMUNITY RESOLUTION LETTER**

7 February 2019

To whom it may concern

NRA N.002-170-213: CONSTRUCTION OF NDABAKAZI INTERMODAL INTERCHANGE ON NATIONAL ROUTE N2 SECTION 17 (KM 23.4)**PERMISSION FOR THE USE OF LAND**

V3 Consulting Engineers have been appointed by the South African National Roads Agency (SOC) Limited (SANRAL) for the construction of the Ndabakazi Intermodal Interchange, located at the N2-R409 interchange (National Route N2 Section 17 (KM 23)).

The proposed Ndabakazi Interchange development will consist of the upgrading of the existing N2 and R409 roads at the intersection, as well as the construction of a new bridge over the N2 with corresponding interchange ramps. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2/R409 bridge.

Temporary traffic diversion routes will be used during the construction phase of the Ndabakazi interchange (refer to the attached layout map). The temporary diversion routes will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndabakazi Interchange. All temporary diversion routes will be surfaced.

For the purpose of the aforementioned construction, portions of tribal land through which the temporary traffic diversion routes will pass, will be used by SANRAL for the undertaking of the above mentioned construction. In order to facilitate the process, it is kindly requested that the contents of this letter is acknowledged and an agreement is reached, allowing SANRAL to proceed with construction within the neighbouring community areas, as shown in the attached layout map.





TO WHOM IT MAY CONCERN

I, MZIKABAWO. LAZIPO, being the duly authorised representative for the NDABAKAZI and CEGCUANA LOCAL COMMUNITY, hereby confirm that the community is in favour of the aforementioned development and grants SANRAL permission to proceed with construction accordingly.

Name & Surname: MZIKABAWO. LAZIPO
 I.D number: 7011155763089
 Physical Address: NDABAKAZI
Box 16
49620
 Telephone: 0837453210
 Email: -
 Signature: M. LAZIPO
 Date: 27-02-2019



ATTENDANCE REGISTER

CONTRACT NO.: N.002-170-2013/1F
 CONSULTING ENGINEERING SERVICES FOR THE CONSTRUCTION OF NDABAKAZI INTERMODAL INTERCHANGE ON NATIONAL ROUTE 2 SECTION 17 (KM23.4)

Community Meeting: DATE: 13 February 2019

1.	Name of Firm/Association	Representative	Contact number			Signature
			Tel. No.	E-mail	Cell No.	
	Z3 Consulting Eng	Fezile. Bebelele	047-531-5120	fezila@z3eng.co.za	083 7430136	
	AMAHLUBI TIC SAC	Z. NKAZANA	063 137 2137	znkazanazule@gmail.com		
		L.S. FIDANI	0777182952			
	AMAHLUBI TIC SAC	M.M. LAZIPO	0834215609	mbanganlazipo@gmail.com		



No.	Name of Firm	Representative	Contact number			Signature
			Tel. No.	E-mail	Cell No.	
5	AMAHLUBI T/C	W.M. MAHLANGENI	Tel. No.			
			E-mail			
			Cell No.	0837373449		
6	AMAHLUBI AMAHLUBI	N. NGAMBI M. FUSA	Tel. No.	0736927068		
			E-mail	0736235018		
			Cell No.			
7	Amahlubi T/C Amahlubi T/C	N. SOTINI S.E. MTINTSILANA	Tel. No.	0634350480		
			E-mail	0736213460		
			Cell No.			
8	Amahlubi	S.E. MTINTSILANA	Tel. No.			
			E-mail			
			Cell No.	0736213460		
9	AMAHLUBI T/A SANRAL	B.W. M. P. B.A. P.L.O.	Tel. No.	0838092338		
			E-mail	073 0717473 / 0834755415		
			Cell No.			
10	AMAHLUBI T/A AMAHLUBI T/A	C.M. P. M. A. D. E.	Tel. No.			
			E-mail	0833747870		
			Cell No.			



ATTENDANCE REGISTER

CONTRACT NO.: N.002-170-2013/1F
 CONSULTING ENGINEERING SERVICES FOR THE CONSTRUCTION OF NDABAKAZI INTERMODAL INTERCHANGE
 ON NATIONAL ROUTE 2 SECTION 17 (KM23.4)

Community Meeting:

DATE: 27 February 2019

No.	Name of Firm/Association	Representative	Contact number			Signature
			Tel. No.	E-mail	Cell No.	
1	Z3 Consulting Eng	Fezile. Bebelele	Tel. No.	047-531-5120		
			E-mail	fezile@z3eng.co.za		
			Cell No.	083 7430136		
2	M.V. LUZIPO	CHIEF AMAHLUBI T/C	Tel. No.	0827453210		
			E-mail			
			Cell No.			
3	Z. MOZANA	AMAHLUBI T/C S.A.C.	Tel. No.			
			E-mail	Zuzilemozana@gmail.com		
			Cell No.			
4	M. FUSA		Tel. No.	0736334018		
			E-mail			
			Cell No.			



	Name of Firm	Representative	Contact number	Signature
5	N. SOINI	AMAHUBI T/C T/LEADER	Tel. No. E-mail Cell No. 0634350480	
6	N. NDAMBI	T/leader	Tel. No. 0736927068 E-mail Cell No.	
7	L.S. FININI	AMAHUBI	Tel. No. 0777182952 E-mail Cell No.	
8	H.S. KELA	NDABANKULU SSS	Tel. No. 082 352 6182 E-mail ndabankuluuserior@gmail.com Cell No. 087 352 6182	
9	BW MPOA		Tel. No. E-mail bwadiwembaug59@Cymml.co Cell No. 08386 32 335	
10	S.E.MTINTSILANA	Amahubi T/C	Tel. No. 0736213460 E-mail Cell No. 0729446827	
11	NGWABENI	AMAHUBI	Tel. No. E-mail Cell No.	
11	M.A. SIZANI	AMAHUBI	Tel. No. 0760759424 E-mail Cell No.	
12	S. QUTHU D. MENDU	AMAHUBI cegenwana	Tel. No. 0738568179 E-mail Cell No. 0810399327	

	Name of Firm	Representative	Contact number	Signature
13	M. DUKULA A. GOMBA	CEGENWANA MAYALLO	Tel. No. 0820343726 E-mail DAS 071 7473 Cell No. amshgombaz@gmail.com	
14			Tel. No. E-mail	

Summary of meeting minutes and concerns raised by community:

Refer to Appendix B-7 below



B-7: I&AP COMMENTS AND RESPONSES TRAIL

Initial Notification			
Date	I&AP	Initial Notification	
27 June 2019	Caryn Clarke - CES	<p>Dear Stakeholder</p> <p>NOTIFICATION OF BASIC ASSESSMENT PROCESS: PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE BETWEEN THE N2 AND THE R409 NEAR BUTTERWORTH, AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE</p> <p>Please find the Letter of Notification and Background Information Document (BID) for the aforementioned proposed SANRAL road development attached. All stakeholders will be notified of the availability of the Draft Basic Assessment Report (and how to access it) once available for 30-day public review.</p> <p>If you have any queries or comments, please do not hesitate to contact me.</p> <p>Kind regards Caryn Clarke</p>	
I&AP comments received			
Date	I&AP	I&AP Comment	CES Response
None to date. To be included in Final BAR			
Summary of meeting minutes during the signing of the Community Resolution Letter			
15 and 27 th February 2019	Ndabakazi Community Meeting with the SANRAL Public Liaison Officer (PLO) and local chiefs	<ul style="list-style-type: none"> The SANRAL PLO briefed the Local chiefs the project using 3 drawings/map which were left behind; Site walkthrough looking at all structures that might be affected; The chiefs agreed to communicate with the affected illegal informal traders to inform them and see if alternative sites can be found; The community resolution letter was discussed and the need for it to be signed. The local chiefs had no problem with this as they all voted unanimously for the development but requested that they first need to speak to all the residents. This was 	<ul style="list-style-type: none"> The local chiefs were in favour of the development and signed the community resolution letter (see Appendix B-6 above). CES and the applicant, SANRAL, are aware of the concerns raised by the community, and have included all concerns raised in the BAR. SANRAL will continue to engage with the community, through the established PLC, to ensure that the concerns are adequately addressed during the proposed development.



		<p>done and a second meeting with the PLO was held on the 27th February 2019 where the letter was signed, and community concerns were raised. The concerns were as follows:</p> <ul style="list-style-type: none"> ○ Concerns were raised concerning the quarry site with the drinking area for animals – informed them that SANRAL is already looking for an alternative. The community welcomed this, and a request was put forward that two small earth dams require remedial works and would like for them to be considered them as well. ○ The local chiefs requested that they be engaged with, in addition to the local councillors, regarding the employment of local labourers. 	
<p>Department of Water Affairs and Sanitation (DWS): Response to initial pre-application meeting and site inspection. Refer to Appendix B-8 below for DWS pre-application meeting minutes</p>			



B-8: DWS Proof of application submission and Pre-Application Meeting Minutes

From: Ewulaas_Do_Not_Reply@dws.gov.za
Sent: 05 February 2019 10:31 AM
To: c.clarke@cesnet.co.za
Subject: Application have been returned to you.
Categories: SANRAL V3 Ndabakazi

Dear Ms Caryn Clarke

The following application have been returned to you:

South African National Roads Agency SOC. Ltd. (SANRAL) Proposed upgrade of the Ndabakazi Interchange between the N2 and the R409, near Butterworth

The reason for the return is as follows :


APPLICATION FOR REGISTRATION OF WATER USE(S) WITHIN THE AMBIT OF A GENERAL AUTHORISATION IN TERMS OF SECTION 40 OF THE NATIONAL WATER ACT, 1998 (ACT 36 OF 1998)

The Department of Water and Sanitation has assessed your Pre Water Use Licence application enquiry. Please continue to apply for registration of water uses(s) authorized in terms of General Authorization.

You received this email from :

Name : Mr Moosa Bera (WUA Administrator)
 e-Mail : beram@dws.gov.za
 Tel : 043701 0227

Thank you,
 The e-WULAAS Team

 East London 25 Tecoma Street, Berea East London, 5201 Tel: +27 (43) 726 7809; Fax: +27 (43) 726 8352 Email: cesel@cesnet.co.za Website: www.cesnet.co.za	MEETING WITH THE DEPARTMENT OF WATER AND SANITATION- MEETING MINUTES	
	TITLE	SANRAL N2 SECTION 17 ROAD UPGRADE
	DATE	7 September 2018
	VENUE	CES Office
	TIME OF MEETING	10H30
	MINUTES BY	Caryn Clarke
	CIRCULATION DATE	18 September 2018

BACKGROUND	
A pre-application meeting was held on Friday, 7 September 2018 with the Department of Water and Sanitation (DWS) to discuss the potential water use licensing requirements for the construction of the proposed Ndabakazi Interchange, between the N2 and R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province.	
ATTENDEES:	
Mr Mlondolozzi Mbikwana	Department of Water and Sanitation (DWS)
Ms Caryn Clarke	CES – Environmental Consultant
MEETING MINUTES	



PROJECT DISCUSSION

Ms Clarke provided an overview of the proposed project by using Google Earth imagery to show the proposed layout and the sensitive waterbodies within the vicinity of the road upgrade. The following was discussed:

- **Culvert upgrades:**

- Ms Clarke discussed the several watercourses that may be impacted by the road upgrade, and culvert structures would be upgraded in the process. Mr Mbikwana stated that upgrades to existing culverts may be done so under SANRAL's existing general authorisation, and adhere to Section 19 of the National Water Act. SANRAL must ensure that an effective erosion management plan is in place. New culvert structures will require a (c) and (i) applications.

- **Temporary diversion roads:**

- Ms Clarke discussed the temporary roads the proposed project will require to divert road traffic during the construction phase of the project. Ms Clarke pointed out the temporary road which transverses a wetland (see no.1 in Figure 1 below). Mr Mbikwana stated that the temporary road, which will transverse the wetland, will require a water use license application and that the temporary road will need to be designed with the necessary culvert structures in place and be rehabilitated once construction is complete. He stated that new roads would require a water use license and must have method statements in place.

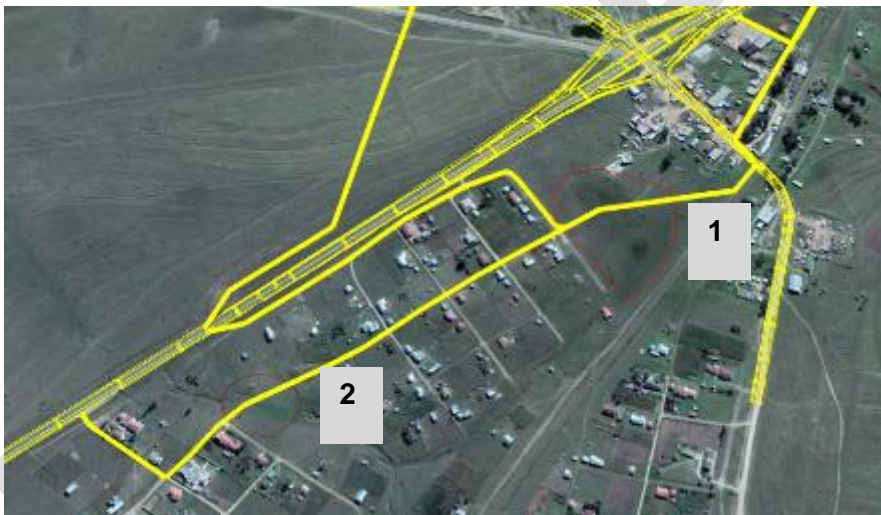


Figure 13-1: Temporary road traffic diversion routes

- Ms Clarke stated that potential alternatives to the temporary road traffic diversion roads will be assessed in the Basic Assessment Report (BAR).
 - He stressed that the temporary road routes used must be least disturbing to the community and the proposed layout must try to avoid diverting heavy traffic through the residential areas as much as possible. He therefore recommended that the temporary road should avoid the watercourse to the south of the wetland (no.2 in Figure 1 above), and rather use the route which largely runs parallel to the existing N2. He further stressed the need for on-going community consultation during the public participation process.
- **Ndabakazi dam:**
 - Ms Clarke pointed out the Ndabakazi dam which falls within the section of the R409 road upgrade route. She further explained that she believed the dam is a result from an old borrow pit which was



never rehabilitated, and explained that the project would require to backfill the dam. Mr Mbikwana acknowledged this and stated that he is aware of the dam. He said backfilling the dam will not require any water use license applications; however it must be subject to approval by the community members. Therefore, this must be thoroughly addressed during the public participation process.

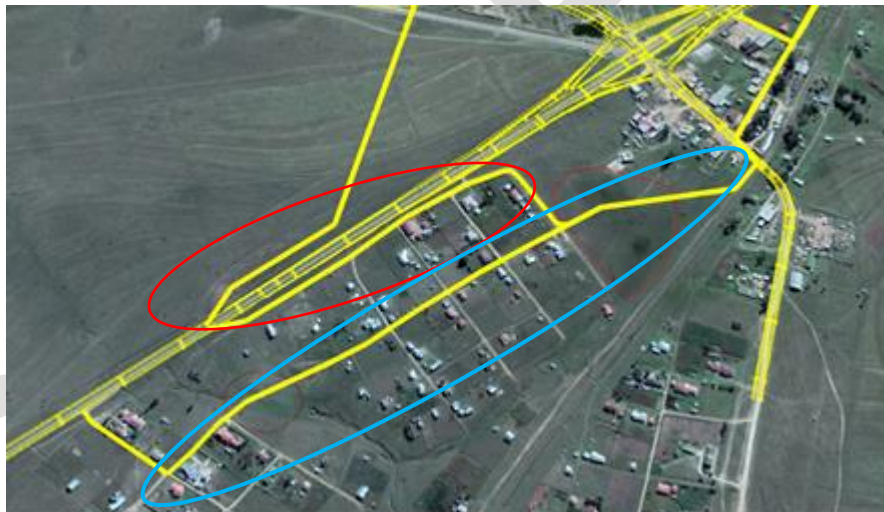
- **Borrow Pits:**

- Ms Clarke explained that the proposed project may involve re-opening existing borrow pit sites, however this is will be subject to a separate application process if deemed necessary. Mr Mbikwana acknowledged this and commented that the least impactful borrow pits should be considered first.

CLOSING

Ms Clarke concluded the meeting by thanking Mr Mbikwana for his attendance and confirmed that the meeting minutes would be circulated shortly.

After further correspondence with the road engineers, the temporary access road circled in red below, was deemed to be too unsafe for road users during construction due to its proximity to the proposed construction work. Therefore, the temporary access road circled in blue is proposed to be used for diverting traffic during construction.





APPENDIX C: EMPR

DRAFT

**PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE BETWEEN NDABAKAZI AND THE R409,
NEAR BUTTERWORTH.
AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE**

DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

DEA Reference:

<p>Prepared for:</p>  <p>V3 CONSULTING ENGINEERS</p> <p>V3 Consulting Engineers</p>	<p>On behalf of:</p>  <p>South African National Roads Agency Ltd (SANRAL)</p>
<p>Prepared by:</p>  <p>ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES</p> <p>CES EAST LONDON 25 Tecoma Street East London, 5201 043 726 7809</p> <p><i>Also in Grahamstown, Cape Town, Johannesburg, Port Elizabeth and Maputo</i></p> <p>www.cesnet.co.za</p>	

May 2019

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1 INTRODUCTION

1.1 Objectives of an EMPr

This EMPr has been compiled to provide recommendations and guidelines according to which compliance monitoring can be done during the construction and operation of the road upgrade and re-alignment. The objective of the EMPr is also to ensure that all relevant factors are considered to ensure environmentally responsible development (Figure 1). The purpose of the EMPr is to provide specifications for "good environmental practice" for application during these phases.

This EMPr informs all relevant parties, which are in this case, the Project Coordinator, the Contractor, the Environmental Control Officer (ECO) and all other staff employed by V3 Consulting Engineers and South African National Roads Agency Ltd. (SANRAL) at the site as to their duties in the fulfilment of the legal requirements for the construction and operation of the road upgrade with particular reference to the prevention and mitigation of anticipated potential environmental impacts.

All parties should note that obligations imposed by the EMPr are legally binding in terms of the environmental authorisation granted by the relevant environmental permitting authority.

The objectives of an EMPr are to:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- Ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures that could optimize beneficial impacts;
- Create management structures that address the concerns and complaints of I&APs with regards to the development;
- Establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that safety recommendations are complied with; and
- Specify time periods within which the measures contemplated in the final environmental management programme must be implemented, where appropriate.

1.2 Structure and Function of an EMPr

An EMPr is focused on sound environmental management practices, which will be undertaken to minimise adverse impacts on the environment through the lifetime of a development. In addition, an EMPr identifies what measures will be in place or will be actioned to manage any incidents and emergencies that may occur during operation of the project.

As such the EMPr provides specifications that must be adhered to in order to minimise adverse environmental impacts associated with the construction and operation of the road upgrade and bridge construction. The content of the EMPr is consistent with the requirements as set out in Appendix 4 of the EIA regulations stated below, for the construction and operation phases.

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (a) Details of –
 - (i) The EAP who prepared the environmental management programme; and
 - (ii) The expertise of the EAP to prepare an environmental management programme, including a curriculum vitae;
- (b) A detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description;
- (c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;
- (d) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
 - (i) Planning and design;
 - (ii) Pre-construction;
 - (iii) construction activities;
 - (iv) Rehabilitation of the environment after construction and where applicable post closure; and
 - (v) where relevant, operation activities;
- (e) a description and identification of impact outcomes required for the aspects contemplated in (d).
- (f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable include actions to –
 - (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
 - (ii) Comply with any prescribed environmental management standards or practices;
 - (iii) Comply with any applicable provisions of the Act regarding closure, where applicable;
 - (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;
- (g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
- (h) The frequency of monitoring the implementation of the impact management actions contemplated in (f);
- (i) An indication of the persons who will be responsible for the implementation of the impact management actions;
- (j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
- (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);
- (l) A program for reporting on compliance, taking into account the requirement as prescribed by the regulations;
- (m) An environmental awareness plan describing the manner in which –
 - (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and
 - (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and
- (n) Any specific information that may be required by the competent authority.

1.3 Legal requirements

Construction must be according to the best industry practices, as identified in the project documents. This EMPr, which forms an integral part of the contract documents, informs the Contractor as to his/her duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. The Contractor should note that obligations imposed by the approved EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter must prevail.

The Contractor must identify and comply with all South African national and provincial environmental legislation, including associated regulations and all local by-laws relevant to the project. Key legislation currently applicable to the construction and operation phases of the project must be complied with. The list of applicable legislation provided below is intended to serve as a guideline only and is not exhaustive:-

- Constitution Act (No. 108 of 1996);
- National Environment Management Act (No. 107 of 1998, as amended, NEMA);
- National Environmental Management: Biodiversity Act (No. 10 of 2004; NEMBA) ;
- Environmental Management: Protected Areas Act (Act No. 57 of 2003; NEMPAA);
- National Water Act (No. 36 of 1998; NWA);
- National Environmental Management: Waste Management Act (No. 59 of 2008; NEMWA);
- National Heritage Resources Act (No. 25 of 1999; NHRA);
- Informal Land Rights Act (No. 109 of 1996; ILRA) ; and
- National Forestry Act, 1998 (No. 84 of 1998; NFA)

Municipal policy

- Amathole District Municipality Integrated Development Plan (ADM IDP, 2018/2019);
- Mquma Local Municipality IDP (MLM IDP, 2018/2019); and
- Mquma Local Municipality Spatial Development Framework (SDF 2014/2015).

2 DETAILS OF THE ENVIRONMENTAL ASSESSMENT TEAM

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (a) Details of –
 - (i) The EAP who prepared the environmental management programme; and
 - (ii) The expertise of the EAP to prepare an environmental management programme, including a curriculum vitae;

2.1 Environmental Consulting Company:

CES

25 Tecoma Street, Berea, East London, 5241

PO Box 8145, Nahoon, East London, 5210

Tel: 043 726 7809

Fax: 043 726 8352

e-mail: cesel@cesnet.co.za

www.cesnet.co.za

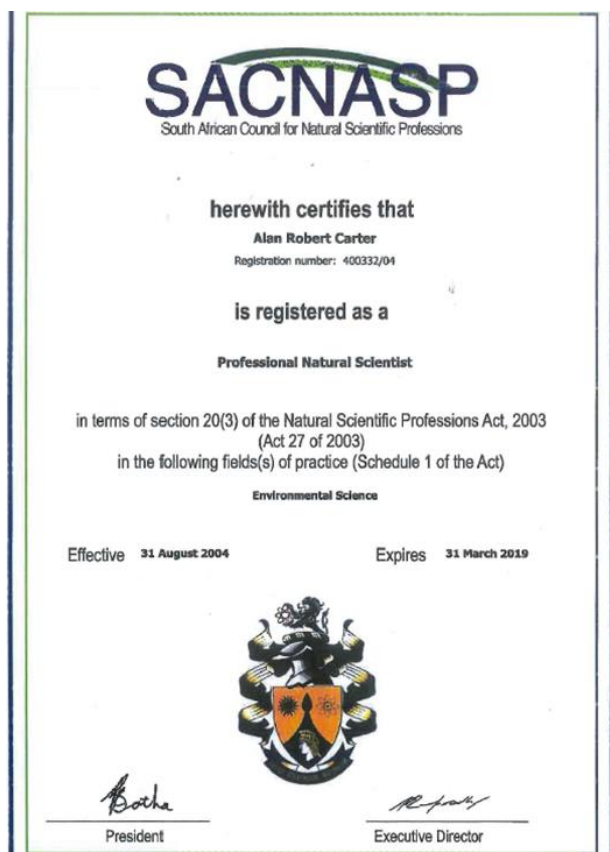
CES was established in 1990 as a specialist environmental consulting company and has considerable experience in terrestrial, marine and freshwater ecology, the Social Impact Assessment (SIA) process, State of Environment Reporting (SOER), Integrated Waste Management Plans (IWMP), EMPs, Spatial Development Frameworks (SDF), public participation, as well as the management and co-ordination of all aspects of the EIA and Strategic Environmental Assessment (SEA) processes.

2.2 Project Team:

- Dr Alan Carter
- Mr Roy de Kock
- Ms Caryn Clarke

Dr Alan Carter

Alan is the executive of the CES East London Office. He holds a PhD in Marine Biology and is a certified Public Accountant, with extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He has 25 years' experience in environmental management and has specialist skills in sanitation, coastal environments and industrial waste. Dr Carter is registered as a Professional Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP). He is also registered as an EAP by the Environmental Assessment Practitioners of South Africa (EAPSA).



Mr Roy de Kock

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. He is registered as a Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP).

Ms Caryn Clarke

Caryn holds a M.Sc. degree in Environmental Science from Rhodes University. Her Master's dissertation investigated climate change adaptation strategies of vulnerable rural households in Willowvale and Lesseyton, Eastern Cape. Her professional interests include climate change policy, renewable energy and various environmental impact assessments. Caryn has worked on numerous basic assessments projects including various linear developments such as roads and pipelines. She has extensive public participation and stakeholder engagement experience. Caryn is a registered Candidate Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP; No: 500022/14).

3 PROPOSED ACTIVITY

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (b) A detailed description of the aspects of the activity that are covered by the draft environmental management programme as identified by the project description;
- (c) A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;

3.1 Description of proposed activity

The South African National Roads Agency SOC Ltd. (SANRAL) is proposing the construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province (see **Error! Reference source not found.** below).

The proposed Ndabakazi Interchange development will consist of the upgrading of the existing N2 and R409 roads at the intersection as well as the construction of a new bridge over the N2 with corresponding interchange ramps. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2/R409 bridge.

In particular, the project will consist of the following:

Existing roads:

- Increasing the road reserve width from 30m to a minimum of 50m wide;
- General widening of the existing road cross section for passing lanes and 3.0m surfaced shoulders.
- The main carriageway is 10.4m and needs to be increased to 20.8m; and
- Widening and/or new construction of existing drainage structures.

New Interchange (called the Ndabakazi Interchange):

- Construction of a new bridge on the R409 over the N2;
- Substantial vertical geometric improvements will be required for the new N2/R409 bridge;
- Rehabilitation of pavement structure on existing alignment and construction of new pavement on new alignment, all for which suitable material will need to be sourced;
- Cut faces requiring stabilisation.

Temporary deviations:

- Temporary traffic diversion routes will be used during the construction phase of the Ndabakazi Interchange;
- The temporary diversion routes will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndabakazi Interchange; and
- All temporary diversion routes are to be surfaced.

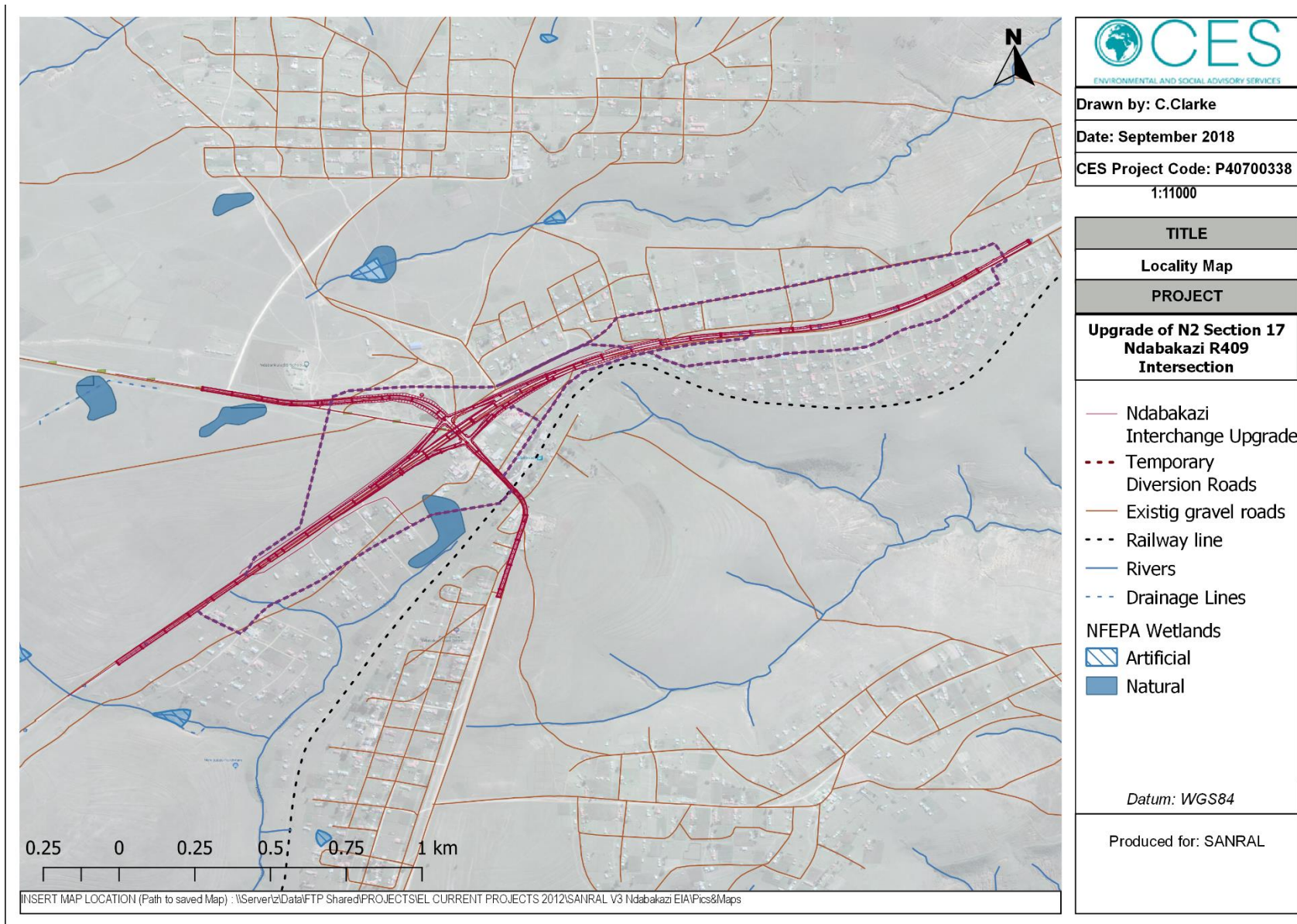


Figure 3.1: Proposed construction of the N2 Ndabakazi – R409 Interchange.

4 SCOPE OF THE EMPr

In order to ensure a holistic approach to the management of environmental impacts during the construction and operation of the proposed road upgrade, this EMPr sets out the methods by which proper environmental controls are to be implemented by the Contractor and all other parties involved.

The EMPr is a dynamic document subject to influences and changes as are wrought by variations to the provisions of the project specification.

4.1 Layout of the EMPr

The EMPr is divided into three phases of development. Each phase has specific issues unique to that period of the construction and operation. The impacts are identified and given a brief description. The phases of the development are identified as below:

4.1.1 Planning and Design Phase

This section of the EMPr provides management principles for the planning and design phase of the project. Environmental actions, procedures and responsibilities as required from SANRAL during the planning and design phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfaction of the Project Coordinator and ECO.

4.1.2 Construction Phase

This section of the EMPr provides management principles for the construction phase of the project. Environmental actions, procedures and responsibilities as required during the construction phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfaction of the Project Coordinator and ECO.

4.1.3 Operational and Maintenance Phase

This section of the EMPr provides management principles for the operation and maintenance phase of the project. Environmental actions, procedures and responsibilities as required from SANRAL during the operation and maintenance phase are specified.

4.1.4 Decommissioning Phase

This section of the EMPr provides management principles for the decommissioning phase of the project. Environmental actions, procedures and responsibilities as required during the decommissioning phase are specified. These specifications will form part of the contract documentation and therefore the Contractor will be required to comply with these specifications to the satisfaction of the Project Coordinator and ECO.

5 MITIGATION AND/OR MANAGEMENT MEASURES

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (d) Information on any proposed management or mitigation measures that will be taken to address the environmental impacts that have been identified in a report contemplated by these Regulations, including environmental impacts or objectives in respect of –
 - (i) Planning and design;
 - (ii) Pre-construction;
 - (iii) construction activities;
 - (iv) Rehabilitation of the environment after construction and where applicable post closure; and
 - (v) where relevant, operation activities;
- (e) a description and identification of impact outcomes required for the aspects contemplated in (d).
- (f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable include actions to –
 - (i) Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;
 - (ii) Comply with any prescribed environmental management standards or practices;
 - (iii) Comply with any applicable provisions of the Act regarding closure, where applicable;
 - (iv) Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

Table 5.1: Impacts and mitigation measures associated with the proposed development.

1. PLANNING & DESIGN PHASE			
	Issue	Impact Description	Mitigation
1.1	Relevant National Legislation and Policy	During the planning and design phase, non-compliance with the laws and policies of South Africa pertaining to the environment could lead to damage to the aquatic and terrestrial environment, unnecessary delays in construction activities, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.	<ul style="list-style-type: none"> • The development must adhere to the relevant legislation and/or policy, e.g. ECBCP, Municipal By-laws, SDFs, etc. • All legal matters pertaining to permitting must be completed prior to any construction activity. • In particular, all necessary Water Use Licences must be in order for any construction activities within 100 m of a watercourse and within 500 m of a wetland. • In particular, the relevant permits must be obtained from the competent authority in order to remove any protected plant species.
1.2	Scheduling of construction	During the planning and design phase, inappropriate construction scheduling that does not take into account the seasonal requirements of the aquatic	<ul style="list-style-type: none"> • Wherever possible, construction activities should be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc.

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1. PLANNING & DESIGN PHASE			
	Issue	Impact Description	Mitigation
		environment, e.g. allowing for unimpeded flood events, could lead to short-term (and potentially long-term) impacts on the aquatic environment such as excessive sediment mobilization, etc.	<ul style="list-style-type: none"> When not possible, sediment traps must be used to ensure the watercourses are not negatively impacted by construction activity.
1.3	Changes to fluvial geomorphology and hydrology	During the planning and design phase, the inappropriate design of stormwater management infrastructure and culverts may cause the degradation of watercourses, wetlands and associated natural habitats and sensitive aquatic systems.	<ul style="list-style-type: none"> The road engineer must ensure that appropriate stormwater structures are designed in line with both SANRAL and DWS requirements. Any upgraded culverts must be designed in such a manner so as not to impede or divert base flows or increase upstream flood inundation. If any planned construction takes place inside or within 100m of any watercourse, authorisation must be obtained from DWS.
1.4	Stormwater Management	During the planning and design phase, the inappropriate design of storm water infrastructure will lead to stream sedimentation and erosion of the surrounding area.	<ul style="list-style-type: none"> Appropriate stormwater structures must be designed to minimise erosion and sedimentation of watercourses. All infrastructure situated on slopes must incorporate stormwater diversion. Flood attenuation and a Storm Water Management Plan must be drawn up by a qualified engineer and approved by DEA, the ECO and DWS. Stormwater design must be in line with SANRAL and DWS requirements.
1.5	Erosion Management	During the planning and design phase, inadequate planning for the management of erosion could lead to erosion in the study area and surrounding areas.	<ul style="list-style-type: none"> A Rehabilitation, Alien Vegetation and Erosion Management Plan must be compiled during the planning and design phase of the proposed development
1.6	Waste Management	During the planning and design phase, inadequate planning for the management of construction rubble and litter, and identification of licensed waste facilities could lead to pollution in the study area and surrounding areas.	<ul style="list-style-type: none"> A Waste Management Plan must be compiled during the planning and design phase of the proposed development
1.7	Erosion Rehabilitation	During the planning and design phase, inadequate planning for rehabilitation could lead to degradation of the study area and surrounding areas.	<ul style="list-style-type: none"> An Erosion Rehabilitation Plan must be compiled during the planning and design phase of the proposed development
1.8	Loss of natural vegetation	During the planning and design phase, the inappropriate design of the road upgrade will lead to the unnecessary loss of natural vegetation.	<ul style="list-style-type: none"> The design and layout of the road must have as minimal impact on the natural vegetation as possible.
1.9	Loss of Species of Conservation Concern (SCC)	During the planning and design phase, the inappropriate design and alignment of the Ndabakazi Interchange will lead to the loss of identified and unidentified plant and animal SCC.	<ul style="list-style-type: none"> A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area. All plant SCC must be relocated to outside the construction footprint prior to commencement of activities. The relevant permits must be obtained from the competent authority in

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1. PLANNING & DESIGN PHASE			
	Issue	Impact Description	Mitigation
			order to remove any SCC.
1.10	Control of alien plant species	During the planning and design phase, inadequate planning for the removal and management of alien vegetation could result in the invasion of alien vegetation in both terrestrial and riparian areas during the construction and operation phase.	<ul style="list-style-type: none"> • During the planning and design phase a Rehabilitation, Alien Vegetation Management Plan must be complied to reduce the establishment and spread of undesirable alien plant species.
1.11	Traffic	During the planning and design phase, inadequate planning for the management of traffic through the project area may result in a magnitude of impacts, such as increased dust generation, noise pollution, and increased public safety risks.	<ul style="list-style-type: none"> • A Traffic Management Plan must be compiled prior to the commencement of the construction phase detailing appropriate mitigation measures
1.12	Cultivated Land	During the planning and design phase, inappropriate design of the road upgrade will lead to the unnecessary loss of cultivated land.	<ul style="list-style-type: none"> • The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is no unnecessary loss of cultivated land outside the approved road upgrade footprint.
1.13	Potential damage to Colonial Period structures	During the planning and design phase, inadequate consideration of the cultural, heritage and archaeological environment will lead to destruction of cultural, heritage and archaeological features.	<ul style="list-style-type: none"> • The ECO and Contractor must be made aware of the location of all burial and heritage features on site. Such sites must be avoided. • Should the identified heritage buildings be unavoidable, a Phase 2 Heritage Study and the necessary heritage permits must be applied for and obtained from the relevant heritage authority.
1.14	Potential damage to burial sites	During the planning and design phase, inadequate consideration of the cultural, heritage and archaeological environment will lead to destruction of cultural, heritage and archaeological features.	<ul style="list-style-type: none"> • The ECO and Contractor must be made aware of the location of all burial and heritage features on site. Such sites must be avoided. • Should the identified burial sites be unavoidable, grave relocation will be subject to authorisations and permitting by the relevant heritage authority.
1.15	Palaeontological Environment	During the planning and design phase, inadequate provisions and planning made towards the paleontological monitoring programme, may lead to destruction of fossils.	<ul style="list-style-type: none"> • Provisions must be made for a Fossil Chance Find Protocol to be implemented during the construction phase should fossils be encountered.

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2. CONSTRUCTION PHASE			
	Issue	Impact Description	Mitigation
2.1	Relevant National Legislation and Policy	During the construction phase, the failure of the contractor to implement mitigation measures specified in the EMPr and EA could result in fines, overall project failure or delays in construction and undue disturbance to the natural environment.	<ul style="list-style-type: none"> • The developer must employ an independent Environmental Control Officer (ECO) for the construction phase to ensure that construction is implemented according to specifications in the EA and EMPr. • Copies of all applicable licenses, permits and managements plans (EA, EMPr, Water Use Licenses, Permits, etc.) must be available on-site at all times. • Environmental Awareness Training must be included in site meetings/talks with all workers.
2.2	Scheduling of construction	During the construction phase, inappropriate construction scheduling that does not take into account the seasonal requirements of the aquatic environment, e.g. allowing for unimpeded flood events, could lead to short-term (and potentially long-term) impacts on the aquatic environment such as excessive sediment mobilization, etc.	<ul style="list-style-type: none"> • Wherever possible, construction activities should be undertaken during the driest part of the year to minimize downstream sedimentation due to excavation, etc.
2.3	Changes to fluvial geomorphology and hydrology	During the construction phase, activities within licensed watercourses/drainage channels may impede the flow of watercourses, affecting the local hydrology, should it not be undertaken in the correct manner.	<ul style="list-style-type: none"> • The construction within licensed water crossings should be as minimal as practically possible. • Construction must adhere to the conditions of the Water Use License • All work within the watercourses and drainage channels should be completed during the dry season, when flows are at their lowest, if possible. • Temporary access roads through wetland/watercourses must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed.
		During the construction phase, inappropriate activities/ encroachment into wetland (natural and artificial) areas could affect the water quality and integrity of the wetlands.	<ul style="list-style-type: none"> • During the construction phase no stockpiles should be placed within 50 m of a watercourse or wetland system. • No ablation facilities must be located within 50 m of a watercourse or wetland system. • Construction must adhere to the conditions of the Water Use License.
2.4	Material Stockpiling	During the construction phase, stockpiling of construction materials close to watercourses could result in erosion and mobilisation of the materials into the nearby watercourses/wetlands, resulting in sedimentation and a decrease in water quality and aquatic habitat.	<ul style="list-style-type: none"> • No construction material must be stored within 50 m of a watercourse or wetland system.

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2.5	Stormwater Management	During the construction phase, the inappropriate routing of stormwater will lead to stream sedimentation, adversely affecting the aquatic environment.	<ul style="list-style-type: none"> • The Storm Water & Contingency Management Plan must be implemented and monitored by the ECO. • An Erosion and Sediment Management Plan must be implemented to minimize the ingress of sediment-laden stormwater into the rivers/ wetlands and monitored by an ECO.
2.6	Erosion Management	During the construction phase, inadequate provision for the management of erosion could lead to erosion of the study area and surrounding areas.	<ul style="list-style-type: none"> • The Erosion Management Plan must be implemented during construction.
2.7	Waste Management	Litter on site may attract vermin, detract from the visual appeal of the area, and pollute the surrounding areas. Construction rubble left onsite could pollute the area and encourage the growth of opportunistic alien vegetation.	<ul style="list-style-type: none"> • Construction rubble must be disposed of in predetermined, demarcated spoil dumps. • The ECO must monitor the sanitation of the work sites as well as the Contractor campsite for litter and waste. • All waste must be removed from the site and transported to the closest licenced landfill site.
2.8	Loss of natural vegetation	During the construction phase, the clearing of natural vegetation for construction will lead to the loss of natural vegetation.	<ul style="list-style-type: none"> • The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is no unnecessary loss of natural vegetation outside the approved road upgrade footprint. • Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken.
2.9	Loss of Species of Conservation Concern (SCC)	During the construction phase, the clearing of natural vegetation may lead to the destruction of habitats and the loss of identified and unidentified plant SCC.	<ul style="list-style-type: none"> • All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them. • Identified SCC's must be relocated immediately outside of the construction and operational footprint. • Search and rescue must be undertaken by a professional and qualified botanist. • The contractor's staff must not poach or trap wild animals. • The contractor's staff must not harvest any natural vegetation.
2.10	Control of alien plant species	During the construction phase, poor continuous rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow for alien vegetation species to expand.	<ul style="list-style-type: none"> • All temporarily impacted areas must be rehabilitated back to their original condition. • Only topsoil from the immediate area must be used for rehabilitation. • All temporarily impacted areas must be restored as per the Erosion Rehabilitation and Alien Vegetation Management Plan.
2.11	Job creation	During the construction phase, the proposed development will create temporary employment opportunities.	<ul style="list-style-type: none"> • Where possible, individuals residing in proximity to the proposed road route upgrade should be contracted for unskilled and semi-skilled employment.

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2.12	Air pollution	During the construction phase, dust (air) pollution caused by grading and levelling exposed land can cause a nuisance to nearby traffic and neighbouring residential areas.	<ul style="list-style-type: none"> • Cleared surfaces must be dampened whenever possible, especially during dry and windy conditions, to avoid excessive dust generation. • Any soil excavated, and not utilised for rehabilitation, must be removed from site or covered and no large mounds of soil may be left behind after construction.
2.13	Noise pollution	During the construction phase, noise pollution could potentially be a nuisance to neighbouring residential areas.	<ul style="list-style-type: none"> • Construction activity close to residential settlements, which includes the movement of construction vehicles, should be restricted to normal working hours (7:00am – 17:00pm).
2.14	Visual	During the construction phase, temporary construction related structures and activities may impact on the aesthetic appearance of the project area.	<ul style="list-style-type: none"> • The site camp must be decommissioned and the area rehabilitated once construction has been completed. • All waste, materials and equipment must be removed from site. • The project area is to be kept tidy and free of litter, where possible.
2.15	Health and Safety	During the construction phase, inadequate attention to fire safety awareness and fire safety equipment could result in runaway fires, an unsafe working environment and the loss of property.	<ul style="list-style-type: none"> • The contractor must ensure that operational firefighting equipment is present on site at all times as per Occupational Health and Safety Act. • All construction foremen must be trained in fire hazard control and firefighting techniques. • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • No open fires will be allowed on site unless in a demarcated area identified by the ECO. No smoking near flammable substances. • All cooking shall be done in demarcated areas considered safe in terms of runaway or uncontrolled fires. • The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.
		During the construction phase, the inappropriate use of equipment and machinery on site may result in worker injuries or loss of life.	<ul style="list-style-type: none"> • The contractor must ensure that workers adhere to all safety regulations as per Occupational Health and Safety Act. • Appropriate PPE must be worn by workers at all time. • Regular training/talks must be given to all workers on site regarding safe working procedures. • The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.
2.16	Management of hazardous substances	During the construction phase, the location of the construction site and associated activities may present safety risks to the local community should access control and appropriate signage/demarcation not be in place.	<ul style="list-style-type: none"> • Appropriate warning signs must be in place to notify the public regarding construction activities. • The construction site and camp must have access control and be demarcated, where possible. • Designated pedestrian walkways must be made available.

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		<p>During the construction phase, increased flow of construction and vehicular traffic through neighbouring community areas will present a safety risk to the local community</p>	<ul style="list-style-type: none"> • Appropriate warning signs must be in place to notify the public regarding construction activities. • Appropriate measures must be put in place to reduce the speed of construction and road traffic through community areas.
		<p>During the construction phase, improper management (usage and storage) of hazardous substances such as cement, tar bitumen, fuel and oil may result in spillages occurring leading to site contamination.</p>	<ul style="list-style-type: none"> • Hazardous Chemical Substances Regulations promulgated in terms of the Occupational Health and Safety Act 85 of 1993 and the SABS Code of Practise must be adhered to. This applies to solvents and other chemicals possibly used during the construction process. • The individual(s) that will be handling hazardous materials must be trained to do so. • All hazardous chemicals must be stored properly in a secure, bunded and contained area. • Concrete must not be mixed directly on the ground, or during rainfall events when the potential for transport to the stormwater system is the greatest. • Concrete must only be mixed in the area demarcated for this purpose and on an impermeable surface. • Oil trays must be placed under construction machinery to avoid soil contamination. • Should a spill occur, the individual responsible for or the individual who discovers the petrochemical spill must report the incident to the Project Coordinator, ECO and/or Contractor as soon as reasonably possible. • The immediate response must be to contain the spill. • The ECO must determine the precise method of treatment of polluted soil. This could involve the application of oil absorbent materials or oil-digestive
2.17	Sanitation and Water	<p>During the construction phase, failure to provide adequate onsite sanitation and clean drinking water may result in runoff transferring contaminants into the surrounding environment.</p>	<ul style="list-style-type: none"> • Adequate sanitary and ablutions facilities must be provided for construction workers. • The facilities must be serviced regularly to reduce the risk of surface or groundwater pollution. • Contaminated wastewater must be managed by the Contractor to ensure the existing water resources on the site are not contaminated. • All wastewater from general activities in the camp must be collected and removed from the site for appropriate disposal at a licensed facility.
2.18	Traffic	<p>During the construction phase, construction vehicles will impact the traffic flow.</p>	<ul style="list-style-type: none"> • A Traffic Management Plan, prepared by SANRAL or the appointed engineers, must be implemented during construction.
2.19	Cultivated Land	<p>During the construction phase, the vegetation clearing and earthworks may potentially impact on the surrounding cultivated land.</p>	<ul style="list-style-type: none"> • No construction related activities should take place outside of the development footprint.

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2.20	Potential damage to Colonial Period structures	During the construction phase, the sensitive heritage sites identified could be damaged or destroyed by construction activities.	<ul style="list-style-type: none"> • Frequent monitoring of the identified heritage features by the ECO and Contractor must take place. • Such sites must be avoided and a 50 m conservation buffer applied. • Should the identified heritage buildings be unavoidable, a Phase 2 Heritage Study and the necessary heritage permits must be applied for and obtained from the relevant heritage authority.
2.21	Potential damage to burial sites	During the construction phase, the sensitive burial sites identified could be damaged or destroyed by construction activities.	<ul style="list-style-type: none"> • Frequent monitoring of the identified burial sites by the ECO and Contractor must take place. • Such sites must be avoided and a 100 m conservation buffer applied. • Should the identified burial sites be unavoidable, grave relocation will be subject to authorisations and permitting by the relevant heritage authority.
2.22	Palaeontological Environment	During the construction phase, inadequate monitoring may lead to destruction of fossils.	<ul style="list-style-type: none"> • A Fossil Chance Find Protocol (as per the Paleontological Report) must be implemented if fossils are found once excavations and construction have commenced. • The fossils should be rescued and a palaeontologist called to assess and collect a representative sample. • Before the fossils are removed from the site, a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.

3. OPERATION PHASE			
	Issue	Impact Description	Mitigation
3.1	Changes to fluvial geomorphology and hydrology	During the operational phase, inadequate management and maintenance of stormwater infrastructure and culverts may cause the degradation of watercourses, wetlands and associated natural habitats and sensitive aquatic systems.	<ul style="list-style-type: none"> • The Storm Water & Contingency Management Plan must be implemented and infrastructure monitored and maintained by SANRAL.
3.2	Stormwater Management	During the operation phase, inappropriate routing of stormwater will lead to stream sedimentation.	<ul style="list-style-type: none"> • Stormwater infrastructure should be monitored post construction to ensure rivers and wetlands do not have changes in sediment levels caused by the ingress of sediment-laden stormwater.
3.3	Erosion Rehabilitation	During the operational phase inadequate provision for the management of erosion could lead to erosion of the study area and surrounding areas.	<ul style="list-style-type: none"> • An Erosion Management Plan must be included as part of SANRAL's on-going maintenance plan.

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3.4	Management of hazardous substances	During the operational phase, normal vehicle traffic may lead to the spillage of toxic substances (such as heavy metals, hydrocarbons, surfactants and oils) which may negatively impact the surrounding environment and biodiversity.	<ul style="list-style-type: none"> • SANRAL must ensure that emergency response procedures are in place for accidental spills as part of their on-ongoing maintenance plan.
3.5	Traffic	The proposed development will contribute to improve road safety.	<ul style="list-style-type: none"> • No mitigation

4. DECOMMISSIONING PHASE			
	Issue	Impact Description	Mitigation
4.1	Legal and Policy Compliance	During the decommissioning phase, the failure of the contractor to implement mitigation measures specified in the EMPr and EA could result in fines, overall project failure or delays in construction and undue disturbance to the natural environment.	<ul style="list-style-type: none"> • The Environmental Control Officer (ECO) must monitor for the implementation of conditions and mitigation measures specified in the EMPr and EA. • Copies of all applicable licenses, permits and managements plans (EA, EMPr, Water Use Licenses, Permits, etc.) must be available on-site at all times.
4.2	Stormwater Management	During the decommissioning phase, inappropriate routing of stormwater will lead to stream sedimentation.	<ul style="list-style-type: none"> • Stormwater infrastructure should be monitored during decommissioning to ensure rivers and wetlands do not have changes in sediment levels caused by the ingress of sediment-laden stormwater.
4.3	Erosion Management	During the decommissioning phase, inadequate provision for the management of erosion could lead to erosion of the study area and surrounding areas.	<ul style="list-style-type: none"> • The Erosion Management Plan must be implemented during decommissioning.
4.4	Waste Management	During the decommissioning phase, litter on site may attract vermin, detract from the visual appeal of the area, and pollute the surrounding areas. Construction rubble left onsite could pollute the area and encourage the growth of opportunistic alien vegetation.	<ul style="list-style-type: none"> • The Waste Management Plan must be implemented during decommissioning. • The ECO must ensure that all temporary construction related structures, materials and waste are removed from site.
4.5	Erosion Rehabilitation plan	During the decommissioning phase inadequate provision for the management of erosion could lead to erosion of the study area and surrounding areas.	<ul style="list-style-type: none"> • The Erosion Management Plan must be implemented during decommissioning and included as part of SANRAL's on-going maintenance plan.
4.6	Loss of natural vegetation	During the decommissioning phase, activities relating to site camp closure and rehabilitation of temporary access roads may lead to the loss of natural vegetation.	<ul style="list-style-type: none"> • No decommissioning related activities should take place outside of the development footprint. • Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken.

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4.7	Loss of Species of Conservation Concern (SCC)	During the decommissioning phase, the clearing of natural vegetation may lead to the destruction of habitats and the loss of identified and unidentified plant SCC.	<ul style="list-style-type: none"> • Identified SCC's must be avoided or relocated immediately outside of the construction and operational footprint (once the relevant permits have been obtained). • The contractor's staff must not poach or trap wild animals. • The contractor's staff must not harvest any natural vegetation.
4.8	Control of alien plant species	During the decommissioning phase, poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow for alien vegetation species to expand.	<ul style="list-style-type: none"> • All temporarily impacted areas must be rehabilitated back to their original condition. • Only topsoil from the immediate area must be used for rehabilitation. • All temporarily impacted areas must be restored as per the Rehabilitation Management Plan.
4.9	Job creation	During the decommissioning phase, the proposed development will create temporary employment opportunities.	<ul style="list-style-type: none"> • Where possible, individuals residing in proximity to the proposed road route upgrade should be contracted for unskilled and semi-skilled employment.
4.10	Air pollution	During the decommissioning phase, dust (air) pollution caused by grading and levelling exposed land can cause a nuisance to nearby traffic and neighbouring residential areas.	<ul style="list-style-type: none"> • Cleared surfaces must be dampened whenever possible, especially during dry and windy conditions, to avoid excessive dust generation. • Any soil excavated, and not utilised for rehabilitation, must be removed from site or covered and no large mounds of soil may be left behind after construction.
4.11	Noise Pollution	During the decommissioning phase, noise pollution could potentially be a nuisance to neighbouring residential areas.	<ul style="list-style-type: none"> • Construction activity close to residential settlements, which includes the movement of construction vehicles, should be restricted to normal working hours (7:00am – 17:00pm).
4.12	Visual	During the decommissioning phase, temporary construction related structures and activities may impact on the aesthetic appearance of the project area.	<ul style="list-style-type: none"> • The site camp must be decommissioned and the area rehabilitated once construction has been completed. • All waste, materials and equipment must be removed from site. • The project area is to be kept tidy and free of litter, where possible.
4.13	Health & Safety	During the decommissioning phase, inadequate attention to fire safety awareness and fire safety equipment could result in runaway fires, an unsafe working environment and the loss of property.	<ul style="list-style-type: none"> • The contractor must ensure that operational firefighting equipment is present on site at all times as per Occupational Health and Safety Act. • All construction foremen must be trained in fire hazard control and firefighting techniques. • All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. • No open fires will be allowed on site unless in a demarcated area identified by the ECO. No smoking near flammable substances. • All cooking shall be done in demarcated areas considered safe in terms of runaway or uncontrolled fires. • The level of firefighting equipment must be assessed and evaluated through a typical risk assessment process.

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4.14	Management of hazardous substances	During the decommissioning phase, normal vehicle traffic may lead to the spillage of toxic substances (such as heavy metals, hydrocarbons, surfactants and oils) which may negatively impact the surrounding environment and biodiversity.	<ul style="list-style-type: none"> • SANRAL must ensure that emergency response procedures are in place for accidental spills as part of their on-ongoing maintenance plan.
4.15	Traffic	During the decommissioning phase, construction vehicles will impact the traffic flow.	<ul style="list-style-type: none"> • A Traffic Management Plan, prepared by SANRAL or the appointed engineers, must be implemented during decommissioning.
4.16	Cultivated Land	During the decommissioning phase, the vegetation clearing and earthworks may potentially impact on the surrounding cultivated land.	<ul style="list-style-type: none"> • No decommissioning related activities should take place outside of the development footprint.
4.17	Potential damage to Colonial Period structures	During the decommissioning phase, the sensitive heritage sites identified could be damaged or destroyed by construction activities.	<ul style="list-style-type: none"> • Frequent monitoring of the identified heritage features by the ECO and Contractor must take place. • Such sites must be avoided and a 50 m conservation buffer applied.
4.18	Potential damage to burial sites	During the decommissioning phase, the sensitive burial sites identified could be damaged or destroyed by construction activities.	<ul style="list-style-type: none"> • Frequent monitoring of the identified burial sites by the ECO and Contractor must take place. • Such sites must be avoided and a 100 m conservation buffer applied.

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6 ENVIRONMENTAL MONITORING

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (g) The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);
- (h) The frequency of monitoring the implementation of the impact management actions contemplated in (f);

A monitoring programme must be implemented for the duration of the construction and operation of the road upgrade. This programme should include:

- Establishing a baseline of pre-construction site conditions validated with photographic evidence.
- Monthly audits will be conducted by an independent ECO for the construction phase to ensure compliance with the conditions stipulated in this EMPr and, where necessary, make recommendations for corrective action. These audits can be conducted randomly and do not require prior arrangement with the Project Coordinator.
- Compilation of an audit report with a rating of compliance with the EMPr. The ECO must keep a photographic record of the demarcated site and construction area. The Contractor must be held liable for all unnecessary damage to the environment. A register must be kept of all complaints from the community. All complaints / claims must be handled immediately to ensure timeous rectification / payment by the responsible party.

7 ROLES AND RESPONSIBILITIES

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (i) An indication of the persons who will be responsible for the implementation of the impact management actions;

7.1 Project Coordinator

The Project Coordinator is responsible for overall management of the project and the implementation of the EMPr. The following tasks fall within his / her responsibilities:

- Be familiar with the recommendations and mitigation measures of this EMPr, and implement these measures;
- Monitor site activities on a daily basis for compliance;
- Conduct internal audits of the construction site against the EMPr;
- Confine the construction site to the demarcated areas; and
- Rectify transgressions through the implementation of corrective action.

7.2 Contractor

The Contractor is responsible for the overall execution of the activities envisioned in the construction phase, including the implementation and compliance with recommendations and conditions of the EMPr. The Contractor must therefore ensure compliance with the EMPr at all times during construction activities and maintain an environmental register which keeps a record of all environmental incidents that occur on the site during construction and rehabilitation of the Ndabakazi Interchange. These incidents may include:

- Public involvement / complaints;
- Health and safety incidents;
- Incidents involving Hazardous materials stored on site; and
- Non-compliance incidents.

The Contractor is also responsible for the implementation of corrective actions issued by the ECO and Project Coordinator within a reasonable or agreed upon period of time.

7.3 Environmental Control Officer

For the purposes of implementing the conditions contained herein, SANRAL must appoint an ECO for the contract. The ECO must be the responsible person for ensuring that the provisions of the EMPr and that any necessary environmental authorisations are complied with during the construction period. The ECO's duties in this regard will include, *but are not limited to*, the following:

- Conduct regular site visits to be able to report on and respond to any environmental issues;
- Report compliance and non-compliance issues to the competent authority;
- Advise the Contractor on environmental issues within the defined work areas;
- Review access and incident records that may pertain to the environment and reconcile the entries with the observations made during site inspection, monitoring and auditing;
- Recommend corrective action when required for aspects of non-compliance within the EMPr;
- Take immediate action on site where clearly defined and agreed upon "no-go" areas are violated or in danger of being violated, inform a SANRAL representative of the occurrence immediately and take action; and

- Be contactable by the public regarding matters of environmental concern as they relate to the operation of the works.

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8 COMPLIANCE WITH THE EMPr

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (j) The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;
- (k) The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);

A copy of the EMPr must be kept on site at all times during the construction period. The EMPr will be binding on all contractors operating on the site and must be included within the Contractual Clauses.

It should be noted that in terms of Section 28 of the National Environmental Management Act (No. 107 of 1998): those responsible for environmental damage must pay the repair costs both to the environment, human health and the preventative measures to reduce or prevent further pollution and/or environmental damage (The 'polluter pays' principle).

8.1 Non-compliance

The contractors must act immediately when notice of non-compliance is received and take corrective action. Complaints received regarding activities on the construction site pertaining to the environment must be recorded in a dedicated register and the response(s) noted with the date and action taken. The ECO should be made aware of any complaints.

Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause must be reported to the competent authority for them to deal with the transgression, as it deems fit.

The Contractor is deemed not to have complied with the EMPr if, *inter alia*:

- There is evidence of contravention of the EMPr specifications within the boundaries of the construction site and site extensions;
- There is contravention of the EMPr specifications which relate to activities outside the boundaries of the construction site;
- Environmental damage ensues due to negligence;
- Construction activities take place outside the defined boundaries of the site; and/or
- The Contractor fails to comply with corrective or other instructions issued within a specific time period.

It is recommended that the Contractors institute penalties for the following less serious violations and any others determined during the course of work, as detailed below:

- Littering on site.
- Lighting of illegal fires on site.
- Persistent or unrepaired fuel and oil leaks.
- Any persons, vehicles or equipment related to the Contractor's operations found within the designated "no-go" areas.
- Excess dust or excess noise emanating from site.
- Possession or use of intoxicating substances on site.
- Any vehicles being driven in excess of designated speed limits.
- Removal and/or damage to fauna, flora, cultural or heritage objects on site.
- Urination and defecation anywhere except at designated facilities.

8.2 Emergency preparedness

The Contractor must compile and maintain environmental emergency procedures to ensure that there will be appropriate responses to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the construction period. Such activities may include, *inter alia*:

- Accidental waste water discharges to water and land.
- Accidental fires.
- Accidental spillage of hazardous substances.
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans should include:

- Emergency organisation (manpower) and responsibilities, accountability and liability.
- A list of key personnel and contact details.
- Details of emergency services available (e.g. the fire department, spill clean-up services, etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.

The Contractor must comply with the emergency preparedness and incident- and accident-reporting requirements, as required by the Occupational Health and Safety Act (No. 85 of 1993), the NEMA (No. 107 of 1998) and the National Water Act (No. 36 of 1998) as amended and/or any other relevant legislation.

8.3 Incident reporting and remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident. The following information must be provided:

- the location;
- the nature of the load;
- the extent of the impact; and
- the status at the site of the accident itself (i.e. whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

8.4 Penalties

Where environmental damage is caused or a pollution incident, and/or failure to comply with any of the environmental specifications contained in the EMP, SANRAL and/or the Contractor will be liable.

The following violations, and any others determined during the course of work, should be penalised:

- Hazardous chemical/oil spill and/or dumping in non-approved sites.
- Damage to sensitive environments.
- Damage to cultural and historical sites.

- Unauthorised removal/damage to indigenous trees and other vegetation, particularly in identified sensitive areas.
- Uncontrolled/unmanaged erosion.
- Unauthorised blasting activities (*if applicable*).
- Pollution of water sources.
- Unnecessary removal or damage to trees.

The following steps will be followed by the ECO, on behalf of SANRAL, when observing a transgression:

1. **Transgression observed:** Give a warning to the Contractor, with time to remedy the situation. Report transgression and agreed remedial action to SANRAL.
2. **Transgression not remedied:** Report the Contractor directly to SANRAL and issue a financial penalty to the Contractor with an agreed time period to remedy the situation with the assistance of SANRAL (*if necessary*).
3. **Failure to remediate:** Depending on the severity and impact significance of the transgression, which must be assessed and discussed with SANRAL prior to reporting to the competent authority, the ECO may report directly to DEA (Compliance) recommending that for:
 - HIGH impact: DEA to issue a notice to cease construction;
 - MEDIUM impact: DEA to issue a notice instructing SANRAL to implement recommended remedial action; and/or
 - LOW impact: ECO to notify, but up to discretion of DEA to apply sanction.

In all cases, however, non-compliance must be reported to DEA in the monthly audit reports. However, the ECO will also report on corrective actions proposed and implemented.

The following schedule of fines for environmental damage or EMPr transgressions have been adapted from the City of Cape Town: Standard Environmental Specifications.

Table 9.1. List of fines for transgressions or resultant environmental damage

TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	Min. fine	Max. fine
Failure to comply with prescriptions regarding ECO appointment and monitoring of EMPr	R1 000	R2 000
Failure to comply with prescriptions regarding environmental awareness training	R2000	R10 000
Failure to comply with prescriptions regarding method statements	R2 000	R10 000
Failure to report environmental damage or EMPr transgressions to the ECO	R1 000	R2 000
Failure to carry out instructions of the DEO/ECO regarding the environment of the EMPr	R1 000	R2 000
Failure to comply with prescriptions posting of emergency numbers	R2 000	R10 000
Failure to comply with prescriptions regarding information boards	R1 000	R2 000
Failure to comply with prescriptions regarding a complaints register	R1 000	R2 000
Failure to comply with prescriptions regarding site demarcation and enforcement of “no go” areas	R2 000	R10 000
Failure to comply with prescriptions regarding site clearing	R2 000	R10 000
Failure to comply with prescriptions for the storage of imported materials within a designated Contractors yard	R1 000	R2 000
Failure to comply with prescribed administration, storage or handling of hazardous substances	R1 000	R2 000
Failure to comply with prescriptions regarding equipment maintenance and storage	R1 000	R2 000
Failure to comply with fuel storage, refuelling, or clean-up prescriptions	R1 000	R2 000
Failure to comply with prescriptions regarding procedures for emergencies (spillages and fires)	R2 000	R10 000

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Failure to comply with prescriptions regarding construction camp	R2 000	R10 000
Failure to comply with prescriptions for the use of ablution facilities	R1 000	R2 000
Failure to comply with prescriptions regarding water provision	R1 000	R2 000
Failure to comply with prescriptions for the use of designated eating areas, heating source for cooking or presence of fire extinguishers	R1 000	R2 000
Failure to comply with prescriptions regarding fire control	R2 000	R10 000
Failure to comply with prescriptions for solid waste management	R2 000	R10 000
Failure to comply with prescriptions to prevent water pollution and sedimentation	R2 000	R10 000
Failure to comply with prescriptions to the protection of natural features, flora, fauna and archaeology	R2 000	R10 000
Failure to comply with prescriptions regarding speed limits	R1 000	R2 000
Failure to comply with prescriptions regarding noise levels of construction activity	R2 000	R10 000
Failure to comply with prescriptions regarding working hours	R2 000	R10 000
Failure to comply with prescriptions regarding aesthetics	R1 000	R2 000
Failure to comply with prescriptions regarding dust control	R1 000	R2 000
Failure to comply with prescriptions regarding security and access onto private property	R1 000	R2 000
Failure to comply with prescriptions regarding cement and concrete batching	R2 000	R10 000

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9 REPORTING

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (l) A program for reporting on compliance, taking into account the requirement as prescribed by the regulations;

9.1 Administration

Before the construction activities commence, the Contractor must provide the ECO and SANRAL with a written method statement setting out the following:

- Details of the construction activities;
- Location where the activity will take place;
- Identification of impacts that might result from the activity;
- Identification of activities that may cause impacts;
- Methodology and/or specifications for impact prevention for each activity or aspect;
- Methodology and/or specifications for impact containment for each activity or aspect;
- Emergency/disaster incident and reaction procedures; and the
- Treatment and continued maintenance of the impacted environment.

The Contractor should provide such information in advance of any or all construction activities provided that new submissions are given to the ECO whenever there is a change or variation to the original.

The ECO should provide comment on the methodology and procedures proposed by the Contractor but he/she will not be responsible for the Contractor's chosen measures of impact mitigation and emergency/disaster management systems.

9.2 Good housekeeping

The Contractor must undertake "good housekeeping" practices during construction. This will help avoid disputes on responsibility and allow for the smooth running of the contract as a whole. Good housekeeping extends beyond the wise practice of construction methods to include the care for and preservation of the environment within which the construction is situated.

9.3 Record keeping

The ECO must continuously monitor the Contractor's adherence to the approved impact prevention procedures and the ECO must issue the Contractor with a notice of non-compliance whenever transgressions are observed. The ECO should document the nature and magnitude of the non-compliance in a designated register, the action taken to discontinue the non-compliance, the action taken to mitigate its effects and the results of the actions. The non-compliance should be documented and reported to SANRAL in the monthly report. These reports must be made available to DEA when requested.

9.4 Document control

The Contractor is responsible for establishing a procedure for electronic document control. The document control procedure should comply with the following requirements:

- Documents must be identifiable by organisation, division, function, activity and contact person.

- Every document should identify the personnel and their position(s), who drafted and compiled the document(s), who reviewed and recommended approval, and who finally approved the document for distribution.
- All documents should be dated, provided with a revision number and reference number, filed systematically, and retained for a five year period.

The Contractor must ensure that documents are periodically reviewed and revised, *where necessary*, and that current versions are available at all locations where operations essential to the functioning of the EMP are performed. All documents must be made available to the ECO and other independent external auditors.

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10 ENVIRONMENTAL AWARENESS

According to APPENDIX 4 of GN R 982, an environmental management programme must include:

- (m) An environmental awareness plan describing the manner in which –
 - (i) The applicant intends to inform his or her employees of any environmental risk which may result from their work; and
 - (ii) Risks must be dealt with in order to avoid pollution or the degradation of the environment; and

The Contractors must ensure that their employees and any third party, who carries out all or part of the Contractors' obligations, are adequately trained with regard to the implementation of the EMPr and the general environmental legal requirements and obligations. Training should be conducted by the ECO where necessary.

Environment and health awareness training programmes should be targeted at three distinct levels of employment, i.e. the executive, middle management and labour. Environmental awareness training programmes should contain the following information:

- The names, positions and responsibilities of personnel to be trained;
- The framework for appropriate training plans;
- The summarised content of each training course; and
- A schedule for the presentation of the training courses.

The ECO must ensure that records of all training interventions are kept in accordance with the record keeping and documentation control requirements as set out in this EMPr. The training records must verify each of the targeted personnel's training experience.

The Developer must ensure that adequate environmental training takes place. All employees must be given an induction presentation on environmental awareness and the content of the EMPr. The presentation needs to be conducted in the language of the employees to ensure it is understood. The environmental training must, as a minimum, include the following:

- The importance of conformance with all environmental policies;
- The environmental impacts, actual or potential, of their work activities;
- The environmental benefits of improved personal performance;
- Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Agency's environmental management systems, including emergency preparedness and response requirements;
- The potential consequences of departure from specified operating procedures;
- The mitigation measures required to be implemented when carrying out their work activities;
- Environmental legal requirements and obligations;
- Details regarding floral/faunal species of special concern and protected species, and the procedures to be followed should these be encountered during the construction of approach roads or construction camps;
- The importance of not littering;
- The importance of using supplied ablution facilities;
- The need to use water sparingly;
- Details of and encouragement to minimise the production of waste and re-use, recover and recycle waste where possible; and the
- Details regarding archaeological and/or historical sites which may be unearthed during construction and the procedures to be followed should these be encountered.

Recommended Environmental Education Material is provided in Appendix 1.

10.1 Monitoring of environmental training

The Contractor must monitor the performance of construction workers to ensure that the points relayed during their introduction have been properly understood and are being followed. If necessary, the ECO and / or a translator should be called to the site to further explain aspects of environmental or social behaviour that are unclear. Toolbox talks are recommended

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11 CLOSURE PLANNING

Final site cleaning - the contractor must clear and clean the site and ensure that all equipment and residual materials not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.

Rehabilitation - the contractor (landscape architect/horticulturist) must be responsible for rehabilitating and re-vegetation of all areas disturbed/areas earmarked for conservation during construction to the satisfaction of the engineer and ECO.

11.1 Post-construction audit

A post-construction audit must be carried out and submitted to DEA at the expense of SANRAL. Objectives should be to audit compliances with the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The audit should be undertaken annually and should cover a cross section of issues, including implementation of environmental controls, environmental management and environmental monitoring.

Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

11.2 General review of EMPr

The EMPr will be reviewed by the ECO on an on-going basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site.

Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexures of this nature must be distributed to all relevant parties.

12 CONCLUSIONS

All foreseeable actions and potential mitigations and/or management actions are contained in this document; the EMPr should be seen as a day-to-day management document. The EMPr thus sets out the environmental and social standards, which would be required to minimise the negative impacts and maximise the positive benefits of the construction activities. The EMPr could thus change daily, and if managed correctly lead to a successful construction and operation phases.

All attempts should be made to have this EMPr available, as part of any tender documentation, so that the Contractors are made aware of the potential cost and timing implications needed to fulfil the implementation of the EMPr, thus adequately costing for these.

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APPENDIX A

PROPOSED ENVIRONMENTAL EDUCATION COURSE

WHAT IS THE ENVIRONMENT?

- Soil
- Water
- Plants
- People
- Animals
- Air we breathe
- Buildings, cars and houses



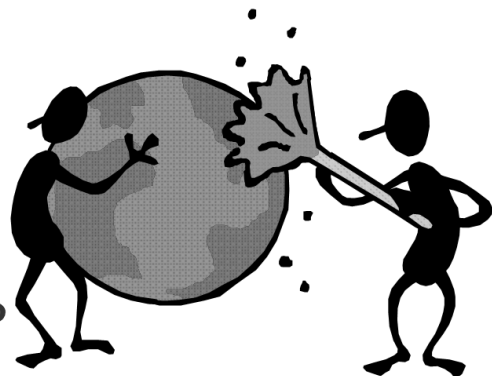
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WHY MUST WE LOOK AFTER THE ENVIRONMENT?

- It affects us all as well as future generations
- We have a right to a healthy environment
- A contract has been signed
- Disciplinary action (e.g. construction could stop or fines issued)

HOW DO WE LOOK AFTER THE ENVIRONMENT?

- Report problems to your supervisor/ foreman
- Team work
- Follow the rules in the EMP



WORKING AREAS

Workers & equipment must stay inside the site boundaries at all times



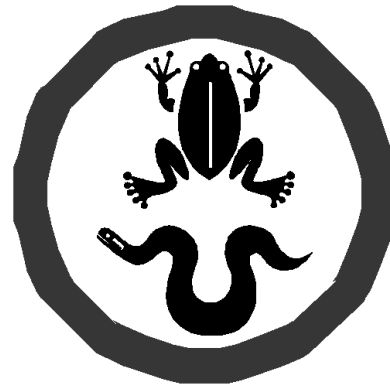
RIVERS & STREAMS

- Do not swim in or drink from streams
- Do not throw oil, petrol, diesel, concrete or rubbish in the stream
- Do not work in the stream without direct instruction
- Do not damage the banks or vegetation of the stream



ANIMALS

- Do not injure or kill any animals on the site
- Ask your supervisor or Contract's Manager to remove animals found on site



TREES AND FLOWERS

- Do not damage or cut down any trees or plants without permission
- Do not pick flowers



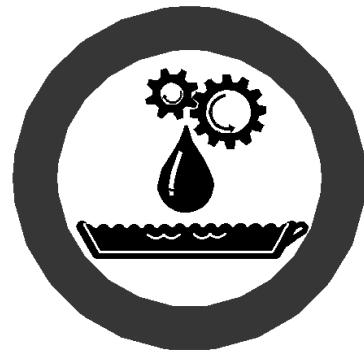
SMOKING AND FIRE

- Put cigarette butts in a rubbish bin
- Do not smoke near gas, paints or petrol
- Do not light any fires without permission
- Know the positions of fire fighting equipment
- Report all fires
- Do not burn rubbish or vegetation without permission



PETROL, OIL AND DIESEL

- Work with petrol, oil & diesel in marked areas
- Report any petrol, oil & diesel leaks or spills to your supervisor
- Use a drip tray under vehicles & machinery
- Empty drip trays after rain & throw away where instructed



DUST

Try to avoid producing dust -
Use water to make ground &
soil wet



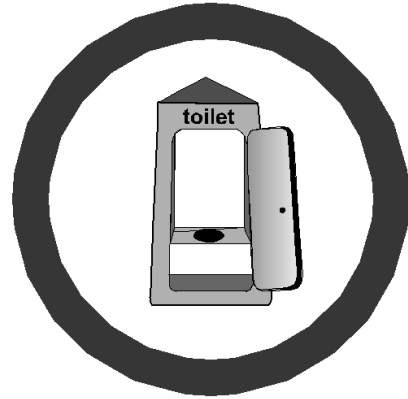
NOISE

- Do not make loud noises around the site, especially near schools and homes
- Report or repair noisy vehicles



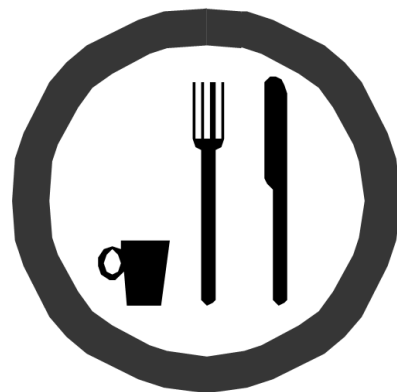
TOILETS

- Use the toilets provided
- Report full or leaking toilets



EATING

- Only eat in demarcated eating areas
- Never eat near a river or stream
- Put packaging & leftover food into rubbish bins



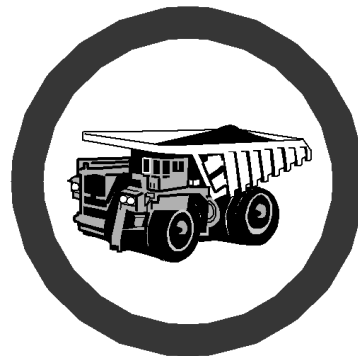
RUBBISH

- Do not litter – put all rubbish (especially cement bags) into the bins provided
 - Report full bins to your supervisor
 - The responsible person should empty bins regularly
-



TRUCKS AND DRIVING

- Always keep to the speed limit
 - Drivers – check & report leaks and vehicles that belch smoke
 - Ensure loads are secure & do not spill
-



EMERGENCY PHONE NUMBERS

Know all the emergency phone numbers:

- Local Municipality:
- Ambulance:
- Fire:
- Police:

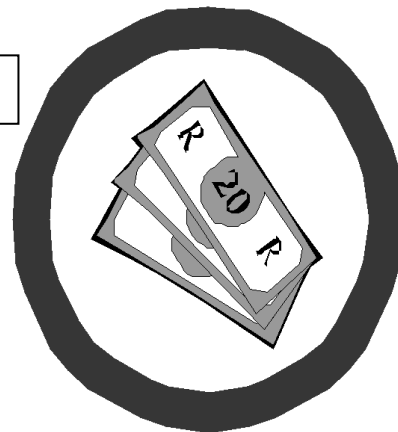


FINES AND PENALTIES

- Spot fines of between

To be confirmed by the Engineer

- Your company may be fined
- Removal from site
- Construction may be stopped



PROBLEMS - WHAT TO DO!

- Report any breaks, floods, fires, leaks and injuries to your supervisor
- Ask questions!



DRAFT

APPENDIX B

ENVIRONMENTAL AUTHORISATION

DRAFT

APPENDIX C

PRO-FORMA: PROTECTION OF THE ENVIRONMENT

To be signed by Contractors

DRAFT

PRO FORMA

Employer _____
Contract No _____
Contract title _____

PROTECTION OF THE ENVIRONMENT

The Contractor will not be given right of access to the site until this form has been signed.

I/ we _____ (Contractor) record as follows:

1. I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the increasing requirement by society that construction activities must be carried out with due regard to their impact on the environment.
2. In view of this requirement of society and a corresponding requirement by the Employer with regard to this Contract, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate employees, plant, materials and methods of construction, in so far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.
3. I/ we acknowledge and accept the right of _____ to deduct, should they so wish, from any amounts due to me/us, such amounts (hereinafter referred to as fines) as the Resident Engineer and Environmental Site Officer must certify as being warranted in view of my/ our failure to comply with the terms of the Contract dealing with protection of the environment, subject to the following:
 - 3.1 The Resident Engineer and Environmental Officer, in determining the amount of such fine, must take into account *inter alia*, the nature of the offence, the seriousness of its impact on the environment, the degree of prior compliance/non-compliance, the extent of the Contractor's overall compliance with environmental protection requirements and, in particular, the extent to which he considers it necessary to impose a sanction in order to eliminate/reduce future occurrences.
 - 3.2 The Resident Engineer and Environmental Officer must, with respect to any fine imposed, provide me/ us with a written statement giving details of the offence, the facts on which the Resident Engineer and Environmental Officer has based his assessment and the terms of the Contract (by reference to the specific clause) which has been contravened.

Signed _____
CONTRACTOR

Date _____



APPENDIX D: SPECIALIST REPORTS

DRAFT

**Palaeontological Impact Assessment for the proposed
construction of the new Ndabakazi Interchange
between the N2 and the R409, near Butterworth,
Eastern Cape Province**

Desktop Study

For

EOH CES

19 November 2018

Prof Marion Bamford

Palaeobotanist

P Bag 652, WITS 2050

Johannesburg, South Africa

Marion.bamford@wits.ac.za

Expertise of Specialist

The Palaeontologist Consultant is: Prof Marion Bamford
Qualifications: PhD (Wits Univ, 1990); FRSSAf, ASSAf
Experience: 30 years research; 22 years PIA studies

Declaration of Independence

This report has been compiled by Professor Marion Bamford, of the University of the Witwatersrand, sub-contracted by EOH CES, Grahamstown, South Africa. The views expressed in this report are entirely those of the author and no other interest was displayed during the decision making process for the Project.

Specialist: Prof Marion Bamford

Signature: 

Executive Summary

A palaeontological Impact Assessment was requested for the proposed extension of the Ndabakazi Interchange by SANRAL at the intersection of the N2 and R409, near Butterworth, Eastern Cape Province. To comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed development of a sand mining area.

The proposed site lies partly on non-fossiliferous dolerite dykes of the Jurassic and mostly on the Balfour Formation, Beaufort Group, Karoo Supergroup. The Balfour Formation shales and mudstones could contain fossil vertebrates (fish, amphibians, therapsids) or fossil plants of the *Glossopteris* flora (*Glossopteris* leaves, ferns, sphenophytes and lycopods) but below the surface. The area has been disturbed by urbanisation so surface fossils have most likely been destroyed. Since there is a chance of fossils being disturbed by the excavation for the project a Fossil Chance Find Protocol must be added to the EMPr whereby, once excavations commence, the responsible person must contact a professional palaeontologist as soon as any potential fossil material is found a professional palaeontologist is contacted for an opinion. Based on this information it is recommended that no palaeontological site visit is required unless excavations yield fossil material.

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1. Background

The South African National Roads Agency SOC Ltd. (SANRAL) is proposing the construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province (Figure 1). The proposed Ndabakazi Interchange development will consist of the upgrading of the existing N2 and R409 roads at the intersection as well as the construction of a new bridge over the N2 with corresponding interchange ramps. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2/R409 Bridge.

In particular, the project will consist of the following:

Existing roads:

- Increasing the road reserve width from 30m to a minimum of 50m wide;
- General widening of the existing road cross section for passing lanes and 3.0m surfaced shoulders. The main carriageway is 10.4m and needs to be increased to 20.8m;
- Widening and/or new construction of existing drainage structures.

New Interchange (called the Ndabakazi Interchange):

- Construction of a new bridge on the R409 over the N2;
- Substantial vertical geometric improvements will be required for the new N2/R409 Bridge;
- Rehabilitation of pavement structure on existing alignment and construction of new pavement on new alignment, all for which suitable material will need to be sourced;
- Cut faces requiring stabilisation.

Temporary deviations:

- Temporary traffic diversion routes will be used during the construction phase of the Ndabakazi Interchange (refer to Figure 1.1);
- The temporary diversion routes will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndabakazi Interchange;
- All temporary diversion routes will be surfaced.

To comply with the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA), a desktop Palaeontological Impact Assessment (PIA) was completed for the proposed project by SANRAL.

Table 1: Specialist report requirements in terms of Appendix 6 of the EIA Regulations (2014)

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 must contain:	Relevant section in report
Details of the specialist who prepared the report	Appendix B
The expertise of that person to compile a specialist report including a curriculum vitae	Appendix B
A declaration that the person is independent in a form as may be specified by the competent authority	Page 1
An indication of the scope of, and the purpose for which, the report was prepared	Section 1
The date and season of the site investigation and the relevance of the season to the outcome of the assessment	N/A
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 2
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure	Section ii Error! Reference source not found.
An identification of any areas to be avoided, including buffers	N/A
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;	N/A
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 5
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 4
Any mitigation measures for inclusion in the EMPr	N/A
Any conditions for inclusion in the environmental authorisation	N/A
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 8
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	N/A
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	N/A
A description of any consultation process that was undertaken during the course of carrying out the study	N/A
A summary and copies if any comments that were received during any consultation process	N/A
Any other information requested by the competent authority.	N/A



Figure 1: Google Earth map of the proposed extension and improvement to the Nwabakazi Interchange, near Butterworth, on the N2/R409 roads, shown in yellow. Map supplied by EOH CES.

2. Methods and Terms of Reference

The Terms of Reference (ToR) for this study were to undertake a PIA and provide feasible management measures to comply with the requirements of SAHRA.

The methods employed to address the ToR included:

1. Consultation of geological maps, literature, palaeontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources included records housed at the Evolutionary Studies Institute at the University of the Witwatersrand and SAHRA databases;
2. Where necessary, site visits by a qualified palaeontologist to locate any fossils and assess their importance (*not applicable to this assessment*);
3. Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (*not applicable to this assessment*); and

4. Determination of fossils' representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (*not applicable to this assessment*).

3. Geology and Palaeontology

i. Project location and geological context.

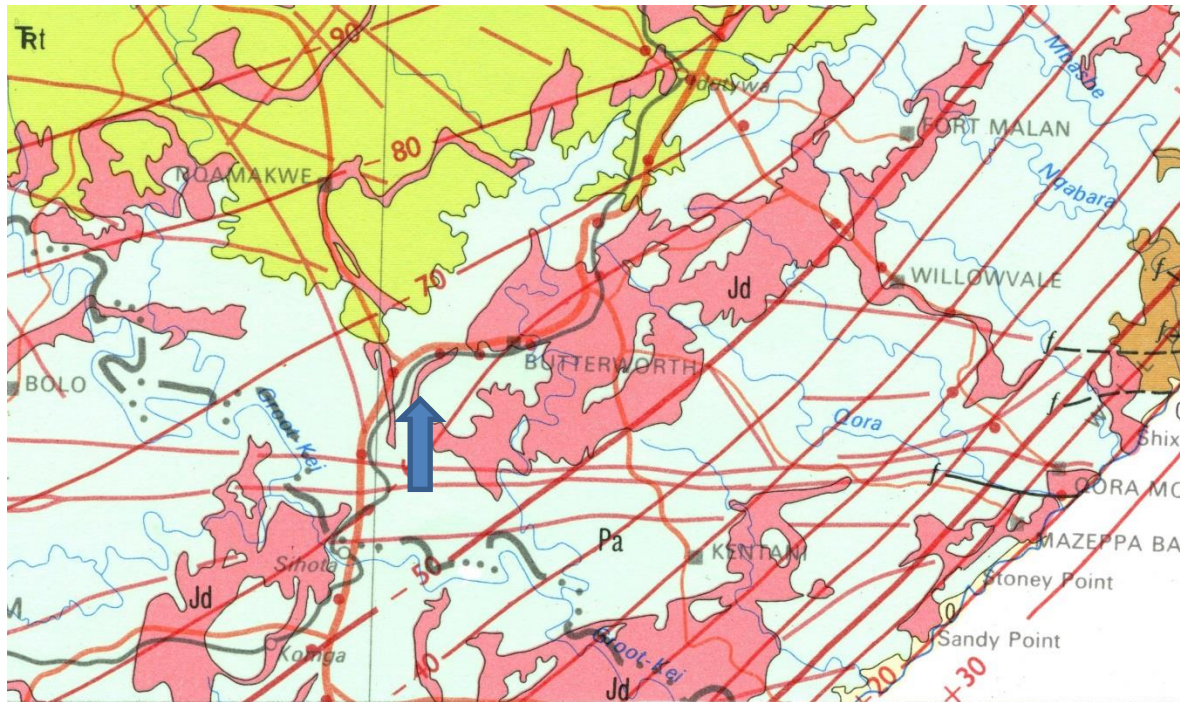


Figure 2: Geological map of the area around the proposed Ndbakazi Interchange, Amathole District Municipality, Eastern Cape Province. The location of the proposed project is indicated with the arrow. Abbreviations of the rock types are explained in Table 2. Map enlarged from the Geological Survey 1: 1 000 000 map 1984.

Table 2: Explanation of symbols for the geological map and approximate ages (Barbolini et al., 2016; Erikssen et al., 2006. Johnson et al., 2006). SG = Supergroup; Fm = Formation.

Symbol	Group/Formation	Lithology	Approximate Age
Q	Quaternary	Alluvium, sand, calcrete	Neogene, ca 25 Ma to present
Jd	Jurassic dykes	Dolerite dykes, intrusive	Jurassic, approx. 180 Ma
Trt	Tarkastad Subgroup	Mudstone, sandstone	
Pa	Balfour Fm, Adelaide Subgroup, Beaufort Group (with 5 members)	Bluish-grey and grey-green mudstone; sandstone	256 – 251 Ma
Pa	Middleton Fm, Adelaide Subgroup, Beaufort	Dark red and grey-green mudstones interbedded	261.5 – 256 Ma

Symbol	Group/Formation	Lithology	Approximate Age
	Group	sandstones with a fining upward sequence	
Pa	Koonap Fm, Adelaide Subgroup, Beaufort Group	Greenish silty mudstones and sandstones in a fining upward sequence	266 – 261.5 Ma

The area is in the south western part of the main Karoo Basin and the rocks are sedimentary depositions of bluish-grey mudrocks and grey sandstones and represent low sinuosity fluvial and channel facies. Dolerite dykes intrude these sediments and were precursor of or associated with the Drakensberg volcanics. The Balfour Formation has been subdivided into a number of vertebrate assemblage zones, each based on the short ranging vertebrate taxon, here the Dicynodon Assemblage Zone according to the GIS database map produced in van der Walt et al., 2010.

ii. Palaeontological context

The site for the Ndabakazi Interchange upgrade and extension lies on rocks of the Balfour Formation, Adelaide Subgroup, Beaufort Group of the Main Karoo Basin. The age is between 256 and 251 million years old. Based on the palaeontology and sedimentology the environment at the time was drying out and changing from floodplains and shallow sea(s) to meandering rivers (Catuneanu et al., 1998; Rubidge, 2005). Vertebrate fossils occur in these sediments but are not abundant (see list in Appendix A). The groups represented are fish, reptiles and therapsids of the Dicynodon Assemblage Zone (Rubidge, 1995). Fossil leaf impressions of the *Glossopteris* flora could also occur but they are scattered and rare (Anderson and Anderson, 1985).



Figure 3: SAHRIS palaeosensitivity map for the site for the proposed Ndabakazi Interchange shown within the yellow rectangle. Colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero.

Jurassic dolerite dykes do not contain fossils as they are intrusive into the Karoo sediments, and also tend to destroy fossils in their proximity.

From the SAHRIS map above (Figure 3) the area is indicated as predominantly highly sensitive (red) however the area has been extensively disturbed from urban activities. Surface occurrences of fossils are likely to be highly disturbed but below the surface there may be significant fossils.

4. Impact assessment

IMPACT RATING METHODOLOGY

Table 1.1 Impact Significance Rating Table

Duration of the Project	
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.
Spatial Scale	
Individual	Impacts affect an individual.
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the study area.
Project Level	Impacts affect the entire study 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.
Degree of Confidence or Certainty	
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 1.2 Impact Severity Rating. Impact severity

(The severity of negative impacts or how beneficial positive impacts would be on a particular affected system or affected party)

The severity of negative impacts or how beneficial positive impacts would be on a particular affected system or affected party)	
Very severe	Very beneficial
An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. For example the permanent loss of land.	A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit. For example the vast improvement of sewage effluent quality.
Severe	Beneficial
Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these. For example, the clearing of forest vegetation.	A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. For example an increase in the local economy.
Moderately severe	Moderately beneficial
Medium to long term impacts on the affected system(s) or party(ies), which could be mitigated. For example constructing the sewage treatment facility where there was vegetation with a low conservation value.	A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this

	way. For example a 'slight' improvement in sewage effluent quality.
Slight	Slightly beneficial
Medium or short term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary. For example a temporary fluctuation in the water table due to water abstraction.	A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect	Don't know/Can't know
The system(s) or party(ies) is not affected by the proposed development.	In certain cases it may not be possible to determine the severity of an impact.

Table 1.3 Overall Significance Rating

OVERALL SIGNIFICANCE (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 severe or very severe effects, or beneficial or very beneficial effects.</p> <p>Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.</p> <p>Example: 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>Example: 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>Example: 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>Example: 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>Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.</p> <p>Example: 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

There are no primary or secondary effects at all that are important to scientists or the public.
 Example: 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.

DON'T KNOW

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.
 Example: The effect of a particular development on people's psychological perspective of the environment.

RESULTS OF IMPACT RATING

Table 2.1 Impact Significance Rating Table

Duration of the Project	
Short term	Less than 5 years (many construction phase impacts are of a short duration).
Spatial Scale	
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the study area.
Degree of Confidence or Certainty	
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.

Table 2.2 Impact Severity Rating. Impact severity

(The severity of negative impacts or how beneficial positive impacts would be on a particular affected system or affected party)

Slight
Medium or short term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary. For example a temporary fluctuation in the water table due to water abstraction.

Table 2.3 Overall Significance Rating

OVERALL SIGNIFICANCE (THE COMBINATION OF ALL THE ABOVE CRITERIA AS AN OVERALL SIGNIFICANCE)	
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. Example: The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.</p>	

Based on the nature of the project, surface activities are unlikely to impact upon the fossil heritage if preserved in the development footprint. Once excavations begin for the construction of diversions, railway lines and infrastructure, there is a moderate chance of finding fossils. Fossils are known to occur in rocks of the Balfour Formation but they are not common or abundant.

5. Assumptions and uncertainties

Based on the geology of the area and the palaeontological record as we know it, it can be assumed that the formation and layout of the dolerites, sandstones, shales and sands are typical for the country and do contain fossil plant, insect, invertebrate and vertebrate material. The surface is much less likely to contain fossils because of previous disturbance from urbanisation.

6. Recommendation

Based on experience and the lack of any previously recorded fossils from the area, it is possible that fossil vertebrates or plants could be preserved below the surface. A Fossil Chance Find Protocol must be added to the EMP: if fossils are found once excavations and construction have commenced then they should be rescued and a palaeontologist called to assess and collect a representative sample.

7. References

Anderson, J.M., Anderson, H.M., 1985. Palaeoflora of Southern Africa: Prodrum of South African megaflores, Devonian to Lower Cretaceous. A.A. Balkema, Rotterdam. 423 pp.

Catuneanu, O., Hancox, P.J. and Rubidge, B.S., 1998. Reciprocal flexural behaviour and contrasting stratigraphies: a new basin development model for the Karoo retroarc foreland system, South Africa. *Basin Res.*, v. 10, pp. 417-439.

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Rubidge, B.S. (Ed), 1995. Biostratigraphy of the Beaufort Group (Karoo Supergroup).. Biostratigraphy Series 1, South African Commission for Stratigraphy. Council for Geoscience, 46 pp.

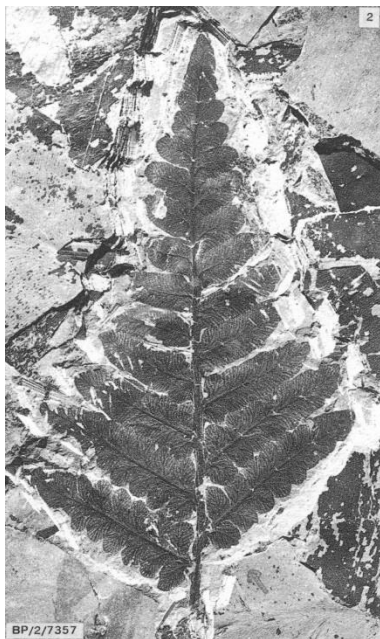
Rubidge, B.S., 2005. 27th Du Toit Memorial Lecture: re-uniting lost continents — fossil reptiles from the ancient Karoo and their wanderlust. South African Journal of Geology 108: 135-172.

8. Chance Find Protocol

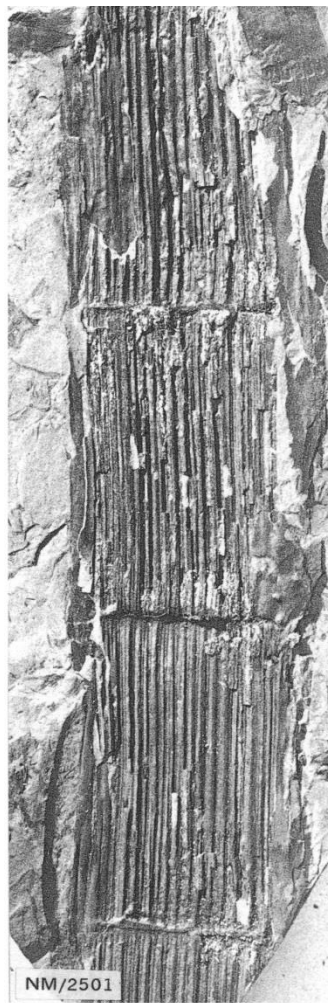
Monitoring Programme for Palaeontology – to commence once the excavations begin.

1. The following procedure is only required if fossils are seen on the surface and when excavations commence.
2. When excavations begin the rocks and must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone, coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted.
3. Photographs of similar vertebrates and fossil plants must be provided to the developer to assist in recognizing the fossils in the shales and mudstones (for example see Figure 4-7). This information must be built into the EMP's training and awareness plan and procedures.
4. Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment.
5. If there is any possible fossil material found by the developer/environmental officer/miners then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible.
6. Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits.
7. If no good fossil material is recovered then the site inspections by the palaeontologist will not be necessary. Annual reports by the palaeontologist must be sent to SAHRA.
8. If no fossils are found and the excavations have finished then no further monitoring is required.

Appendix A – Examples of fossils from the Balfour Formation, Beaufort Group, Karoo Supergroup.



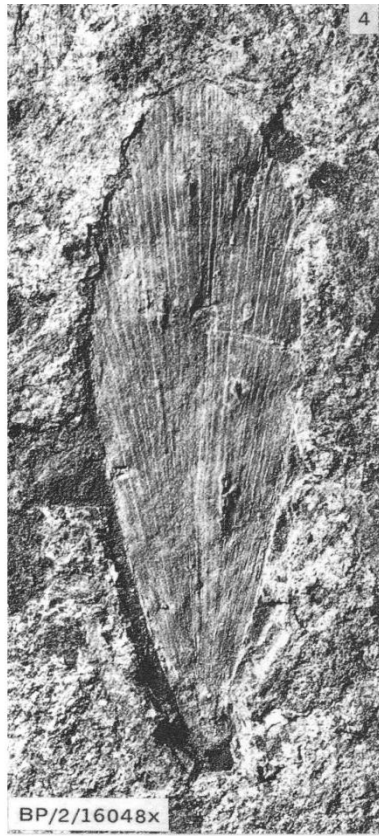
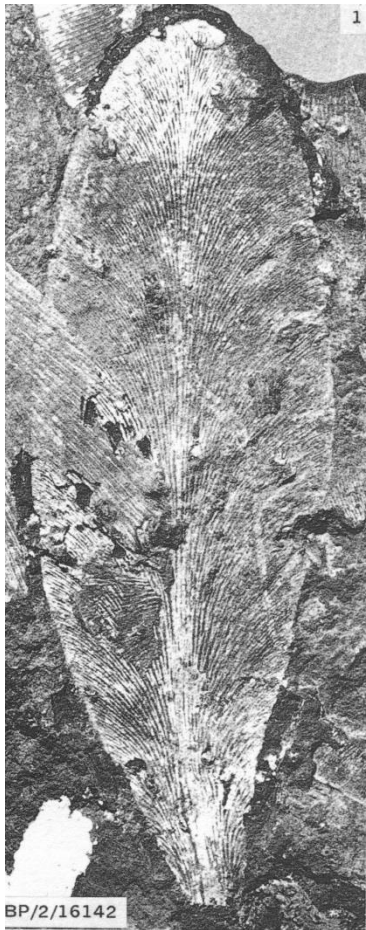
Fern: *Asterotheca* sp.



Sphenophytes: whorls of leaves on a striated stem



Figure 4: Examples of fossils plants from the *Glossopteris* Flora



Noeggerathiopsis and
Glossopteris leaves

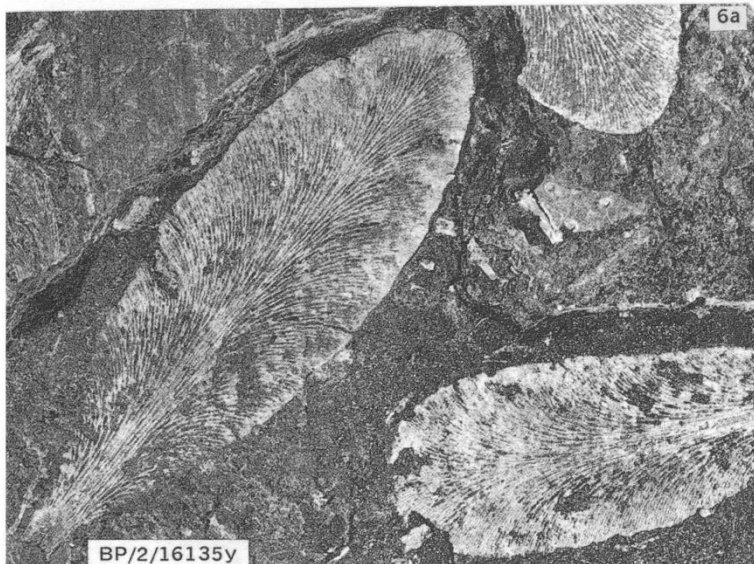


Figure 5: Examples of *Glossopteris* leaves from the Karoo Supergroup.

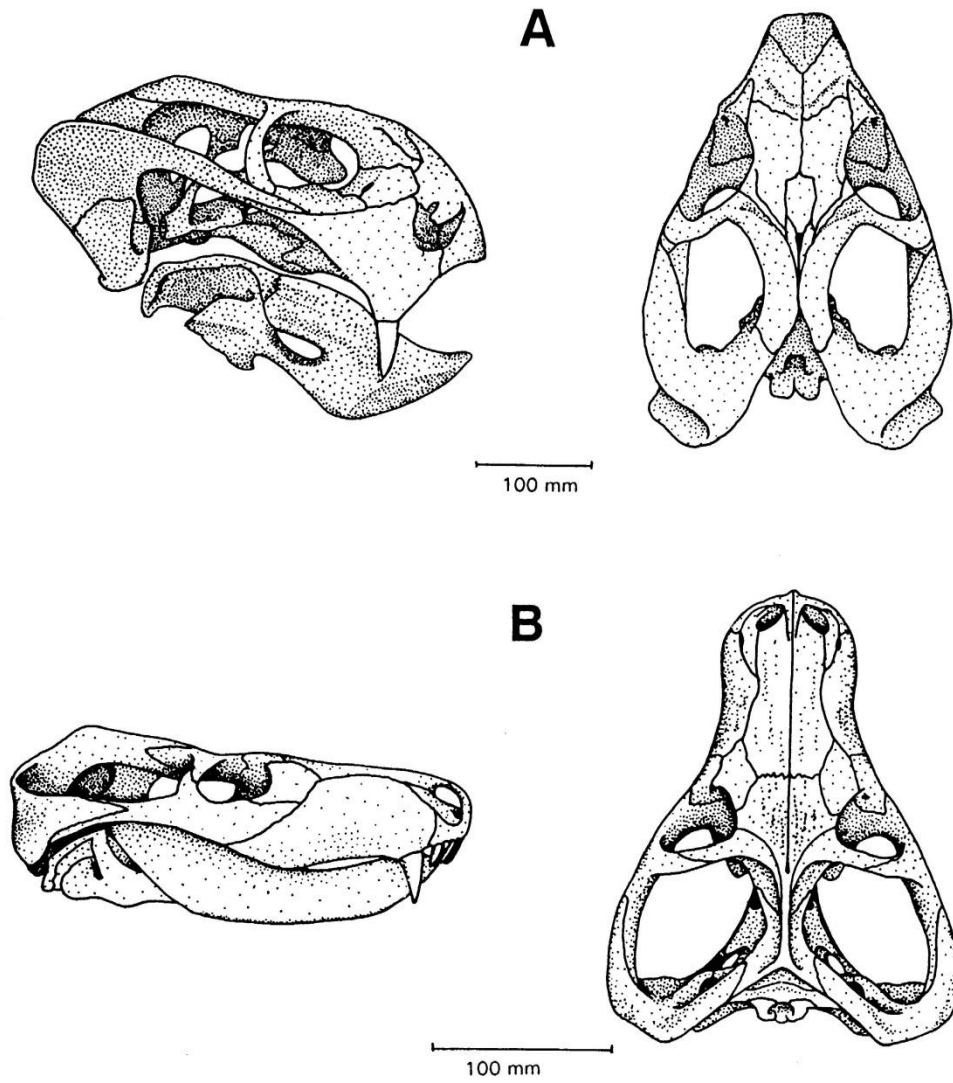


Figure 6: Diagrams of fossil vertebrate skulls from the Balfour Formation (from Rubidge, 1999, page 29).



Figure 7: fossil bones exposed in the rock

Curriculum vitae (short) - Marion Bamford PhD October 2018

i) Personal details

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ii) Academic qualifications

Tertiary Education: All at the University of the Witwatersrand:
1980-1982: BSc, majors in Botany and Microbiology. Graduated April 1983.
1983: BSc Honours, Botany and Palaeobotany. Graduated April 1984.
1984-1986: MSc in Palaeobotany. Graduated with Distinction, November 1986.
1986-1989: PhD in Palaeobotany. Graduated in June 1990.

iii) Professional qualifications

Wood Anatomy Training (overseas as nothing was available in South Africa):
1994 - Service d'Anatomie des Bois, Musée Royal de l'Afrique Centrale, Tervuren, Belgium, by Roger Dechamps
1997 - Université Pierre et Marie Curie, Paris, France, by Dr Jean-Claude Koeniguer
1997 - Université Claude Bernard, Lyon, France by Prof Georges Barale, Dr Jean-Pierre Gros, and Dr Marc Philippe

iv) Membership of professional bodies/associations

Palaeontological Society of Southern Africa
Royal Society of Southern Africa - Fellow: 2006 onwards
Academy of Sciences of South Africa - Member: Oct 2014 onwards
International Association of Wood Anatomists - First enrolled: January 1991

International Organization of Palaeobotany – 1993+
 Botanical Society of South Africa
 South African Committee on Stratigraphy – Biostratigraphy - 1997 - 2016
 SASQUA (South African Society for Quaternary Research) – 1997+
 PAGES - 2008 –onwards: South African representative
 ROCEEH / WAVE – 2008+
 INQUA – PALCOMM – 2011+onwards

vii) Supervision of Higher Degrees

All at Wits University

Degree	Graduated/completed	Current
Honours	6	1
Masters	8	1
PhD	10	3
Postdoctoral fellows	9	3

viii) Undergraduate teaching

Geology II – Palaeobotany GEOL2008 – average 65 students per year
 Biology III – Palaeobotany APES3029 – average 25 students per year
 Honours – Evolution of Terrestrial Ecosystems; African Plio-Pleistocene Palaeoecology;
 Micropalaeontology – average 2-8 students per year.

ix) Editing and reviewing

Editor: *Palaeontologia africana*: 2003 to 2013; 2014 – Assistant editor
 Guest Editor: *Quaternary International*: 2005 volume
 Member of Board of Review: *Review of Palaeobotany and Palynology*: 2010 –
Cretaceous Research: 2014 -

Review of manuscripts for ISI-listed journals: 25 local and international journals

x) Palaeontological Impact Assessments

Selected – list not complete:

- Thukela Biosphere Conservancy 1996; 2002 for DWAF
- Vioolsdrift 2007 for Xibula Exploration
- Rietfontein 2009 for Zitholele Consulting
- Bloeddrift-Baken 2010 for TransHex
- New Kleinfontein Gold Mine 2012 for Prime Resources (Pty) Ltd.
- Thabazimbi Iron Cave 2012 for Professional Grave Solutions (Pty) Ltd
- Delmas 2013 for Jones and Wagener
- Klipfontein 2013 for Jones and Wagener
- Platinum mine 2013 for Lonmin
- Syferfontein 2014 for Digby Wells
- Canyon Springs 2014 for Prime Resources

- Kimberley Eskom 2014 for Landscape Dynamics
- Yzermyne 2014 for Digby Wells
- Matimba 2015 for Royal HaskoningDV
- Commissiekraal 2015 for SLR
- Harmony PV 2015 for Savannah Environmental
- Glencore-Tweefontein 2015 for Digby Wells
- Umkomazi 2015 for JLB Consulting
- Ixia coal 2016 for Digby Wells
- Lambda Eskom for Digby Wells
- Alexander Scoping for SLR
- Perseus-Kronos-Aries Eskom 2016 for NGT
- Mala Mala 2017 for Henwood
- Modimolle 2017 for Green Vision
- Klipootjie and Finaalspan 2017 for Delta BEC
- Ledjadja borrow pits 2018 for Digby Wells
- Lungile poultry farm 2018 for CTS
- Olienhout Dam 2018 for JP Celliers
- Isondlo and Kwasobabili 2018 for GCS
- Kanakies Gypsum 2018 for Cabanga
- Nababeep Copper mine 2018
- Glencore-Mbali pipeline 2018 for Digby Wells
-

xi) Research Output

Publications by M K Bamford up to June 2018 peer-reviewed journals or scholarly books: over 120 articles published; 5 submitted/in press; 8 book chapters.

Scopus h index = 26; Google scholar h index = 28;

Conferences: numerous presentations at local and international conferences.

xii) NRF Rating

NRF Rating: B-2 (2016-2020)

NRF Rating: B-3 (2010-2015)

NRF Rating: B-3 (2005-2009)

NRF Rating: C-2 (1999-2004)



An EOH Company

**EOH COASTAL & ENVIRONMENTAL SERVICES:
PROPOSED NDABAKAZI INTERCHANGE UPGRADE
PROJECT, BUTTERWORTH AREA, AMATHOLE
DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE**

Archaeological Impact Assessment

A 3D rendering of a globe with a splash of water, symbolizing sustainability and environmental impact. The globe is partially submerged in water, with ripples and splashes around it.

**Innovation in
Sustainability**

The logo for EOH, consisting of the letters "EOH" in a bold, white, sans-serif font with a small triangle above the letter 'O'.

Prepared for: **EOH Coastal & Environmental Services**
Prepared by: **Exigo Sustainability**

ARCHAEOLOGICAL IMPACT ASSESSMENT (AIA) FOR THE PROPOSED NDABAKAZI INTERCHANGE UPGRADE PROJECT IN THE BUTTERWORTH AREA OF THE AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE PROVINCE

Compiled for:

EOH Coastal & Environmental Services

Compiled by:

Neels Kruger

DOCUMENT DISTRIBUTION LIST

Name	Institution
Caryn Clarke	EOH Coastal & Environmental Services

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DECLARATION

I, Nelius Le Roux Kruger, declare that –

- I act as the independent specialist;
- I am conducting any work and activity relating to the proposed Ndabakazi Interchange Upgrade Project in an objective manner, even if this results in views and findings that are not favourable to the client;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have the required expertise in conducting the specialist report and I will comply with legislation, including the relevant Heritage Legislation (National Heritage Resources Act no. 25 of 1999, Human Tissue Act 65 of 1983 as amended, Removal of Graves and Dead Bodies Ordinance no. 7 of 1925, Excavations Ordinance no. 12 of 1980), the Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment (SAHRA and the CRM section of ASAPA), regulations and any guidelines that have relevance to the proposed activity;
- I have not, 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 declaration are true and correct.



Signature of specialist

Company: Exigo Sustainability

Date: 20 November 2018

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EXECUTIVE SUMMARY

This report details the results of an Archaeological Impact Assessment (AIA) study subject to an Environmental Impact Assessment (EIA) process for the proposed Ndabakazi Interchange Upgrade (bulk supply & village reticulation) situated in the greater Butterworth area of the Eastern Cape Province. The interchange is situated along the N2 route at Dwarini approximately 10km east of Butterworth. The report includes background information on the area's archaeology, its representation in Southern Africa, and the history of the larger area under investigation, survey methodology and results as well as heritage legislation and conservation policies. A copy of the report will be supplied to the Eastern Cape Provincial Heritage Resources Authority (Eastern Cape-PHRA) and recommendations contained in this document will be reviewed.

Project Title	Ndabakazi Interchange Upgrade Project
Project Location	S32.34875° E28.03525°
1:50 000 Map Sheet	3228AC
Farm Portion / Parcel	Communal Land
Magisterial District / Municipal Area	Amathole District Municipality
Province	Eastern Cape Province

A few archaeological and historical studies have been conducted in this section of the Eastern Cape most of which infer a varied and rich heritage landscape. The literature shows traces of coastal Herder sites during the later Stone Ages with evidence of pastoralism, rock art as well as Iron Age farmer presence and a Colonial frontier denoting European farmer expansion. The vast landscape that encompasses the Ndabakazi Interchange Upgrade footprints seems to have been inhabited continuously for centuries in prehistoric and historical times, the remnants of which are visible in transformed agriculture and rural settlement areas. The following general recommendations are made based on general observations in the proposed Ndabakazi Interchange Upgrade area pertaining to a number of identified occurrences of heritage potential:

- According to the South African Heritage Resources Agency Information System (SAHRIS) Palaeo Map, portions of the project area fall within a potentially sensitive fossiliferous zone and a Palaeontological Assessment is recommended for the project, subject to review and recommendations by the relevant heritage authorities. Should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.
- Two sites containing Historical / Colonial Period buildings (**Site Exigo-NIU-HP01, Site Exigo-NIU-HP02**) have the potential to provide an understanding of architectural, industrial and social developments in the Ndabakazi landscape and the receptors are rated as medium significance. The sites occur in the proximity of temporary road alignments and it is primarily recommended that a conservation buffer of at least 20m around the sites be implemented in order to avoid impact. However, should impact on the sites prove inevitable, the structures should be adequately documented by means of Phase 2 Specialist Studies. Such studies should minimally include the mapping, documentation and possible sampling of the sites in order to conserve the historical fabric of the heritage resources. The necessary alteration and destruction permits should be obtained from the relevant Heritage Resources

- Authorities prior to site sampling and destruction. Generally, the sites should be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains.
- Graves and burials identified within close proximity of temporary road alignments (**Site Exigo-NIU-BP01, Site Exigo-NIU-BP02 and Site Exigo-NIU-BP03**) are of high significance and these sites might be impacted on by the proposed project. In all of these cases, the graves are situated within the Ndabakazi settlement around or very close to homesteads and dwellings. As a primary measure, the Burial Grounds and Graves (BGG) Unit of SAHRA requires a 100m conservation buffer for all burials and as such, it is recommended that temporary road alignments proposed for areas around these burials be redesigned to avoid encroaching on the required conservation buffers. In addition it is recommended that these burials be fenced off wire, chicken wire or palisade fencing of a minimum height of 1.8m placed no closer than 2m from the burials. Access gates should be erected and access control should be applied to the sites. A heritage Site Management Plan (SMP) should be compiled for the burials to stipulate conservation measures, responsible persons and chance find procedures for further heritage mitigation. The developer should carefully liaise with the heritage specialist, SAHRA as well as local communities and possible affected parties with regards to the management and monitoring of any human grave or cemetery in order to detect and manage negative impact on the sites. **Should impact on any human burial prove inevitable, full grave relocations are recommended for these burial grounds. This measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum B).**
 - Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO is recommended during planning and construction phases of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately
 - It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that the possibility of undetected archaeological remains occurring elsewhere in the project area should not be excluded. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development

Ndabakazi Interchange Upgrade Project Heritage Sites Locations

Site Code	Coordinate S E	Short Description	Mitigation Action
EXIGO-NIU-BP01	S32.34362° E28.04748°	Burial Site	Site monitoring, avoidance, 100m conservation buffer, site management. Grave relocation subject to authorisations and permitting if impacted on.
EXIGO-NIU-BP02	S32.34469° E28.05224°	Burial Site	
EXIGO-NIU-BP03	S32.34613° E28.04929°	Burial Site	
EXIGO-NIU-HP01	S32.34982° E28.03709°	Historical Period Site	Site monitoring, avoidance, 50m conservation buffer. Phase 2 Study and destruction permitting if impacted on.
EXIGO-NIU-HP02	S32.34922° E28.03807°	Historical Period Site	

This report details the methodology, limitations and recommendations relevant to these heritage areas, as well as areas of proposed development. It should be noted that recommendations and possible mitigation measures are valid for the duration of the development process, and mitigation measures might have to be implemented on additional features of heritage importance not detected during this Phase 1 assessment (e.g. uncovered during the construction process).

NOTATIONS AND TERMS/TERMINOLOGY

Absolute dating: Absolute dating provides specific dates or range of dates expressed in years.

Archaeological record: The archaeological record minimally includes all the material remains documented by archaeologists. More comprehensive definitions also include the record of culture history and everything written about the past by archaeologists.

Artefact: Entities whose characteristics result or partially result from human activity. The shape and other characteristics of the artefact are not altered by removal of the surroundings in which they are discovered. In the Southern African context examples of artefacts include potsherds, iron objects, stone tools, beads and hut remains.

Assemblage: A group of artefacts recurring together at a particular time and place, and representing the sum of human activities.

Context: An artefact's context usually consists of its immediate *matrix*, its *provenience* and its *association* with other artefacts. When found in *primary context*, the original artefact or structure was undisturbed by natural or human factors until excavation and if in *secondary context*, disturbance or displacement by later ecological action or human activities occurred.

Cultural Heritage Resource: The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

Cultural landscape: A cultural landscape refers to a distinctive geographic area with cultural significance.

Cultural Resource Management (CRM): A system of measures for safeguarding the archaeological heritage of a given area, generally applied within the framework of legislation designed to safeguard the past.

Feature: Non-portable artefacts, in other words artefacts that cannot be removed from their surroundings without destroying or altering their original form. Hearths, roads, and storage pits are examples of archaeological features

Lithic: Stone tools or waste from stone tool manufacturing found on archaeological sites.

Matrix: The material in which an artefact is situated (sediments such as sand, ashy soil, mud, water, etcetera). The matrix may be of natural origin or human-made.

Midden: Refuse that accumulates in a concentrated heap.

Microolith: A small stone tool, typically knapped of flint or chert, usually about three centimetres long or less.

Monolith: A geological feature such as a large rock, consisting of a single massive stone or rock, or a single piece of rock placed as, or within, a monument or site.

Phase 1 CRM Assessment: An Impact Assessment which identifies archaeological and heritage sites, assesses their significance and comments on the impact of a given development on the sites. Recommendations for site mitigation or conservation are also made during this phase.

Phase 2 CRM Study: In-depth studies which could include major archaeological excavations, detailed site surveys and mapping / plans of sites, including historical / architectural structures and features. Alternatively, the sampling of sites by collecting material, small test pit excavations or auger sampling is required. Mitigation / Rescue involves planning the protection of significant sites or sampling through excavation or collection (in terms of a permit) at sites that may be lost as a result of a given development.

Phase 3 CRM Measure: A Heritage Site Management Plan (for heritage conservation), is required in rare cases where the site is so important that development will not be allowed and sometimes developers are encouraged to enhance the value of the sites retained on their properties with appropriate interpretive material or displays.

Provenience: Provenience is the three-dimensional (horizontal and vertical) position in which artefacts are found. Fundamental to ascertaining the provenience of an artefact is *association*, the co-occurrence of an artefact with other archaeological remains; and *superposition*, the principle whereby artefacts in lower levels of a matrix were deposited before the artefacts found in the layers above them, and are therefore older.

Random Sampling: A probabilistic sampling strategy whereby randomly selected sample blocks in an area are surveyed. These are fixed by drawing coordinates of the sample blocks from a table of random numbers.

Site (Archaeological): A distinct spatial clustering of artefacts, features, structures, and organic and environmental remains, as the residue of human activity. These include surface sites, caves and rock shelters, larger open-air sites, sealed sites (deposits) and river deposits. Common functions of archaeological sites include living or habitation sites, kill sites, ceremonial sites, burial sites, trading, quarry, and art sites,

Stratigraphy: This principle examines and describes the observable layers of sediments and the arrangement of strata in deposits

Systematic Sampling: A probabilistic sampling strategy whereby a grid of sample blocks is set up over the survey area and each of these blocks is equally spaced and searched.

LIST OF ABBREVIATIONS

Abbreviation	Description
ASAPA	Association for South African Professional Archaeologists
AIA	Archaeological Impact Assessment
BP	Before Present
BCE	Before Common Era
BGG	Burial Grounds and Graves
CRM	Culture Resources Management
ECO	Environmental Control Officer
EIA	Early Iron Age (also Early Farmer Period)
EIA	Environmental Impact Assessment
EFP	Early Farmer Period (also Early Iron Age)
ESA	Earlier Stone Age
GIS	Geographic Information Systems
HIA	Heritage Impact Assessment
ICOMOS	International Council on Monuments and Sites
K2/Map	K2/Mapungubwe Period
LFP	Later Farmer Period (also Later Iron Age)
LIA	Later Iron Age (also Later Farmer Period)
LSA	Later Stone Age
MIA	Middle Iron Age (also Early later Farmer Period)
MSA	Middle Stone Age
NHRA	National Heritage Resources Act No.25 of 1999, Section 35
PFS	Pre-Feasibility Study
PHRA	Provincial Heritage Resources Authority
SAHRA	South African Heritage Resources Association
YCE	Years before Common Era (Present)

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1 BACKGROUND

1.1 Scope and Motivation

Exigo Sustainability was commissioned by EOH Coastal & Environmental Services for an Archaeological Impact Assessment (AIA) study subject to an Environmental Impact Assessment (EIA) process for the Ndabakazi Interchange Upgrade in the Amathole District Municipality, Eastern Cape Province. The rationale of this AIA is to determine the presence of heritage resources such as archaeological and historical sites and features, graves and places of religious and cultural significance in previously unstudied areas; to consider the impact of the proposed project on such heritage resources, and to submit appropriate recommendations with regard to the cultural resources management measures that may be required at affected sites / features.

1.2 Project Direction

Exigo Sustainability's expertise ensures that all projects be conducted to the highest international ethical and professional standards. As archaeological specialist for Exigo Sustainability, Mr Nelius Kruger acted as field director for the project; responsible for the assimilation of all information, the compilation of the final consolidated AIA report and recommendations in terms of heritage resources on the demarcated project areas. Mr Kruger is an accredited archaeologist and Culture Resources Management (CRM) practitioner with the Association of South African Professional Archaeologists (ASAPA), a member of the Society for Africanist Archaeologists (SAFA) and the Pan African Archaeological Association (PAA) as well as a Master's Degree candidate in archaeology at the University of Pretoria.

1.3 Project Brief

The South African National Roads Agency SOC Ltd. (SANRAL) is proposing the construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province. The proposed Ndabakazi Interchange development will consist of the upgrading of the existing N2 and R409 roads at the intersection as well as the construction of a new bridge over the N2 with corresponding interchange ramps. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2/R409 Bridge. In particular, the project will consist of the following:

Existing roads:

- Increasing the road reserve width from 30m to a minimum of 50m wide;
- General widening of the existing road cross section for passing lanes and 3.0m surfaced shoulders. The main carriageway is 10.4m and needs to be increased to 20.8m;
- Widening and/or new construction of existing drainage structures.
- New Interchange (called the Ndabakazi Interchange):
- Construction of a new bridge on the R409 over the N2;
- Substantial vertical geometric improvements will be required for the new N2/R409 Bridge;
- Rehabilitation of pavement structure on existing alignment and construction of new pavement on new alignment, all for which suitable material will need to be sourced;
- Cut faces requiring stabilisation

Temporary deviations:

- Temporary traffic diversion routes will be used during the construction phase of the Ndabakazi Interchange;
- The temporary diversion routes will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndabakazi Interchange;
- All temporary diversion routes will be surfaced.

Layout Alternative 1 (preferred):

The preferred layout consists of the construction of the N2 Ndabakazi Interchange as proposed, however the routing of the temporary traffic diversion roads are based on the identified sensitive areas in proximity to the proposed development. Therefore, Alternative 1 (preferred alternative) takes into consideration the existing watercourses, dams and wetlands and proposes the least impactful routing of the temporary traffic diversion roads.

Layout Alternative 2:

Layout Alternative 2 considers no changes to the original design layout of the proposed Ndabakazi Interchange.

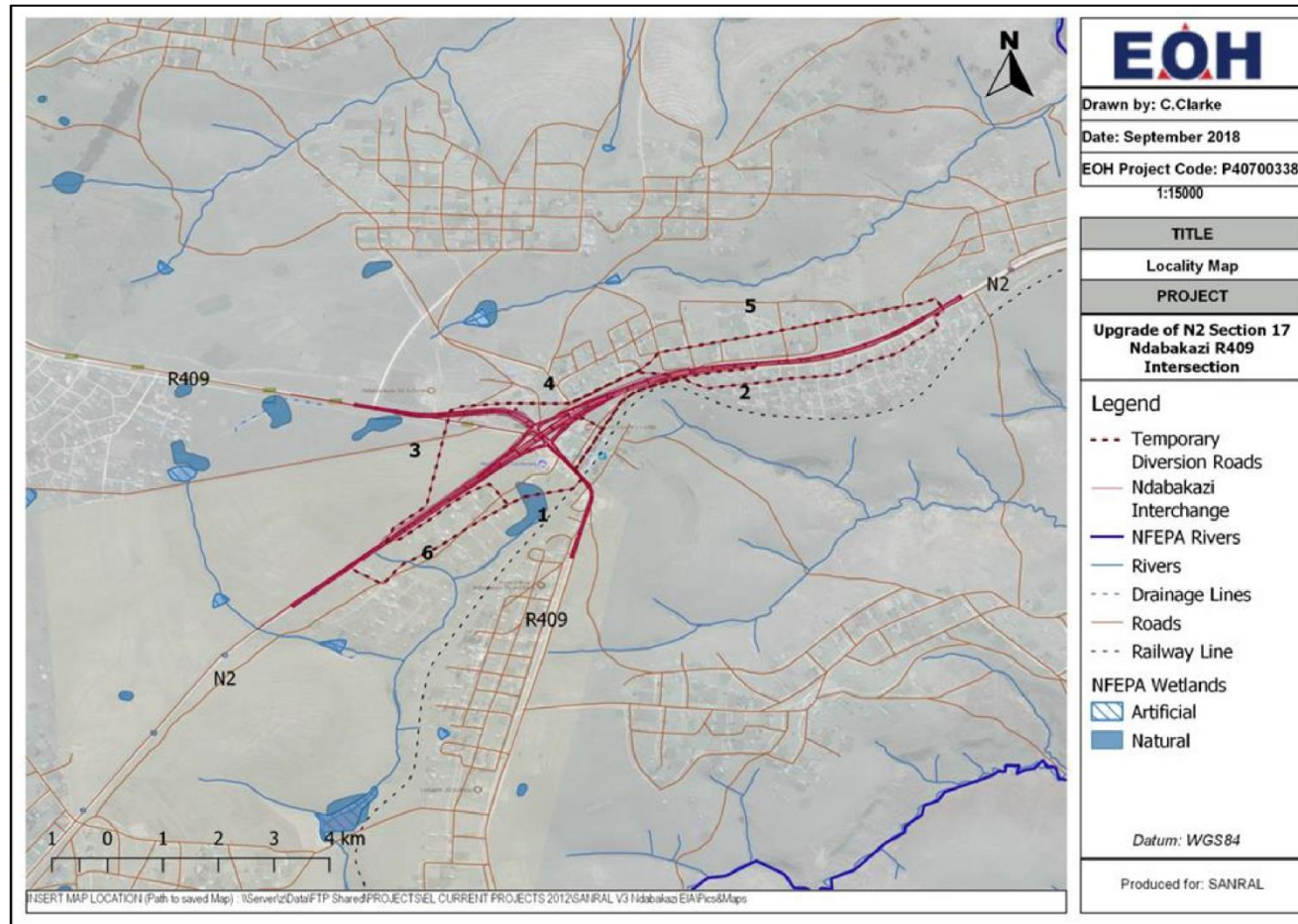


Figure 1-1: Project map indicating the extent of Ndabakazi Interchange Upgrade infrastructure components as discussed in the text.



Figure 1-2: Aerial representation of the Ndabakazi Interchange Upgrade infrastructure components as discussed in the text



Figure 1-3: Aerial representation of the Ndabakazi Interchange Upgrade infrastructure components as discussed in the text. An alternative temporary route is indicated in orange.

1.4 Terms of Reference

Heritage specialist input into the Environmental Impact Assessment (EIA) process is essential to ensure that, through the management of change, developments still conserve our heritage resources. Heritage specialist input in EIA processes can play a positive role in the development process by enriching an understanding of the past and its contribution to the present. It is also a legal requirement for certain development categories which may have an impact on heritage resources (Refer to Section 2.5.2).

Thus, EIAs should always include an assessment of heritage resources. The heritage component of the EIA is provided for in the **National Environmental Management Act, (Act 107 of 1998)** and endorsed by section 38 of the **National Heritage Resources Act (NHRA - Act 25 of 1999)**. In addition, the NHRA protects all structures and features older than 60 years, archaeological sites and material and graves as well as burial sites. The objective of this legislation is to ensure that developers implement measures to limit the potentially negative effects that the development could have on heritage resources. Based hereon, this project functioned according to the following **terms of reference for heritage specialist input**:

- *Provide a detailed description of all archaeological artefacts, structures (including graves) and settlements which may be affected, if any.*
- *Assess the nature and degree of significance of such resources within the area.*
- *Establish heritage informants/constraints to guide the development process through establishing thresholds of impact significance;*
- *Assess and rate any possible impact on the archaeological and historical remains within the area emanating from the proposed development activities.*
- *Propose possible heritage management measures provided that such action is necessitated by the development.*
- *Liaise and consult with the South African Heritage Resources Agency (SAHRA)*

1.5 CRM: Legislation, Conservation and Heritage Management

The broad generic term *Cultural Heritage Resources* refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

1.5.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and its provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

a. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act No 25 of 1999 (section 35) the following features are protected as cultural heritage resources:

- a. Archaeological artifacts, structures and sites older than 100 years

- b. Ethnographic art objects (e.g. prehistoric rock art) and ethnography
- c. Objects of decorative and visual arts
- d. Military objects, structures and sites older than 75 years
- e. Historical objects, structures and sites older than 60 years
- f. Proclaimed heritage sites
- g. Grave yards and graves older than 60 years
- h. Meteorites and fossils
- i. Objects, structures and sites of scientific or technological value.

In addition, the national estate includes the following:

- a. Places, buildings, structures and equipment of cultural significance
- b. Places to which oral traditions are attached or which are associated with living heritage
- c. Historical settlements and townscapes
- d. Landscapes and features of cultural significance
- e. Geological sites of scientific or cultural importance
- f. Archaeological and paleontological importance
- g. Graves and burial grounds
- h. Sites of significance relating to the history of slavery
- i. Movable objects (e.g. archaeological, paleontological, meteorites, geological specimens, military, ethnographic, books etc.)

With regards to activities and work on archaeological and heritage sites this Act states that:

“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority.” (34. [1] 1999:58)

and

“No person may, without a permit issued by the responsible heritage resources authority-

- (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*
- (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58).”*

and

“No person may, without a permit issued by SAHRA or a provincial heritage resources agency-

- (a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60).”*

b. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925

Graves and burial grounds are commonly divided into the following subsets:

- a. ancestral graves
- b. royal graves and graves of traditional leaders
- c. graves of victims of conflict
- d. graves designated by the Minister
- e. historical graves and cemeteries
- f. human remains

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and Ordinance on Excavations (Ordinance no. 12 of 1980) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant local authorities.

c. National Heritage Resources Act No 25 of 1999, section 35

This act (Act 107 of 1998) states that a survey and evaluation of cultural resources must be done in areas where development projects, that will change the face of the environment, will be undertaken. The impact of the development on these resources should be determined and proposals for the mitigation thereof are made. Environmental management should also take the cultural and social needs of people into account. Any disturbance of landscapes and sites that constitute the nation’s cultural heritage should be avoided as far as possible and where this is not possible the disturbance should be minimized and remedied.

1.5.2 Background to HIA and AIA Studies

South Africa’s unique and non-renewable archaeological and palaeontological heritage sites are ‘generally’ protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites.

HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

A detailed guideline of statutory terms and requirements is supplied in Addendum 1.

2 REGIONAL CONTEXT

2.1 Area Location

The project area for the Ndabakazi Interchange Upgrade is located along the N2 highway between the N2 and the R409 south-west of Butterworth within the Amathole District Municipality of the Eastern Cape Province. The town of East London is situated more or less 75km to the south and a number of small villages and settlements surround the project area. The project footprints appear on 1:50 000 map sheets **3228AC** (see Figure 2-1), more or less at the following geographical point:

- **S32.34875° E28.03525°**

2.2 Area Description: Receiving Environment

The Butterworth region is situated on the hills of the Eastern Cape grasslands south of the Drakensberg. The ecological landscape is defined as a combination of mixed grasslands and forest / scrub forest, typically dominated by mixed grassveld and forests at differing altitudes. The annual rainfall ranges between 1150 to over 1300mm per annum. The geology of the larger region is constituted by mudstones and sandstones of the Beaufort group and towards the coast, shales, mudstones and sandstones of the Ecca group, with exposures of dolerite intrusions mostly in the higher lying areas, are found. Soils in the area are moderate to deep and vary between sandy loams in the upper half to clayey loam in the downstream half. Several perennial and non-perennial streams and drainage lines, most of them originating in the surrounding hills, transect the larger landscape.

2.3 Site Description

The Ndabakazi Interchange Upgrade project area subject to the heritage assessment is situated along gradually rolling hills and plains within the rural Eastern Cape landscape. The terrain consists predominantly of valleys interrupted by large open plains of developable land with areas that have been altered where informal and formal housing, schools, shops, homesteads, crop fields, roads, a railway line and station and other infrastructure have been established. Original vegetation remains intact in river valleys and along water courses but disturbance agents such as ploughing and grazing cause severe surface erosion and decomposition of low-lying geomorphological deposits in places.

A number of villages and settlements occur around the Ndabakazi Interchange Upgrade and these include Dwarini, KwaNofodosi, Mazizini, eMarheledwaneni, Mbendeni and Ndabakazi.

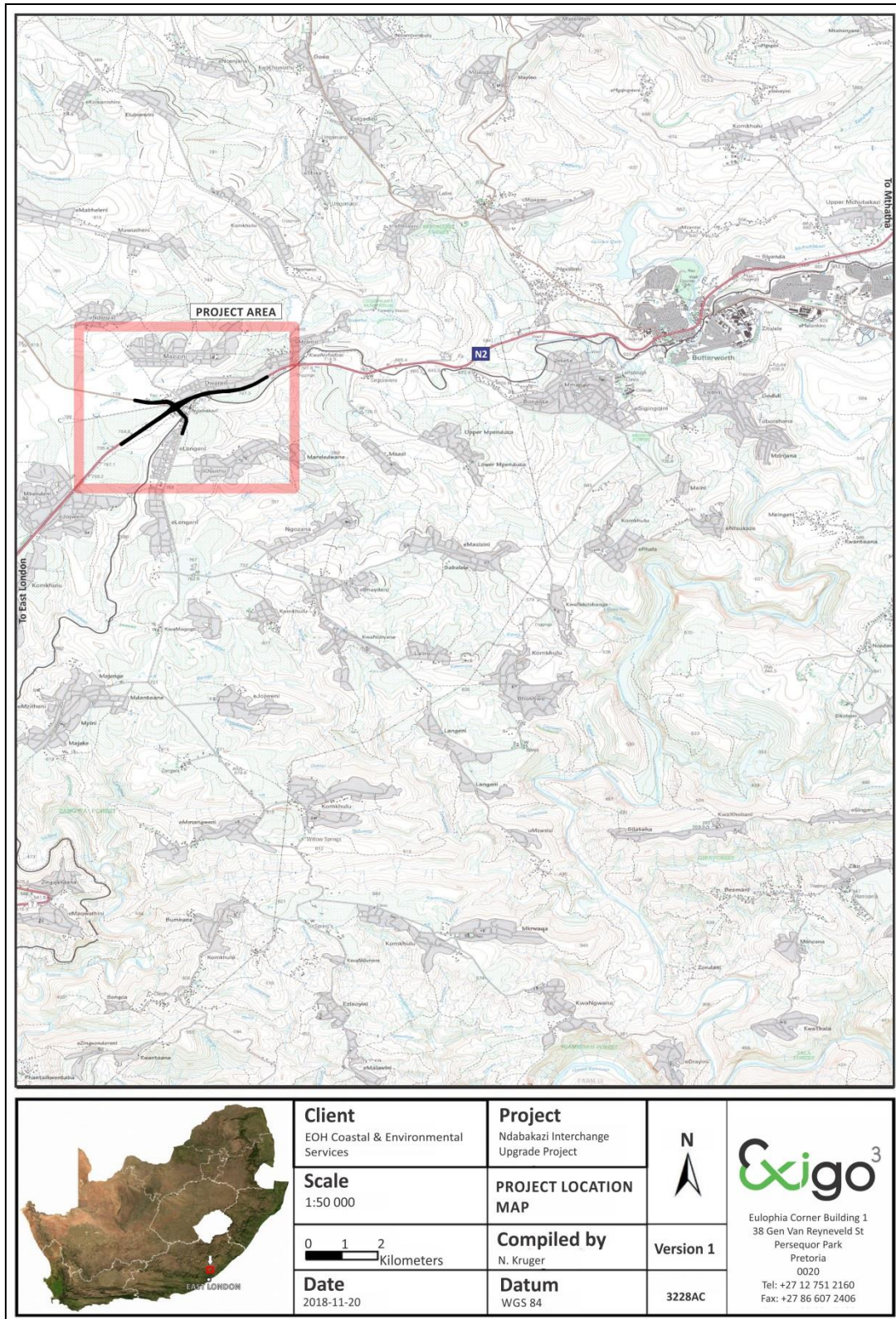


Figure 2-1: 1:50 00 Map representation of the location of the proposed Ndabakazi Interchange Upgrade (sheet 3228AC).

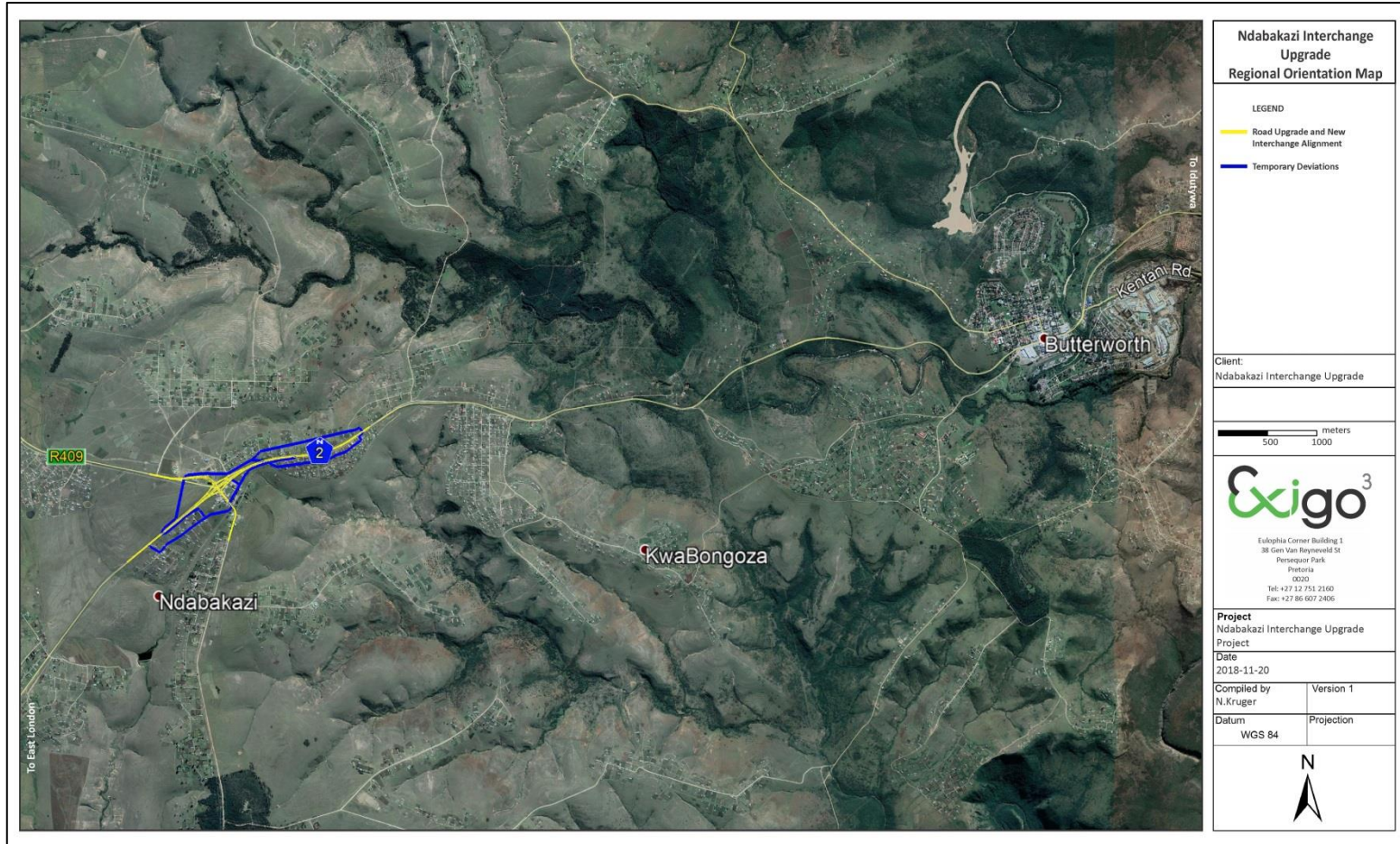


Figure 2-2: Aerial map providing a regional setting for the Ndabakazi Interchange Upgrade project locality.

3 METHOD OF ENQUIRY

3.1 Sources of Information

Data from detailed desktop, aerial and field studies were employed in order to sample surface areas systematically and to ensure a high probability of heritage sites recording.

3.1.1 Desktop Study

The larger landscape of this section of the Eastern Cape has been well documented in terms of its archaeology and history. A desktop study was prepared in order to contextualize the proposed project within a larger historical milieu. As such, the study functioned to provide a historical context for the proposed project and archival sources, aerial photographs, historical maps and local histories were used to create a baseline of the landscape's heritage. This desktop study also relied on commercially driven Heritage Assessments as well as academic papers and research articles that have been conducted in the region around the project area.

3.1.2 Aerial Representations and Survey

Aerial photography is employed to locate and study archaeological sites, particularly where larger scale area surveys are performed. This method was applied to assist the vehicular and foot site survey where depressions, variation in vegetation, soil marks and landmarks were examined. Specific attention was given to shadow sites (shadows of walls or earthworks which are visible early or late in the day), crop mark sites (crop mark sites are visible because disturbances beneath crops cause variations in their height, vigour and type) and soil marks (e.g. differently coloured or textured soil (soil marks) might indicate ploughed-out burial mounds). Attention was also given to moisture differences, as prolonged dampening of soil as a result of precipitation frequently occurs over walls or embankments. By superimposing high frequency aerial photographs with images generated with Google Earth, potential sensitive areas were subsequently identified, geo-referenced and transferred to a handheld GPS device. These areas served as referenced points from where further vehicular and pedestrian surveys were carried out. The aerial survey suggested a landscape that has been transformed over centuries by human activity relating to agriculture and settlement with more recent rural and urban developments along the N2 and Ndabakazi (see Figure 3-1).

3.1.3 Mapping of sites

Historical and current maps of the project area were examined (see Figure 3-2). By merging data obtained from the desktop study and the aerial survey, sites and areas of possible heritage potential were plotted on these maps of the larger Butterworth area using GIS software. These maps were then superimposed on high definition aerial representations in order to graphically demonstrate the geographical locations and distribution of potentially sensitive landscapes. Historical maps of the project area indicate the presence of man-made features such as homesteads, a railway line and associated buildings as well as the N2 road from at least the 1950's (see Figure 3-2).

3.1.4 Field Survey

Archaeological survey implies the systematic procedure of the identification of archaeological sites. Archaeological surveys of the alignments and routes subject to this study were conducted on 6 November 2018. The survey process encompassed field surveys in accordance with standard archaeological practice by which heritage resources are observed and documented. In order to sample surface areas systematically and to ensure a high probability of site recording, all the road alignments identified in the project scope were carefully inspected on foot and in a motor vehicle. In addition, an arbitrary 50m – 100m impact area around these buffers were also observed during the survey. GPS reference points identified during the

aerial and mapping surveys were also visited and random spot checks were made (see detail in previous section). Using a Garmin E-trex Montana GPS, the site was geo-referenced and photographed with a Samsung Digital camera. Real time aerial mapping and positioning by means of a hand-held tablet-based Google Earth application was also employed on site to investigate possible disturbed areas during the survey.

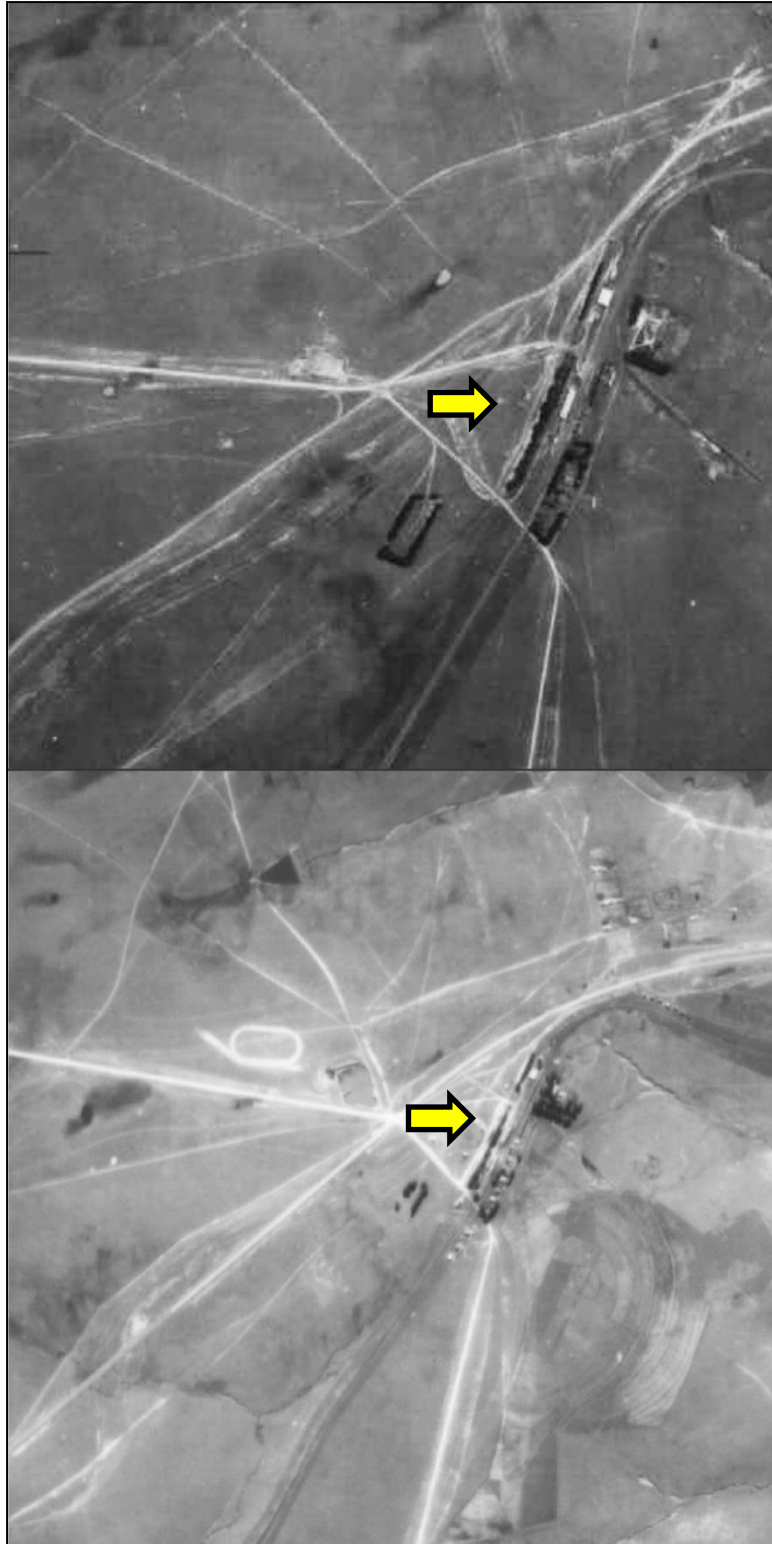


Figure 3-1: Historical aerial images dating to 1938 (top) and 1955 (bottom) indicating the development area within the historical landscape. Note the presence of the Ndabakazi railway station buildings (yellow arrow).

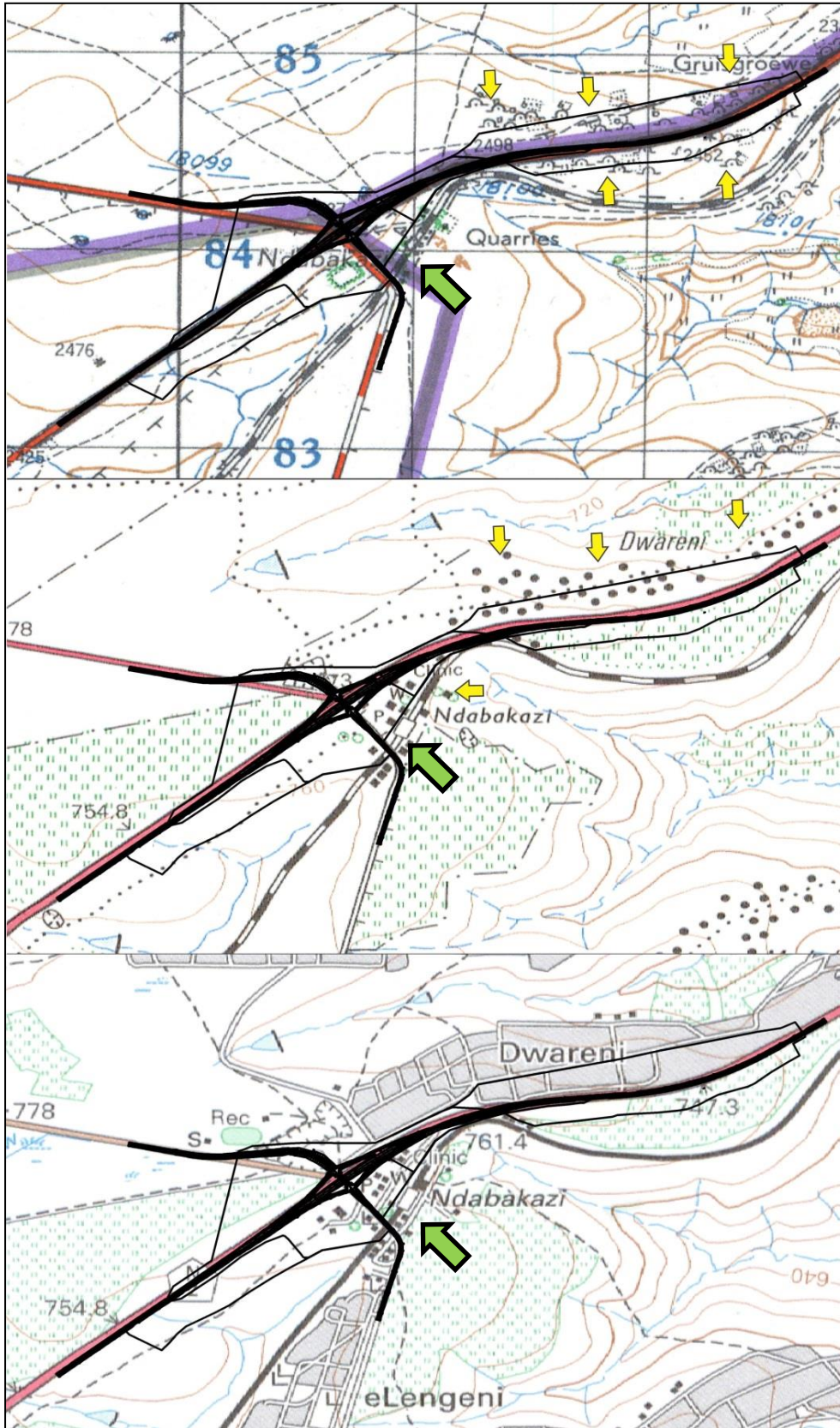


Figure 3-2: Historical topographic maps dating to 1945 (top), 1976 (middle) and 1996 (bottom) indicating the Ndabakazi area within the historical landscape. Note the presence of homesteads and dwellings along the N2 on earlier maps (yellow arrows) as well as the occurrence of the Ndabakazi railway station buildings (green arrow).

3.2 Limitations

3.2.1 Access

The survey zones subject to this survey are accessed either from the N2 of interconnecting regional and local roads. Access control is not applied to the survey areas and no restrictions were encountered during the site visits in terms of access.

3.2.2 Visibility

The surrounding vegetation in the project area is mostly comprised out of mixed grassland, trees and scrubs and riparian vegetation in river valleys. The general visibility at the time of the AIA survey (November 2018) ranged from moderate in densely vegetated areas to high in transformed and inhabited regions (see Figures 3-3 to 3-18). In single cases during the survey sub-surface inspection was possible. Where applied, this revealed no archaeological deposits.



Figure 3-3: View of an existing village road to be upgraded as temporary road in Ndabakazi.



Figure 3-4: View of the general landscape in the project area around the village of Ndabakazi.



Figure 3-5: View of a dirt road to be upgraded as temporary road in Ndabakazi.



Figure 3-6: View of the current Ndabakazi N2 intersection, to be upgraded.



Figure 3-7: View of an open field south of Ndabakazi where a temporary road will be constructed.



Figure 3-8: View of a small quarry along the proposed Ndabakazi N2 intersection upgrade sites.



Figure 3-9: View of an existing village road through an industrial zone of Ndabakazi, be upgraded as temporary road.



Figure 3-10: View of a dirt road along the N2 (left) to be upgraded as temporary road in Ndabakazi.



Figure 3-11: View of an open erf north of Ndabakazi where a temporary road will be constructed.



Figure 3-12: View of a dirt road along the N2 (right) to be upgraded as temporary road in Ndabakazi.



Figure 3-13: View of an open field south of Ndabakazi where a temporary road will be constructed.



Figure 3-14: View of an open field south-east of Ndabakazi where a temporary road will be constructed.



Figure 3-15: View of a small industrial zone at the current Ndabakazi N2 intersection, to be upgraded.



Figure 3-16: View of a dirt road along the N2 (left) to be upgraded as temporary road. Ndabakazi is visible in the distance.



Figure 3-17: View of the N2 to be upgraded at Ndabakazi.

3.2.3 Limitations and Constraints Summary

The foot and vehicular site survey for the Ndabakazi Interchange Upgrade primarily focused around areas of potential heritage sensitivity as well as areas of high human settlement catchment probability (for example, in association with vegetation changes or around soil disturbances).

- **Visibility** proved to be a minor constraint where denser surface cover obscured surface occurrences.

Even though it might be assumed that survey findings are representative of the heritage landscape of the project area for the Ndabakazi Interchange Upgrade, it should be stated that the possibility exists that individual sites could be missed due to the localised nature of some heritage remains as well as the possible presence of sub-surface archaeology. Therefore, maintaining due cognisance of the integrity and accuracy of the archaeological survey, it should be stated that the heritage resources identified during the study do not necessarily represent all the heritage resources present in the project area. The subterranean nature of some archaeological sites, dense vegetation cover and visibility constraints sometimes distort heritage representations and any additional heritage resources located during consequent development phases must be reported to the Heritage Resources Authority or an archaeological specialist.

3.3 Impact Assessment

For consistency among specialists, impact assessment ratings by Exigo Specialists are generally done using the Plomp¹ impact assessment matrix scale supplied by Exigo. According to this matrix scale, each heritage receptor in the project area is given an impact assessment. An assessment of potential heritage impacts for the proposed project is included in this report (see Section 6).

¹ Plomp, H., 2004

4 ARCHAEO-HISTORICAL CONTEXT

4.1 The archaeology of Southern Africa

Archaeology in Southern Africa is typically divided into two main fields of study, the **Stone Age** and the **Iron Age** or **Farmer Period**. The following table provides a concise outline of the chronological sequence of periods, events, cultural groups and material expressions in Southern African pre-history and history.

Table 1 Chronological Periods across Southern Africa

Period	Epoch	Associated cultural groups	Typical Material Expressions
Early Stone Age 2.5m – 250 000 YCE	Pleistocene	Early Hominins: <i>Australopithecines</i> <i>Homo habilis</i> <i>Homo erectus</i>	Typically large stone tools such as hand axes, choppers and cleavers.
Middle Stone Age 250 000 – 25 000 YCE	Pleistocene	First <i>Homo sapiens</i> species	Typically smaller stone tools such as scrapers, blades and points.
Late Stone Age 20 000 BC – present	Pleistocene / Holocene	<i>Homo sapiens sapiens</i> including San people	Typically small to minute stone tools such as arrow heads, points and bladelets.
Early Iron Age / Early Farmer Period 300 – 900 AD	Holocene	First Bantu-speaking groups	Typically distinct ceramics, bead ware, iron objects, grinding stones.
Middle Iron Age (Mapungubwe / K2) / early Later Farmer Period 900 – 1350 AD	Holocene	Bantu-speaking groups, ancestors of present-day groups	Typically distinct ceramics, bead ware and iron / gold / copper objects, trade goods and grinding stones.
Late Iron Age / Later Farmer Period 1400 AD -1850 AD	Holocene	Various Bantu-speaking groups including Venda, Thonga, Sotho-Tswana and Zulu	Distinct ceramics, grinding stones, iron objects, trade objects, remains of iron smelting activities including iron smelting furnace, iron slag and residue as well as iron ore.
Historical / Colonial Period ±1850 AD – present	Holocene	Various Bantu-speaking groups as well as European farmers, settlers and explorers	Remains of historical structures e.g. homesteads, missionary schools etc. as well as, glass, porcelain, metal and ceramics.

4.2 The Eastern Cape and Landscape: Specific Themes.

The archaeological history of the Eastern Cape Province dates back to about 2 million years and possibly older. Several archaeological sites have been recorded in the landscape around Barkly East. The Albany Museum database holds limited information of archaeological sites for the north Eastern Cape, however, records are held at several institutions including the University of the Transkei (now Walter Sisulu University), the University of Fort Hare, and the Rock Art Research Institute at the University of the Witwatersrand. The literature shows evidence of an archaeological heritage that spans from the Early Stone Age, Middle Stone Age to the Later- Stone, as well as evidence of pastoralism and Iron Age farmers. Rock paintings are prolific throughout Southern Drakensberg Mountains. The region is also significant historically as a frontier between hunter-gatherers, pastoralists, Nguni-speaking farming communities and European settlers. White farmers, settling in the area since the middle of the 19th century, divided up the landscape into a number of farms, which even today form the framework for agricultural, residential and other forms of development.

4.2.1 The Stone Ages

The Earlier Stone Age, from between 1.5 million and 250 000 years ago, refers to the earliest that *Homo sapiens sapiens'* predecessors began making stone tools. The earliest stone tool industry was referred to as the Olduvan Industry, originating from stone artefacts recorded at Olduvai Gorge, Tanzania. The Acheulian Industry, the predominant Southern African Early Stone Age Industry, which replaced the Olduvan Industry approximately 1.5 million years ago, is attested to in diverse environments and over wide geographical areas. The hallmark of the Acheulian Industry is its large cutting tools (LCTs or bifaces), primarily handaxes and cleavers. The most well-known Early Stone Age site in Southern Africa is Amanzi Springs, situated about 10km north-east of Uitenhage, near Port Elizabeth (Deacon 1970). In a series of spring deposits a large number of stone tools were found in situ to a depth of 3-4m. Wood and seed material preserved remarkably very well within the spring deposits, and possibly date to between 800 000 to 250 000 years old. Large stone ESA tools are often found associated with the gravels in the area, and were later replaced by smaller stone tools called the Middle Stone Age (MSA) flake and blades industries.

The Middle Stone Age (MSA) spans a period from 250 000-30 000 years ago and focuses on the emergence of modern humans through the change in technology, behaviour, physical appearance, art and symbolism. The large handaxes and cleavers were replaced by smaller stone artefacts called the MSA flake and blade industries. Surface scatters of these flake and blade industries occur widespread across Southern Africa. The majority of MSA sites occur on flood plains and sometimes in caves and rock shelters. Sites usually consist of large concentrations of knapped stone flakes such as scrapers, points and blades and associated manufacturing debris.

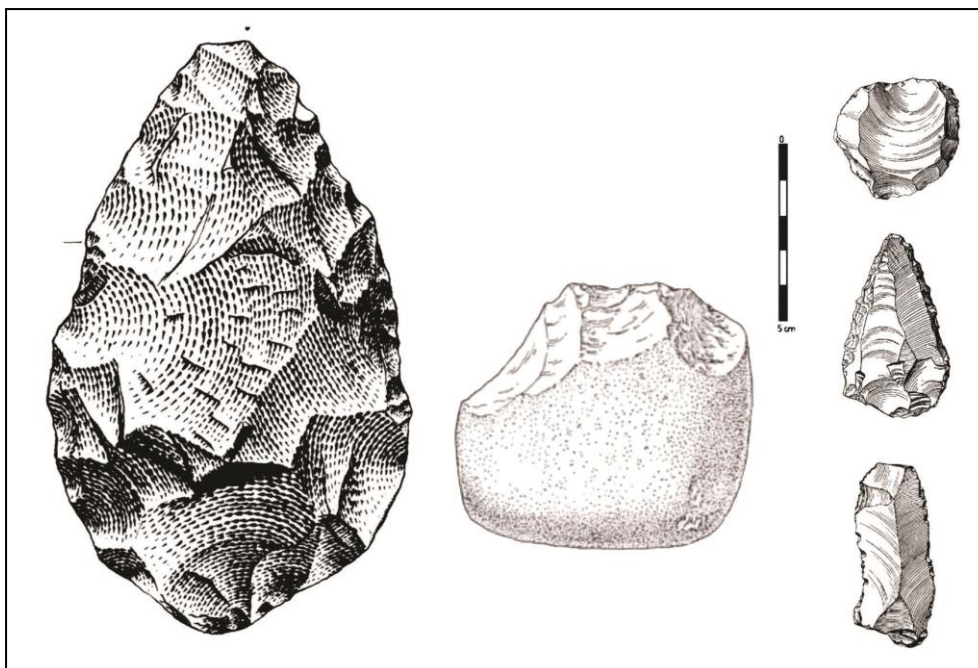


Figure 4-1: Typical ESA handaxe (left) and cleaver (center). To the right is a MSA scraper (right, top), point (right, middle) and blade (right, bottom).

The Later Stone Age (LSA) spans the period from about 20 000 years ago until the colonial era, although some communities continue making stone tools today. The period between 30 000 and 20 000 years ago is referred to as the transition from the MSA to LSA; although there is a lack of crucial sites and evidence that represent this change. The LSA is marked by a series of technological innovations, new tools and artefacts, the development of economic, political and social systems, and core symbolic beliefs and rituals. The stone

toolkits changed over time according to time-specific needs and raw material availability, from smaller microlithic Robberg, Wilton Industries and in between, the larger Albany/Oakhurst and the Kabeljous Industries. Bored stones used as part of digging sticks, grooved stones for sharpening and grinding and stone tools fixed to handles with mastic also become more common. Fishing equipment such as hooks, gorges and sinkers also appear within archaeological excavations. Most importantly bows and arrows revolutionized the hunting economy. It was only within the last 2000 years that earthenware pottery was introduced. Before then tortoiseshell bowls were used for cooking and ostrich eggshell (OES) flasks were used for storing water. Sites dating to the LSA are better preserved in rock shelters, although open sites with scatters of mainly stone tools can occur. Well-protected deposits in shelters allow for stable conditions that result in the preservation of organic materials such as wood, bone, hearths, ostrich eggshell beads and even bedding material.

Human habitation of the Eastern Cape area dates back as far as the earlier Stone Age. Early humans lived here for thousands of years from the Early Stone Age, through what is known as the Middle Stone Age and well into the Late Stone Age. The majority of Stone Age finds are classified as isolated surface occurrences, and mostly date to the Middle Stone Age. Based on the research by Sampson (1972) and Macfarlane (1945) it was anticipated that archaeological material on the farm would date from the ESA, MSA and LSA. We expected to possibly find Acheulian artefacts in the river gravels and along the banks of the river, with MSA and LSA artefacts scattered over the hillsides and ridges. It was also anticipated that traces of Khoekhoe occupation in the area may still be visible. It is known that these herding groups often followed the larger rivers as part of their migration patterns. Extensive research has been undertaken in the Seacow Valley, south west of the survey area, documenting the movements of these herders on the landscape (Sampson 1996). Herders appeared in the area during the mid-first millennium AD (Mitchell 2002). Habitation sites are poorly understood, but some of the stone kraals on the landscape probably relate to these groups. It is also known that Khoekhoe burials are sometimes visible, especially if they are marked with a cairn of stones. Pottery linked to stone kraals of cave sites could also be an indication of a Khoekhoe presence in the area.

Later Stone Age (LSA) sites occur both at the coast and inland as caves deposits, rock shelters, open sites and shell deposits. The majority of LSA archaeological sites in the Eastern Cape area would date from the past 10 000 years where San hunter-gatherers inhabited the landscape living in rock shelters and caves as well as on the open landscape. These latter sites are difficult to find because they are in the open veld and often covered by vegetation and sand. Sometimes these sites are only represented by a few stone tools and fragments of bone. The Southern Drakensberg was occupied by hunter-gatherers before 10 000 BP (Opperman 1987) but was subsequently abandoned in the Holocene after ca. 6 000 BP, only to be re-occupied by 3 000 BP (Tusenius 1989). Ecological evidence suggests that the southern Drakensberg may have been too dry to support the animals and plants needed for the existence of hunter-gatherer people between 6 000 and some time before 3 000 BP (Tusenius 1989). The north-eastern Cape forms a link between the better watered eastern half of South Africa and the drier west. The wettest conditions apparently existed around 2700 BP, probably correlating with an increase in human occupation in the Southern Drakensberg following the possible abandonment of that area during the dry phase(s) of preceding millennia (Rosen et al. 1999). The succession of stone artefact Industries within the LSA of the Drakensberg region of the north-eastern Cape demonstrates that the resources of this area, which is characterized by a steep ecological gradient, were consistently exploited throughout end Pleistocene and Holocene following the amelioration of conditions after the cold maximum of the Late Pleistocene. The culture stratigraphic sequence is very comparable to that recorded in Lesotho, the middle Orange River basin and the southern and Eastern Cape (Opperman 1982). Bonawe (Opperman 1982) is a rock shelter situated below the escarpment about 7 km west of the town of Elliot. The site has been radiocarbon dated to 8 040 ± 100 B.P. and contained end-Pleistocene and Holocene

material. Te Vrede is also a rock shelter situated below the escarpment near Ugie and was dated to 10 000 +- 120 B.P. and 8 100 +-80 Pta-3204, containing end Pleistocene and Holocene material (Opperman 1982). The sites of Colwinton, Ravenscraig, Prospect and Wartrail occur above the escarpment within the Barkly East District north of the proposed area for development. Colwinton Rock Shelter contained end Pleistocene and Holocene material including faunal remains, stone artefacts and pottery (Opperman 1982). The stone tool analysis reveals a sequence of three industries in cultural sequence of the southern and eastern Cape, Lesotho and Middle Orange River.

The renowned San rock paintings of the Drakensberg region also belongs to the LSA period- although the majority were made between 4000 years ago and about 120 years ago. Rock Art can be in the form of rock paintings or rock engravings. Rock paintings occur on the walls of caves and rock shelters across southern Africa and are prolific in the Southern Drakensberg, north-eastern Cape extending the entire Drakensberg range into KwaZulu-Natal and Lesotho. Rock engravings are limited to the Karoo and Northern Cape Regions and do not generally occur within the north Eastern Cape region and former Transkei region. Rock art research within the Southern Drakensberg has been conducted by several researchers and students from the Rock Art Research Institute, University of the Witwatersrand, over a period of 25 years, with a well-established database of site from Maclear, Tsolo, Barkly East, Ugie, Dordrecht and the wider region and extent of the Drakensberg range and Maluti Mountains.

4.2.2 Rock Art

The central Eastern Cape Province is unique in South Africa in that San rock art here consists of both paintings as well as engravings. The vast majority of rock paintings in the Eastern Cape are attributed to the Later Stone Age period or to the San hunter-gatherers and their immediate predecessors. Nevertheless schematic finger paintings do occur near Queenstown (Derricourt 1971) and these may be attributed to Khoekhoen pastoralists rather than San. Today researchers agree that most of the San art depicts the religious world of the San. The art is highly symbolic rather than narrative and contains metaphors relating to the spirit-world as experienced by San medicine people or shamans.

4.2.3 Pastoralism in the Eastern Cape

As noted above, Khoekhoe pastoralists or herders entered southern Africa about 2000 years ago, with domestic animals such as fat-tailed sheep and goats, travelling through the south towards the coast. Their economic systems were directed by the accumulation of wealth in domestic stock numbers and their political make-up was more hierarchical than that of the hunter-gatherers. The most significant Khoekhoe pastoralist sites in the Eastern Cape include Scott's Cave near Patensie (Deacon 1967), Goedgeloof shell midden along the St. Francis coast (Binneman 2007) and Oakleigh rock shelter near Queenstown (Derricourt 1977). Often, these archaeological sites are found close to the banks of large streams and rivers. Little detailed pastoralist research has been conducted within the Elliot area, except for the incidences of ceramics recorded during excavations. Coiwinton Rock Shelter situated north towards Barkly East above the escarpment yielded evidence of pre-agriculturalist ceramics within the excavation as well as at Bonawe Rock Shelter west of the town of Elliot (Opperman 1982; Mazel 1992).

4.2.4 The Iron Age Farmer Period

The beginnings of the Iron Age (Farmer Period) in southern Africa are associated with the arrival of a new Bantu speaking population group at around the third century AD. These newcomers introduced a new way of life into areas that were occupied by Later Stone Age hunter-gatherers and Khoekhoe herders. Distinctive features of the Iron Age are a settled village life, food production (agriculture and animal husbandry), metallurgy (the mining, smelting and working of iron, copper and gold) and the manufacture

of pottery. Iron Age farming communities generally preferred to occupy river valleys within the eastern half of southern Africa owing to the summer-rainfall climate that was conducive for growing millet and sorghum. Even though much research has been conducted on the Iron Age (IA) across southern Africa, only a small portion has focused on the Eastern Cape. A few important Eastern Cape Early Iron Age Sites (EIA) sites include Kulubele situated in the Kei River Valley near Khomga (Binneman 1996), Ntsitsana situated in the interior Transkei, 70 km west of the coast, along the Mzimvubu River (Prins & Granger 1993), and Canasta Place situated on the west bank of the Buffalo River (Nogwaza 1994). Previous investigations into the EIA in the Transkei and Ciskei include work at Buffalo River Mouth (Wells 1934; Laidler 1935), at Chalumna River Mouth (Derricourt 1977) and additional research by Feely (1987) and Prins (1989). The first EIA farming communities during the first millennium AD preferred to occupy river valleys within the eastern half of southern Africa owing to the summer-rainfall climate that was conducive for growing millet and sorghum. The closest documented and well-researched Early Iron Age site, to Elliot is located within the Great Kei River Valley. The site is situated some 200 m below the plateau and 60 km inland from the coast, within the borders of the Transkei, approximately 100 km up the coast towards Durban. There has in the past been some speculation that Early Iron Age populations may have spread well south of the Transkei into the Ciskei, possibly up to the Great Fish River (Binneman et al. 1992), however, no further research has been undertaken to confirm these statements. A closer Early Iron Age site has been documented to the south of East London (Cronin 1982). Thicker and decorated pottery sherds, kraals, possible remains of domesticated animals, upper and lower grindstones and storage pits are associated for identifying EIA sites. The sites are generally large settlements, but the archaeological visibility may in most cases be difficult owing to the organic nature of the homesteads. Metal and iron implements are also associated with EIA communities.

The Later Iron Age (LIA) is not only distinguished from the EIA by greater regional diversity of pottery styles but is also marked by extensive stone wall settlements. LIA sites in the Eastern Cape Province occur adjacent to the major rivers in low lying river valleys but also along ridge crests above the 800m contour. The LIA in the project area can be ascribed to the Mpondomise, Thembu, and Xhosa tribal clusters or their immediate predecessors (Feely 1987). It is also possible that some stone walled sites, especially those incorporating shelters or caves, were constructed by hybrid San/Nguni groups. Trade played a major role in the economy of LIA societies. Goods were traded locally and over long distances. The main trade goods included metal, salt, grain, cattle and thatch. This led to the establishment of economically driven centres and the growth of trade wealth. Keeping of domestic animals, metal work and the cultivation of crops continued with a change in the organisation of economic activities (Maggs, 1989; Huffman 2007). Hilltop settlements are mainly associated with LIA settlement patterns that occurred during the second millennium AD. Later Iron Age settlements have been formally recorded by the Albany Museum and cover a relatively extended area in comparison with the Early Iron Age settlement patterns. With the exception of the Tembu, stone buildings which characterizes the Iron Age sites of Sotho areas, is absent in the Transkei and Ciskei, and a pattern of some mobility without, it is presumed, a stone working technology of significance, makes the allocation of sites a major problem (Derricourt 1973).

4.2.5 The Frontier Wars

A series of clashes historically known as, Frontier Wars date back to 1779 when Xhosa people, Boers, Khoikhoi, San and the British clashed intermittently for nearly a hundred years. This was largely due to colonial expansion which in turn dispossessed Xhosa and Khoikhoi people of their land and cattle among other things. Although periods between the wars were relatively calm, there were incidents of minor skirmishes sparked by stock theft. In addition, alleged violations of signed or verbal agreements played a vital role in sparking the incidents of armed confrontations. Colonists also sought to consolidate their gains

through the presence of military force as witnessed in the building of forts, garrisons, military posts and signal towers. Resistance from particularly the Xhosa was a cohesive one; other Xhosa ethnic groups cooperated with the colonial government when they felt doing so would advance their own interests.

During the early years before Dutch occupation of the region, the Xhosa, Khoikhoi and San people focused primarily on hunting, agriculture and stock farming. In the 1700s, the lack of sufficient space for proper stock farming forced the farmers to pack their possessions into their ox wagons and move deeper into the interior of the Cape Colony. These farmers were called a "Trek boers" (Migrant farmers). Until 1750 (29 years before the First Frontier War), migrant farmers rapidly advanced rapidly into the interior using force. For instance, the use of superior weapons such as guns quickly subdued resistance from local people. Those people who were subdued and those submitted to Trek Boers as an attempt to protect their livestock and land were employed to tend to the cattle and provide other labour needs of the white farmers. However, the Dutch East India Company (V.O.C.) became worried about the migrant farmers moving so far because it became increasingly difficult to exercise any authority over them. In order to maintain its authority, the V.O.C. was forced to follow in their tracks. This constant moving also resulted in the V.O.C. having to continually change the boundaries of the eastern part of the Cape Colony. Eventually, in 1778 less than a year into the First Frontier War, the Great Fish River became the eastern frontier. It was also here that the migrant farmers first experienced problems with the Xhosa. Until that time, the migrant farmers had only experienced serious clashes with the San people when the San attacked them with poisoned arrows and hunted their cattle. The migrant farmers frequently organized hunting parties in reprisal for the San attacks. When the frontier farmers, as they were now called, met with the Xhosa, serious clashes broke out. Each group felt that the other was intruding on their territory and disrupting their livelihood, and both wanted to protect themselves at all costs. The V.O.C. established new districts such as Swellendam and Graaff- Reinet in order to maintain authority over the frontier and to quell the ongoing violence, but to no avail. The frontier farmers kept on moving across the border and the Xhosa vigorously resisted this incursion. A number of wars followed as both groups fought each other over territory and resources.

4.2.6 Historical and Colonial Times and Recent History

The Historical period in Southern Africa encompass the course of Europe's discovery of South Africa and the spreading of European settlements along the East Coast and subsequently into the interior. In addition, the formation stages of this period are marked by the large scale movements of various Bantu-speaking groups in the interior of South Africa, which profoundly influenced the course of European settlement. Bantu migration was mainly as a result of political upheaval during the mfecane ("the crushing" in Nguni). This was a period of bloody tribal and faction struggles in the interior of South Africa. The first Europeans in the area would have been the 'trekboers' looking for grazing for their cattle in the 18th and 19th centuries. The permanent settlement of white farmers in the general vicinity of Butterworth would have resulted in the proclamation of individual farms and the establishment of permanent farmsteads. Features that can typically be associated with early farming history of the area include farm dwellings, sheds, rectangular stone kraals, canals, farm labourer accommodation and cemeteries. Named after Joseph Butterworth, the town of Butterworth was first established as a Wesleyan mission station in 1827 north of the Great Kei River in British Kaffraria. Even though the mission station and Colonial settlement of Butterworth was repeatedly destroyed during the Cape Frontier Wars, it is one of the oldest Colonial settlements in Eastern Cape. The town was close to the seat of Hintska ka Khawuta, chief of the Gcaleka people of the Xhosa group. At the end of the Frontier Wars in 1878, traders began to settle here and the town has grown to become a small industrial centre, becoming a municipality of the Cape Colony in 1904. The town was incorporated into the former Transkei "bantustan" during the apartheid years.

5 RESULTS: ARCHAEOLOGICAL SURVEY

In terms of heritage resources, the landscape around the project area is primarily well known for the occurrence of Iron Age Farmer and Historical Period sites. The landscape around the proposed Ndabakazi Interchange Upgrade alignments remains pristine in places with the regular occurrence of transformed zones as a result of agriculture and ruralisation. A number of occurrences of heritage potential were nonetheless identified in the project area and these were coded “**Exigo-NIU-HP**” (Exigo Ndabakazi Interchange Upgrade Historical Period) and “**Exigo-NIU-BP**” (Exigo Ndabakazi Interchange Upgrade Burial Place).

5.1 The Stone Age

Stone Age remains associated with caves, outcrops/hills and river courses are known to exist in the larger Eastern Cape landscape. However, no stone tools or associated material culture or evidence of any factory or workshop site were found in the project areas.

5.2 The Iron Age Farmer Period

A frontier zone between the east and the west, the Eastern Cape around the project area is rich in precolonial Iron Age Farmer Period remnants. However, the site inspection identified no Iron Age farmer sites.

5.3 Colonial / Historical Period Sites

European and local farming communities settled in the former Trans-Kei during region during the Colonial Period in the last centuries. The project area remained rural for the largest part of the previous century but aerial imagery dating to the first part of the 20th century as well as similar topographic maps indicate the occurrence of Historical Period sites and structures - notably a railway station and associated buildings.



Figure 5-1: Historical aerial photo dating to 1938 (left), 1955 (centre) and 2017 (right) indicating the presence of the Historical Period station undoing's at Site Exigo-NIU-HP01 and Site Exigo-NIU-HP02 during that time.

- **Site Exigo-NIU-HP01: Historical / Colonial Period Building**
S32.34982° E28.03709°

A relatively small, free-standing building dating to the Historical Period occurs on a fenced-off property along a gravel road demarcated to be used as a temporary road for the project in the Ndabakazi. The multi room buildings building was constructed out of plastered up brick with a pitched corrugated iron roof, metal window frames and wooden doors. A large corrugated iron rainwater tank occurs next to the building. The building is relatively well preserved and its general appearance resembles later Historical / Colonial Period architecture of the rural areas in the Eastern Cape. Considering the building's proximity to the old railway station to the east, the structure was probably used for a function relation to the railway

operations of the area in the previous century. An analysis of historical topographical maps and aerial photographs indicate the presence of the building by at least 1942 and the structure is older than 60 years - and generally protected under the National Heritage Resource Act (NHRA 1999). The structure might afford a better understanding of architectural, settlement and social developments in the Ndabakazi landscape and the site is of medium heritage significance. A permit for the destruction of the structures is required subject to the NHRA should the site be impacted on by the proposed construction of temporary roads in the area.



Figure 5-2: The Historical Period building noted at Site Exigo-NIU-HP01.

- **Site Exigo-NIU-HP02: Historical / Colonial Period Buildings**
S32.34922° E28.03807°

The old Ndabakazi railway station, consisting of Historical Period buildings occurs in the proximity of a gravel road demarcated to be used as a temporary road for the project in the Ndabakazi. At the site, a plastered up brick building with pitched corrugated iron roof as well as a large corrugated iron shed occur along the old railway apron. The buildings display typical of Historical Period architecture of the rural areas in the Eastern Cape. It might be assumed that the buildings, unfortunately in a somewhat dilapidated state of preservation, were constructed during the first part of the 20th century where an analysis of historical topographical maps and aerial photographs indicate the presence of the compound by at least 1940. The structures are older than 60 years and generally protected under the National Heritage Resource Act (NHRA 1999). The site affords a better understanding of architectural, industrial and social developments in the Ndabakazi landscape and it is of medium heritage significance. As such, a permit for the destruction of the structures is required subject to the NHRA should these sites be impacted on by the proposed construction of temporary roads in the area.



Figure 5-3: View of the Historical Period Ndabakazi station building at Site Exigo-NIU-HP02.



Figure 5-4: View of the Historical Period railway shed at Site Exigo-NIU-HP02

5.4 Graves / Human Burial Sites

At least 3 burial sites were documented in the Ndabakazi survey area subject to this assessment. The burial places hold various numbers of graves, some of which are unmarked.

- **Site Exigo-NIU-BP01: Burial Site**
S32.34362° E28.04748°

A single grave occurs on a plot along a gravel road demarcated to be used as a temporary road for the project in Ndabakazi, north of the N2. The burial is indicated by a rectangular concrete slab with a marked marble headstone, which has since collapsed, placed on one side. The headstone indicates that the grave belongs to a member of the Mnguphane family and the date of passing is provided as 1949. The grave occurs in a fenced off Erf and the condition of the burial is fair. The burial site is of high heritage significance, it is situated in close proximity of proposed temporary road alignment and a conservation buffer should be observed. Alternatively, the burials should be relocated according to the applicable social and statutory requirements, should impact prove inevitable.



Figure 5-5: View of a burial site at Site Exigo-NIU-BP01.

- **Site Exigo-NIU-BP02: Burial Site**
S32.34469° E28.05224°

Three graves occur in an open field on a plot along a gravel road demarcated to be used as a temporary road for the project in Ndabakazi, south of the N2. One of the burial sites – a double grave - is indicated by a rectangular concrete slab and a single grave dressing with a marked marble headstone is placed on one of the graves. The headstone indicates that the particular grave belongs to a member of the Mpumezo family and the date of passing is provided as 2010. Another unmarked grave occurs at the site, the burial is indicated by a soil mound enclosed in an iron fence. The burial sites occur in a fenced off Erf and the condition of the burials is fair. The burial site is of high heritage significance, it is situated in close proximity of proposed temporary road alignment and a conservation buffer should be observed. Alternatively, the burials should be relocated according to the applicable social and statutory requirements, should impact prove inevitable.



Figure 5-6: View of a burial at Site Exigo-NIU-BP02.

- **Site Exigo-NIU-BP03: Burial Site**
S32.34613° E28.04929°

Another single grave occurs in an open field on a plot near along a gravel road demarcated to be used as a temporary road for the project in Ndabakazi, south of the N2. The burial, which is enclosed in an iron fence, is indicated by a rectangular marble grave dressing filled in with gravel with a marked marble headstone, placed on one side. The headstone indicates that the grave belongs to a member of the Ntungwa family and the date of passing is provided as 2008. The grave occurs in a fenced off Erf and the condition of the burial is fair. The burial site is of high heritage significance, it is situated in close proximity of proposed temporary road alignment and a conservation buffer should be observed. Alternatively, the burials should be relocated according to the applicable social and statutory requirements, should impact prove inevitable.



Figure 5-7: View of a burial at Site Exigo-NIU-BP03.

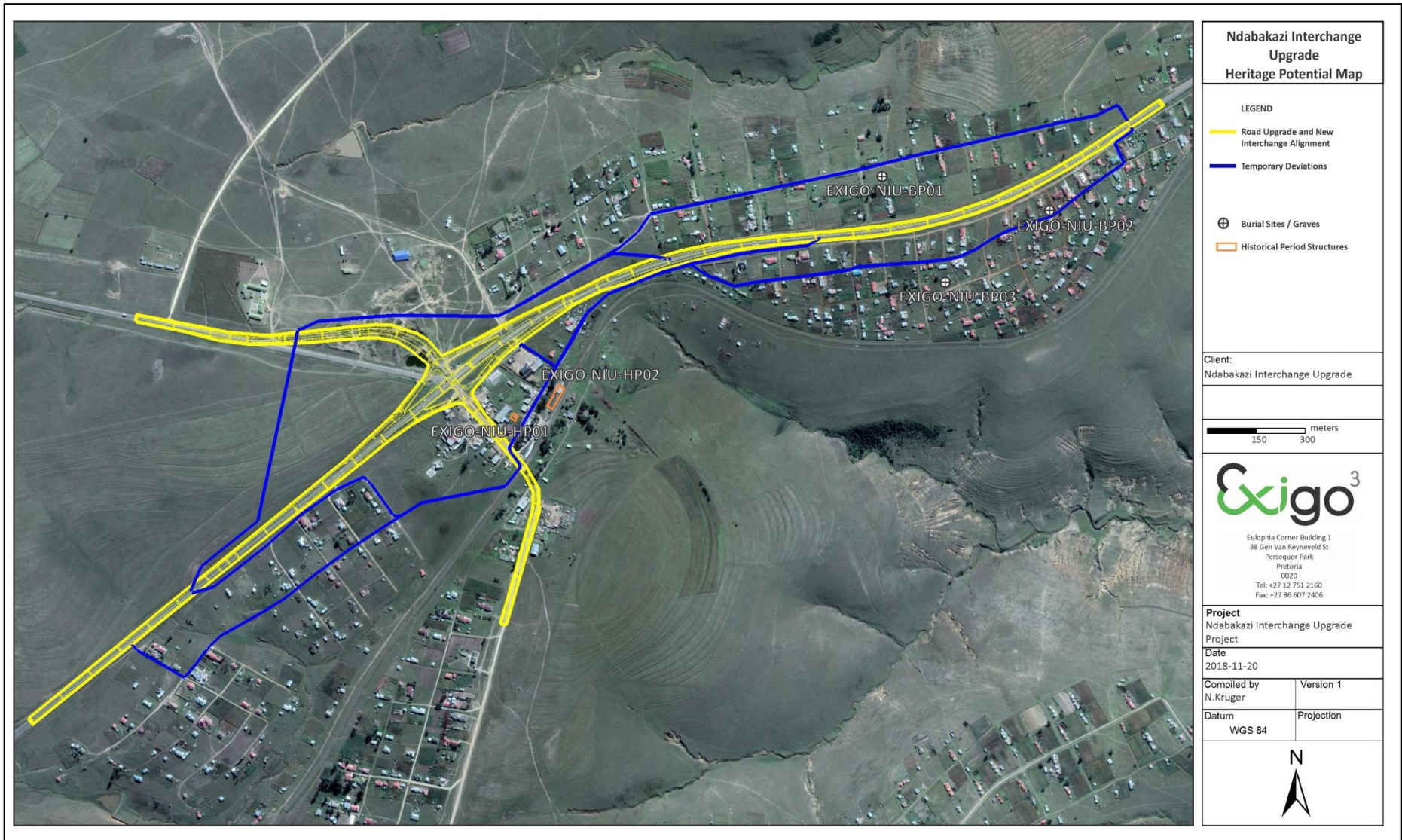


Figure 5-8: Aerial map indicating the locations of occurrences of heritage potential in the project area, discussed in the text.

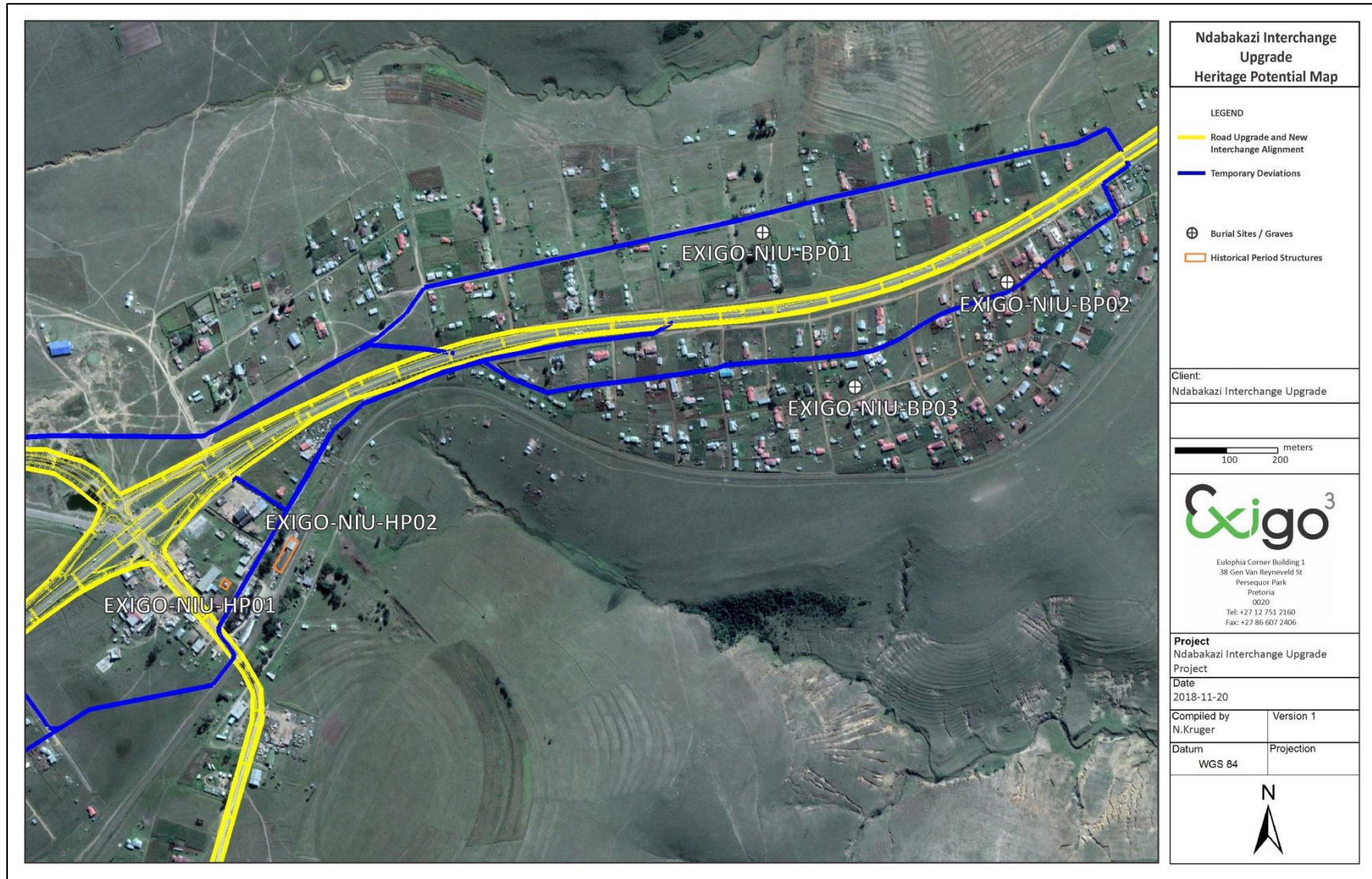


Figure 5-9: Detail aerial map indicating the locations of occurrences of heritage potential in the project area, discussed in the text.

6 RESULTS: STATEMENT OF SIGNIFICANCE AND IMPACT RATING

6.1 Potential Impacts and Significance Ratings²

The following section provides a background to the identification and assessment of possible impacts and alternatives, as well as a range of risk situations and scenarios commonly associated with heritage resources management. A guideline for the rating of impacts and recommendation of management actions for areas of heritage potential within the project area is supplied in Section 10.2 of the Addendum.

6.1.1 General assessment of impacts on resources

Generally, the value and significance of archaeological and other heritage sites might be impacted on by any activity that would result immediately or in the future in the destruction, damage, excavation, alteration, removal or collection from its original position, any archaeological material or object (as indicated in the National Heritage Resources Act (No 25 of 1999)). Thus, the destructive impacts that are possible in terms of heritage resources would tend to be direct, once-off events occurring during the initial construction period. However, in the long run, the proximity of operations in any given area could result in secondary indirect impacts. The EIA process therefore specifies impact assessment criteria which can be utilised from the perspective of a heritage specialist study which elucidates the overall extent of impacts.

6.1.2 Direct impact rating

Direct or primary effects on heritage resources occur at the same time and in the same space as the activity, e.g. loss of historical fabric through demolition work. **Indirect effects or secondary effects** on heritage resources occur later in time or at a different place from the causal activity, or as a result of a complex pathway, e.g. restriction of access to a heritage resource resulting in the gradual erosion of its significance, which is dependent on ritual patterns of access (refer to Section 10.3 in the Addendum for an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected). The significances of the impacts were determined through a synthesis of the criteria below:

Probability: This describes the likelihood of the impact actually occurring.	
Improbable:	The possibility of the impact occurring is very low, due to the circumstances, design or experience.
Probable:	There is a probability that the impact will occur to the extent that provision must be made therefore.
Highly Probable	It is most likely that the impact will occur at some stage of the development.
Definite:	The impact will take place regardless of any prevention plans, and there can only be relied on mitigatory actions or contingency plans to contain the effect.
Duration: The lifetime of the impact	
Short term:	The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases.
Medium term:	The impact will last up to the end of the phases, where after it will be negated.
Long term:	The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter.
Permanent:	Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

² Based on: Winter, S. & Baumann, N. 2005. *Guideline for involving heritage specialists in EIA processes: Edition 1.*

Scale: The physical and spatial size of the impact	
Local:	The impacted area extends only as far as the activity, e.g. footprint
Site:	The impact could affect the whole, or a measurable portion of the above mentioned properties.
Regional:	The impact could affect the area including the neighbouring residential areas.
Magnitude/ Severity: Does the impact destroy the environment, or alter its function.	
Low:	The impact alters the affected environment in such a way that natural processes are not affected.
Medium:	The affected environment is altered, but functions and processes continue in a modified way.
High:	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.
Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.	
Negligible:	The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.
Low:	The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.
Moderate:	The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.
High:	The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The following weights were assigned to each attribute:

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, Magnitude) x Probability	
	Negligible	<20
	Low	<40
	Moderate	<60
	High	>60

The significance of each activity is rated without mitigation measures and with mitigation measures for both construction and operational phases of the development.

The following table summarizes impacts to the heritage receptors within and in close proximity of the project areas:

Nr	Activity	Impact	Without or With Mitigation	Nature (Negative or Positive Impact)	Probability		Duration		Scale		Magnitude/ Severity		Significance		Mitigation Measures
					Magnitude	Score	Magnitude	Score	Magnitude	Score	Magnitude	Score	Score	Magnitude	
Planning Phase															
1	Site Exigo-NIU-HP01, Site Exigo-NIU-HP02	Potential damage to Colonial Period structures	WOM	Negative	Probable	2	Short term	1	Site	2	Medium	6	18	Negligible	Frequent site monitoring by heritage specialist / ECO, heritage site management plan.
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	
2	Site Exigo-NIU-BP01 - Site Exigo-NIU-BP03	Potential damage to burial sites	WOM	Negative	Probable	2	Short term	1	Site	2	High	8	22	Low	Frequent site monitoring by heritage specialist / ECO, heritage site management plan.
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	
Construction Phase															
3	Site Exigo-NIU-HP01, Site Exigo-NIU-HP02	Potential damage to Colonial Period structures	WOM	Negative	Probable	2	Long term	4	Site	2	Medium	6	24	Low	Site monitoring, avoidance, 50m conservation buffer. Phase 2 Study and destruction permitting if impacted on.
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	
4	Site Exigo-NIU-BP01 - Site Exigo-NIU-BP03	Potential damage to burial sites	WOM	Negative	Definite	5	Long term	4	Site	2	High	8	70	High	Site monitoring, avoidance, 100m conservation buffer, site management. Grave relocation subject to authorisations and permitting if impacted on.
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	
Decommissioning and Operational Phase															
5	Site Exigo-NIU-HP01, Site Exigo-NIU-HP02	Potential damage to Colonial Period structures	WOM	Negative	Improbable	1	Permanent	5	Local	1	Medium	6	12	Negligible	Avoidance, 50m conservation buffer. Phase 2 Study and destruction permitting if impacted on.
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	
6	Site Exigo-NIU-BP01 - Site Exigo-NIU-BP03	Potential damage to burial sites	WOM	Negative	Definite	5	Permanent	5	Site	2	High	8	75	High	Avoidance, 100m conservation buffer, site management. Grave relocation subject to authorisations and permitting if impacted on.
			WM	Positive	Improbable	1	Short term	1	Site	2	Low	2	5	Negligible	

6.2 Evaluation Impacts

Previous studies conducted in the larger Eastern Cape landscape around the project area suggest a rich and diverse archaeological landscape. The Ndabakazi Interchange Upgrade landscape has been inhabited sparsely but continuously in prehistoric and historical times where large portions of land have been transformed for agriculture. Cognisance should be taken of archaeological material that might be present in surface and sub-surface deposits.

6.2.1 Archaeology

The study did not identify any archaeological receptors which will be directly impacted by the proposed project and no impact on archaeological sites or features is anticipated.

6.2.2 Built Environment

A number of Historical Period buildings relating to rural settlement and industrialization occur in the general landscape which implies that the project area bears significance in terms of the built environment. However, no impact on the built environment is anticipated provided that proposed mitigation and management measures be implemented.

6.2.3 Cultural Landscape

The larger area comprises a rich cultural horizon and the natural landscape surrounding the proposed project encompasses open grasslands and deep river alleys, typical of the Wild Coast of rural Eastern Cape. The cultural landscape holds Herder sites, Iron Age remains, Colonial Period farmsteads and Historical towns. The proposed project is unlikely to result in a significant impact on the cultural landscape of this area.

6.2.4 Graves / Human Burials Sites

Burial sites were located in the study area in close proximity of road upgrade and construction alignments. These receptors are of high significance for their social and cultural value. The potential impact on the resources is anticipated to be high but this impact rating can be limited to a indelible impact by the implementation of mitigation measures (avoidance, site management, site monitoring / grave relocation) for the sites, if / when required.

In the rural areas of the Eastern Cape, graves and cemeteries sometimes occur within settlements or around homesteads but they are also randomly scattered around archaeological and historical settlements. The probability of additional and informal human burials encountered during development should thus not be excluded. In addition, human remains and burials are commonly found close to archaeological sites; they may be found in "lost" graveyards, or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked at the surface. Human remains are usually observed when they are exposed through erosion. In some instances packed stones or rocks may indicate the presence of informal pre-colonial burials. If any human bones are found during the course of construction work then they should be reported to an archaeologist and work in the immediate vicinity should cease until the appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial they would need to be exhumed under a permit from SAHRA (for pre-colonial burials as well as burials later than about AD 1500). Should any unmarked human burials/remains be found during the course of construction, work in the immediate vicinity should cease and the find must immediately be reported to the archaeologist, or the South African Heritage Resources Agency (SAHRA).

Under no circumstances may burials be disturbed or removed until such time as necessary statutory procedures required for grave relocation have been met.

Heritage resources occur in close proximity of the Ndabakazi Interchange Upgrade project zones and potential peripheral to direct impacts on these heritage receptors are foreseen. However, these impacts can be mitigated and in the opinion of the author of this AIA study the proposed Ndabakazi Interchange Upgrade project may proceed from a culture resources management perspective on the condition that mitigation measures are implemented where applicable, and provided that no subsurface heritage remains are encountered during construction.

6.3 Management actions

Recommendations for relevant heritage resources management actions are vital to the conservation of heritage resources. A general guideline for recommended management actions is included in Section 10.4 of the Addendum. The following management measures should be considered during implementation of the proposed Ndabakazi Interchange Upgrade.

OBJECTIVE: prevent unnecessary disturbance and/or destruction of previously undetected heritage receptors.

- For the Historical Period structures of medium significance (**Site Exigo-NIU-HP01, Site Exigo-NIU-HP02**) within the project area the following are required in terms of heritage management and mitigation:

PROJECT COMPONENT/S	All phases of construction and operation.		
POTENTIAL IMPACT	Damage/destruction of sites.		
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
MITIGATION: TARGET/OBJECTIVE	To conserve the historical fabric of the sites and to locate undetected heritage remains as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME	
Fixed Mitigation Procedure (required)			
Avoidance: Implement a heritage conservation buffer of at least 20m around the heritage resource, redesign the proposed road alignments to avoid the heritage resource and the proposed conservation buffer. Site Monitoring: Regular examination of trenches and excavations.	ECO, HERITAGE ASSESSMENT PRACTITIONER	Monitor as frequently as practically possible.	
Alternative Mitigation Procedure (if preferred mitigation procedure is not feasible)			
Documentation of sites if features are to be impacted on by development (mapping, desktop study Phase 2 site sampling). Permitting if and when required.	HERITAGE ASSESSMENT PRACTITIONER	Prior to the commencement of construction and earth-moving.	
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		

MONITORING	Successful location of sites by person/s monitoring.
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- For the highly significant burial sites (**Site Exigo-NIU-BP01 - Site Exigo-NIU-BP03**) occurring within the project area the following are required in terms of heritage management and mitigation:

PROJECT COMPONENT/S	All phases of construction and operation.		
POTENTIAL IMPACT	Damage/disturbance to subsurface burials and surface burial features.		
ACTIVITY RISK/SOURCE	Digging foundations and trenches into sensitive deposits that are not visible at the surface.		
MITIGATION: TARGET/OBJECTIVE	To locate human burials as soon as possible after disturbance so as to maximize the chances of successful rescue/mitigation work.		
MITIGATION: ACTION/CONTROL	RESPONSIBILITY	TIMEFRAME	
Preferred Mitigation Procedure			
Avoidance: Implement a heritage conservation buffer of at least 100m around the grave / cemeteries, if necessary redesign road alignments to avoid the heritage resource and the proposed conservation buffer. Fence all burial places and apply access control. Implement a site management plan detailing strict site management conservation measures.	DEVELOPER QUALIFIED HERITAGE SPECIALIST	Prior to and during the commencement of construction and earth-moving as well as during operation phase.	
Alternative Mitigation Procedure (if preferred mitigation procedure is not feasible)			
Grave Relocation: Relocation of burials and documentation of site, full social consultation with affected parties, possible conservation management and protection measures. Subject to authorisations and relevant permitting from heritage authorities and affected parties.	QUALIFIED HERITAGE SPECIALIST	Prior to the commencement of construction and earth-moving.	
Fixed Mitigation Procedure (required)			
Site Monitoring: Regular examination of trenches and excavations in this area in order to avoid the destruction of previously undetected burials or heritage remains.	ECO	Monitor prior to and during the commencement of construction and earth-moving...	
PERFORMANCE INDICATOR	Archaeological sites are discovered and mitigated with the minimum amount of unnecessary disturbance.		
MONITORING	Successful location of sites by person/s monitoring.		

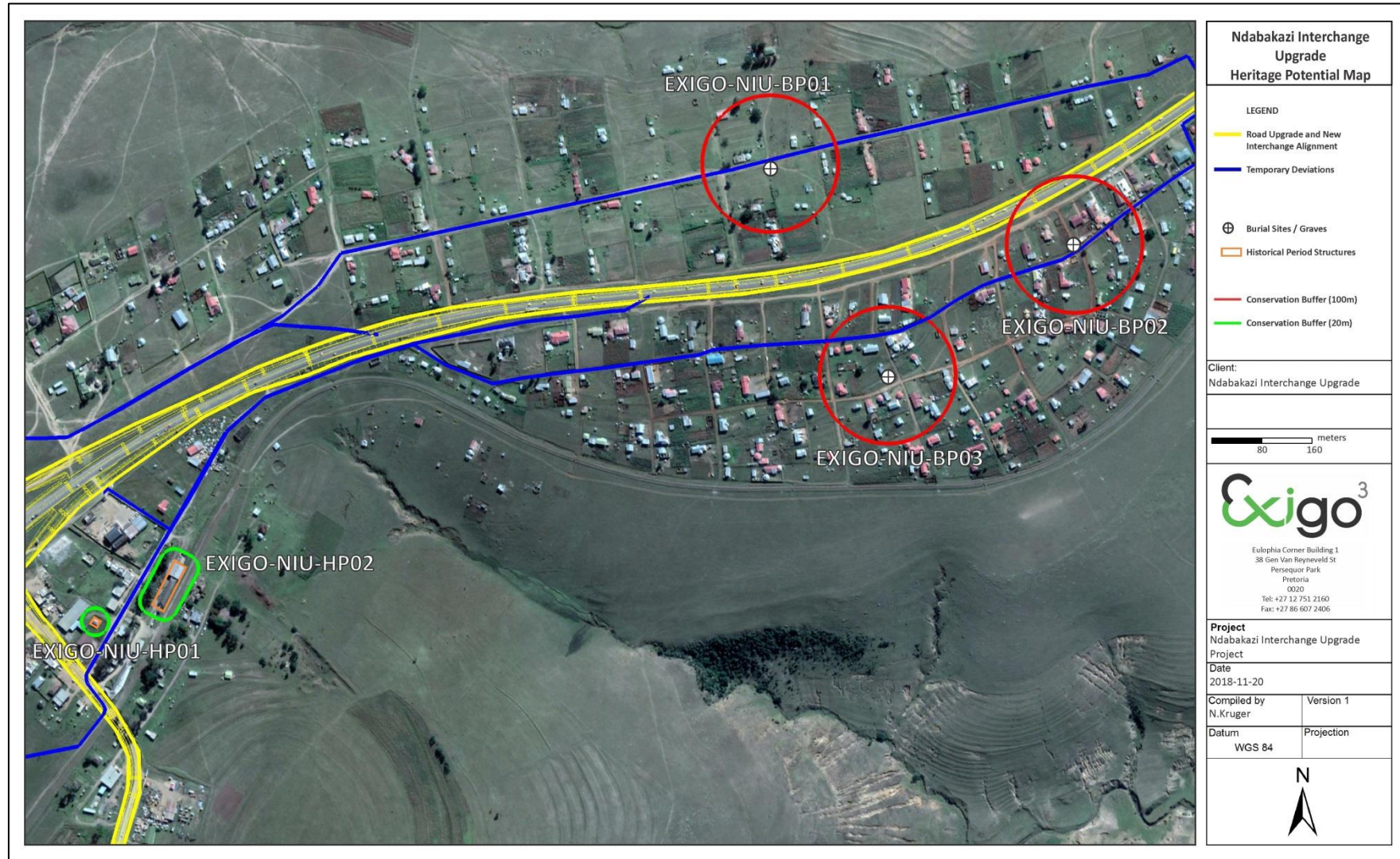


Figure 6-1: Aerial map indicating the extent of required heritage conservation buffers in relation to Ndabakazi Interchange Upgrade infrastructure components, discussed in the text.

7 RECOMMENDATIONS

In terms of heritage resources, the landscape around the project area is primarily well known for the occurrence of later Stone Ages sites with evidence of pastoralism, rock art as well as Iron Age farmer presence and a Colonial frontier denoting farmer expansion. The vast landscape that encompasses the Ndabakazi Interchange Upgrade footprints seems to have been inhabited continuously for centuries in prehistoric and historical times, the remnants of which are visible in transformed agriculture and rural settlement areas. The following general recommendations are made based on general observations in the proposed Ndabakazi Interchange Upgrade area pertaining to a number of identified occurrences of heritage potential:

- According to the South African Heritage Resources Agency Information System (SAHRIS) Palaeo Map, portions of the project area fall within a potentially sensitive fossiliferous zone and a Palaeontological Assessment is recommended for the project, subject to review and recommendations by the relevant heritage authorities. Should fossil remains such as fossil fish, reptiles or petrified wood be exposed during construction, these objects should carefully safeguarded and the relevant heritage resources authority (SAHRA) should be notified immediately so that the appropriate action can be taken by a professional palaeontologist.
- Two sites containing Historical / Colonial Period buildings (**Site Exigo-NIU-HP01, Site Exigo-NIU-HP02**) have the potential to provide an understanding of architectural, industrial and social developments in the Ndabakazi landscape and the receptors are rated as medium significance. The sites occur in the proximity of temporary road alignments and it is primarily recommended that a conservation buffer of at least 20m around the sites be implemented in order to avoid impact. However, should impact on the sites prove inevitable, the structures should be adequately documented by means of Phase 2 Specialist Studies. Such studies should minimally include the mapping, documentation and possible sampling of the sites in order to conserve the historical fabric of the heritage resources. The necessary alteration and destruction permits should be obtained from the relevant Heritage Resources Authorities prior to site sampling and destruction. Generally, the sites should be monitored by an informed ECO in order to avoid the destruction of previously undetected heritage remains.
- Graves and burials identified within close proximity of temporary road alignments (**Site Exigo-NIU-BP01, Site Exigo-NIU-BP02 and Site Exigo-NIU-BP03**) are of high significance and these sites might be impacted on by the proposed project. In all of these cases, the graves are situated within the Ndabakazi settlement around or very close to homesteads and dwellings. As a primary measure, the Burial Grounds and Graves (BGG) Unit of SAHRA requires a 100m conservation buffer for all burials and as such, it is recommended that temporary road alignments proposed for areas around these burials be redesigned to avoid encroaching on the required conservation buffers. In addition it is recommended that the burial site be fenced off with wire, chicken wire or palisade fencing of a minimum height of 1.8m placed no closer than 2m from the burials. Access gates should be erected and access control should be applied to the sites. A heritage Site Management Plan (SMP) should be compiled for the burials to stipulate conservation measures, responsible persons and chance find procedures for further heritage mitigation. The developer should carefully liaise with the heritage specialist, SAHRA as well as local communities and possible affected parties with regards to the management and monitoring of any human grave or cemetery in order to detect and manage negative impact on the sites. **Should impact on any human burial prove inevitable, full grave relocations are recommended for these burial grounds. This measure should be undertaken by a qualified archaeologist, and in accordance with relevant legislation, permitting, statutory permissions and subject to any local and regional provisions and laws and**

by-laws pertaining to human remains. A full social consultation process should occur in conjunction with the mitigation of cemeteries and burials (see Addendum B).

- Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO is recommended during planning and construction phases of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately
- It is essential that cognisance be taken of the larger archaeological landscape of the area in order to avoid the destruction of previously undetected heritage sites. It should be stated that the possibility of undetected archaeological remains occurring elsewhere in the project area should not be excluded. Burials and historically significant structures dating to the Colonial Period occur on farms in the area and these resources should be avoided during all phases of construction and development, including the operational phases of the development.

In addition to these site-specific recommendations, careful cognizance should be taken of the following:

- As Palaeontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive.
- Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material the larger landscape should be regarded as potentially sensitive in terms of possible subsurface deposits.

8 GENERAL COMMENTS AND CONDITIONS

This AIA report serves to confirm the extent and significance of the heritage landscape of the proposed Ndabakazi Interchange Upgrade area. The larger heritage horizon encompasses rich and diverse archaeological landscapes and cognisance should be taken of heritage resources and archaeological material that might be present in surface and sub-surface deposits. If, during construction, any possible archaeological material culture discoveries are made, the operations must be stopped and a qualified archaeologist be contacted for an assessment of the find. Such material culture might include:

- Formal Earlier Stone Age stone tools.
- Formal MSA stone tools.
- Formal LSA stone tools.
- Potsherds
- Iron objects.
- Beads made from ostrich eggshell and glass.
- Ash middens and cattle dung deposits and accumulations.
- Faunal remains.
- Human remains/graves.
- Stone walling or any sub-surface structures.
- Historical glass, tin or ceramics.
- Fossils.

If such sites were to be encountered or impacted by any proposed developments, recommendations contained in this report, as well as endorsement of mitigation measures as set out by Eastern Cape-PHRA, SAHRA, the National Resources Act and the CRM section of ASAPA will be required.

It must be emphasised that the conclusions and recommendations expressed in this archaeological heritage sensitivity investigation are based on the visibility of archaeological sites/features and may not therefore, represent the area's complete archaeological legacy. Many sites/features may be covered by soil and vegetation and might only be located during sub-surface investigations. If subsurface archaeological deposits, artefacts or skeletal material were to be recovered in the area during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately (**cf. NHRA (Act No. 25 of 1999)**, Section 36 (6)). It must also be clear that Archaeological Specialist Reports will be assessed by the relevant heritage resources authority (SAHRA).

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10 ADDENDUM 1: HERITAGE LEGISLATION BACKGROUND

10.1 CRM: Legislation, Conservation and Heritage Management

The broad generic term Cultural Heritage Resources refers to any physical and spiritual property associated with past and present human use or occupation of the environment, cultural activities and history. The term includes sites, structures, places, natural features and material of palaeontological, archaeological, historical, aesthetic, scientific, architectural, religious, symbolic or traditional importance to specific individuals or groups, traditional systems of cultural practice, belief or social interaction.

10.1.1 Legislation regarding archaeology and heritage sites

The South African Heritage Resources Agency (SAHRA) and their provincial offices aim to conserve and control the management, research, alteration and destruction of cultural resources of South Africa. It is therefore vitally important to adhere to heritage resource legislation at all times.

d. National Heritage Resources Act No 25 of 1999, section 35

According to the National Heritage Resources Act of 1999 a historical site is any identifiable building or part thereof, marker, milestone, gravestone, landmark or tell older than 60 years. This clause is commonly known as the "60-years clause". Buildings are amongst the most enduring features of human occupation, and this definition therefore includes all buildings older than 60 years, modern architecture as well as ruins, fortifications and Iron Age settlements. "Tell" refers to the evidence of human existence which is no longer above ground level, such as building foundations and buried remains of settlements (including artefacts).

The Act identifies heritage objects as:

- objects recovered from the soil or waters of South Africa including archaeological and palaeontological objects, meteorites and rare geological specimens
- visual art objects
- military objects
- numismatic objects
- objects of cultural and historical significance
- objects to which oral traditions are attached and which are associated with living heritage
- objects of scientific or technological interest
- any other prescribed category

With regards to activities and work on archaeological and heritage sites this Act states that:

"No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority." (34. [1] 1999:58)

and

"No person may, without a permit issued by the responsible heritage resources authority-

- (d) *destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;*
- (e) *destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;*

- (f) *trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or*
- (g) *bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."*

and

"No person may, without a permit issued by SAHRA or a provincial heritage resources agency-

- (h) *destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;*
- (i) *destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;*
- (j) *bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."*

e. Human Tissue Act of 1983 and Ordinance on the Removal of Graves and Dead Bodies of 1925

Graves 60 years or older are heritage resources and fall under the jurisdiction of both the National Heritage Resources Act and the Human Tissues Act of 1983. However, graves younger than 60 years are specifically protected by the Human Tissues Act (Act 65 of 1983) and the Ordinance on the Removal of Graves and Dead Bodies (Ordinance 7 of 1925) as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial MEC as well as the relevant Local Authorities.

10.1.2 Background to HIA and AIA Studies

South Africa's unique and non-renewable archaeological and palaeontological heritage sites are 'generally' protected in terms of the National Heritage Resources Act (Act No 25 of 1999, section 35) and may not be disturbed at all without a permit from the relevant heritage resources authority. Heritage sites are frequently threatened by development projects and both the environmental and heritage legislation require impact assessments (HIAs & AIAs) that identify all heritage resources in areas to be developed. Particularly, these assessments are required to make recommendations for protection or mitigation of the impact of the sites. HIAs and AIAs should be done by qualified professionals with adequate knowledge to (a) identify all heritage resources including archaeological and palaeontological sites that might occur in areas of developed and (b) make recommendations for protection or mitigation of the impact on the sites.

The National Heritage Resources Act (Act No. 25 of 1999, section 38) provides guidelines for Cultural Resources Management and prospective developments:

"38. (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a

development categorised as:

- (a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;*
- (b) the construction of a bridge or similar structure exceeding 50m in length;*
- (c) any development or other activity which will change the character of a site:*
 - (i) exceeding 5 000 m² in extent; or*
 - (ii) involving three or more existing erven or subdivisions thereof; or*
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or*
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;*
- (d) the re-zoning of a site exceeding 10 000 m² in extent; or*
- (e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,*

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development."

And:

"The responsible heritage resources authority must specify the information to be provided in a report required in terms of subsection (2)(a): Provided that the following must be included:

- (k) The identification and mapping of all heritage resources in the area affected;*
- (l) an assessment of the significance of such resources in terms of the heritage assessment criteria set out in section 6(2) or prescribed under section 7;*
- (m) an assessment of the impact of the development on such heritage resources;*
- (n) an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;*
- (o) the results of consultation with communities affected by the proposed development and other interested parties regarding the impact of the development on heritage resources;*
- (p) if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and*
- (q) plans for mitigation of any adverse effects during and after the completion of the proposed development (38. [3] 1999:64)."*

Consequently, section 35 of the Act requires Heritage Impact Assessments (HIAs) or Archaeological Impact Assessments (AIAs) to be done for such developments in order for all heritage resources, that is, all places or objects of aesthetics, architectural, historic, scientific, social, spiritual, linguistic or technological value or significance to be protected. Thus any assessment should make provision for the protection of all these

heritage components, including archaeology, shipwrecks, battlefields, graves, and structures older than 60 years, living heritage, historical settlements, landscapes, geological sites, palaeontological sites and objects. Heritage resources management and conservation.

10.2 Assessing the Significance of Heritage Resources

Archaeological sites, as previously defined in the National Heritage Resources Act (Act 25 of 1999) are places in the landscape where people have lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities. Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and *non-renewable*. Many such sites are unfortunately lost on a daily basis through development for housing, roads and infrastructure and once archaeological sites are damaged, they cannot be re-created as site integrity and authenticity is permanently lost. Archaeological sites have the potential to contribute to our understanding of the history of the region and of our country and continent. By preserving links with our past, we may not be able to revive lost cultural traditions, but it enables us to appreciate the role they have played in the history of our country.

- Categories of significance

Rating the significance of archaeological sites, and consequently grading the potential impact on the resources is linked to the significance of the site itself. The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences. The guidelines as provided by the NHRA (Act No. 25 of 1999) in Section 3, with special reference to subsection 3 are used when determining the cultural significance or other special value of archaeological or historical sites. In addition, ICOMOS (the Australian Committee of the International Council on Monuments and Sites) highlights four cultural attributes, which are valuable to any given culture:

- *Aesthetic value:*

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria include consideration of the form, scale, colour, texture and material of the fabric, the general atmosphere associated with the place and its uses and also the aesthetic values commonly assessed in the analysis of landscapes and townscape.

- *Historic value:*

Historic value encompasses the history of aesthetics, science and society and therefore to a large extent underlies all of the attributes discussed here. Usually a place has historical value because of some kind of influence by an event, person, phase or activity.

- *Scientific value:*

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality and on the degree to which the place may contribute further substantial information.

- *Social value:*

Social value includes the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a certain group.

It is important for heritage specialist input in the EIA process to take into account the heritage management structure set up by the NHR Act. It makes provision for a 3-tier system of management including the South Africa Heritage Resources Agency (SAHRA) at a national level, Provincial Heritage Resources Authorities (PHRAs) at a provincial and the local authority. The Act makes provision for two types or forms of protection of heritage resources; i.e. formally protected and generally protected sites:

Formally protected sites:

- Grade 1 or national heritage sites, which are managed by SAHRA
- Grade 2 or provincial heritage sites, which are managed by the provincial HRA (MP-PHRA).
- Grade 3 or local heritage sites.

Generally protected sites:

- Human burials older than 60 years.
- Archaeological and palaeontological sites.
- Shipwrecks and associated remains older than 60 years.
- Structures older than 60 years.

With reference to the evaluation of sites, the certainty of prediction is definite, unless stated otherwise and if the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low. The significance of archaeological sites is generally ranked into the following categories.

Significance	Rating Action
No significance: sites that do not require mitigation.	None
Low significance: sites, which may require mitigation.	2a. Recording and documentation (Phase 1) of site; no further action required 2b. Controlled sampling (shovel test pits, augering), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction
Medium significance: sites, which require mitigation.	3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]
High significance: sites, where disturbance should be avoided.	4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism
High significance: Graves and burial places	4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinterment [including 2a, 2b & 3]

Furthermore, the significance of archaeological sites was based on six main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

A fundamental aspect in assessing the significance and protection status of a heritage resource is often whether or not the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and mitigated in order to gain data / information, which would otherwise be lost.

11 ADDENDUM 2: CONVENTIONS USED TO ASSESS THE SIGNIFICANCE OF HERITAGE

11.1 Site Significance Matrix

According to the NHRA, Section 2(vi) the **significance** of heritage sites and artefacts is determined by its aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technical value in relation to the uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these. The following matrix is used for assessing the significance of each identified site/feature.

2. SITE EVALUATION			
2.1 Heritage Value (NHRA, section 2 [3])	High	Medium	Low
It has importance to the community or pattern of South Africa's history or pre-colonial history.			
It possesses unique, uncommon, rare or endangered aspects of South Africa's natural or cultural heritage.			
It has potential to yield information that will contribute to an understanding of South Africa's natural and cultural heritage.			
It is of importance in demonstrating the principle characteristics of a particular class of South Africa's natural or cultural places or objects.			
It has importance in exhibiting particular aesthetic characteristics valued by a particular community or cultural group.			
It has importance in demonstrating a high degree of creative or technical achievement at a particular period.			
It has marked or special association with a particular community or cultural group for social, cultural or spiritual reasons (sense of place).			
It has strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa.			
It has significance through contributing towards the promotion of a local sociocultural identity and can be developed as a tourist destination.			
It has significance relating to the history of slavery in South Africa.			
It has importance to the wider understanding of temporal changes within cultural landscapes, settlement patterns and human occupation.			
2.2 Field Register Rating			
National/Grade 1 [should be registered, retained]			
Provincial/Grade 2 [should be registered, retained]			
Local/Grade 3A [should be registered, mitigation not advised]			
Local/Grade 3B [High significance; mitigation, partly retained]			
Generally Protected A [High/Medium significance, mitigation]			
Generally protected B [Medium significance, to be recorded]			
Generally Protected C [Low significance, no further action]			
2.3 Sphere of Significance	High	Medium	Low
International			
National			
Provincial			
Local			
Specific community			

11.2 Impact Assessment Criteria

The following table provides a guideline for the rating of impacts and recommendation of management actions for sites of heritage potential.

Significance of the heritage resource

This is a statement of the nature and degree of significance of the heritage resource being affected by the activity. From a heritage management perspective it is useful to distinguish between whether the significance is embedded in the physical fabric or in associations with events or persons or in the experience of a place; i.e. its visual and non-visual qualities. This statement is a primary informant to the nature and degree of significance of an impact and thus needs to be thoroughly considered. Consideration needs to be given to the significance of a heritage resource at different scales (i.e. sitespecific, local, regional, national or international) and the relationship between the heritage resource, its setting and its associations.

Nature of the impact

This is an assessment of the nature of the impact of the activity on a heritage resource, with some indication of its positive and/or negative effect/s. It is strongly informed by the statement of resource significance. In other words, the nature of the impact may be historical, aesthetic, social, scientific, linguistic or architectural, intrinsic, associational or contextual (visual or non-visual). In many cases, the nature of the impact will include more than one value.

Extent

Here it should be indicated whether the impact will be experienced:

- On a site scale, i.e. extend only as far as the activity;
- Within the immediate context of a heritage resource;
- On a local scale, e.g. town or suburb
- On a metropolitan or regional scale; or
- On a national/international scale.

Duration

Here it should be indicated whether the lifespan of the impact will be:

- Short term, (needs to be defined in context)
- Medium term, (needs to be defined in context)
- Long term where the impact will persist indefinitely, possibly beyond the operational life of the activity, either because of natural processes or by human intervention; or
- Permanent where mitigation either by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.

Of relevance to the duration of an impact are the following considerations:

- Reversibility of the impact; and
- Renewability of the heritage resource.

Intensity

Here it should be established whether the impact should be indicated as:

- Low, where the impact affects the resource in such a way that its heritage value is not affected;
- Medium, where the affected resource is altered but its heritage value continues to exist albeit in a modified way; and
- High, where heritage value is altered to the extent that it will temporarily or permanently be damaged or destroyed.

Probability

This should describe the likelihood of the impact actually occurring indicated as:

- Improbable, where the possibility of the impact to materialize is very low either because of design or historic experience;
- Probable, where there is a distinct possibility that the impact will occur;
- Highly probable, where it is most likely that the impact will occur; or
- Definite, where the impact will definitely occur regardless of any mitigation measures

Confidence

This should relate to the level of confidence that the specialist has in establishing the nature and degree of impacts. It relates to the level and reliability of information, the nature and degree of consultation with I&AP's and the dynamic of the broader socio-political context.

- High, where the information is comprehensive and accurate, where there has been a high degree of consultation and the socio-political context is relatively stable.

- Medium, where the information is sufficient but is based mainly on secondary sources, where there has been a limited targeted consultation and socio-political context is fluid.
- Low, where the information is poor, a high degree of contestation is evident and there is a state of socio-political flux.

Impact Significance

The significance of impacts can be determined through a synthesis of the aspects produced in terms of the nature and degree of heritage significance and the nature, duration, intensity, extent, probability and confidence of impacts and can be described as:

- Low; where it would have a negligible effect on heritage and on the decision
- Medium, where it would have a moderate effect on heritage and should influence the decision.
- High, where it would have, or there would be a high risk of, a big effect on heritage. Impacts of high significance should have a major influence on the decision;
- Very high, where it would have, or there would be high risk of, an irreversible and possibly irreplaceable negative impact on heritage. Impacts of very high significance should be a central factor in decision-making.

11.3 Direct Impact Assessment Criteria

The following table provides an outline of the relationship between the significance of a heritage context, the intensity of development and the significance of heritage impacts to be expected

HERITAGE CONTEXT	TYPE OF DEVELOPMENT			
	CATEGORY A	CATEGORY B	CATEGORY C	CATEGORY D
CONTEXT 1 High heritage Value	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected	Very high heritage impact expected
CONTEXT 2 Medium to high heritage value	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected	Very high heritage impact expected
CONTEXT 3 Medium to low heritage value	Little or no heritage impact expected	Minimal heritage impact expected	Moderate heritage impact expected	High heritage impact expected
CONTEXT 4 Low to no heritage value	Little or no heritage impact expected	Little or no heritage impact expected	Minimal heritage value expected	Moderate heritage impact expected

NOTE: A DEFAULT "LITTLE OR NO HERITAGE IMPACT EXPECTED" VALUE APPLIES WHERE A HERITAGE RESOURCE OCCURS OUTSIDE THE IMPACT ZONE OF THE DEVELOPMENT.

HERITAGE CONTEXTS	CATEGORIES OF DEVELOPMENT
<p>Context 1: Of high intrinsic, associational and contextual heritage value within a national, provincial and local context, i.e. formally declared or potential Grade 1, 2 or 3A heritage resources</p> <p>Context 2: Of moderate to high intrinsic, associational and contextual value within a local context, i.e. potential Grade 3B heritage resources.</p> <p>Context 3: Of medium to low intrinsic, associational or contextual heritage value within a national, provincial and local context, i.e. potential Grade 3C heritage resources</p> <p>Context 4: Of little or no intrinsic, associational or contextual heritage value due to disturbed, degraded conditions or extent of irreversible damage.</p>	<p>Category A: Minimal intensity development</p> <ul style="list-style-type: none"> - No rezoning involved; within existing use rights. - No subdivision involved. - Upgrading of existing infrastructure within existing envelopes - Minor internal changes to existing structures - New building footprints limited to less than 1000m2. <p>Category B: Low-key intensity development</p> <ul style="list-style-type: none"> - Spot rezoning with no change to overall zoning of a site. - Linear development less than 100m - Building footprints between 1000m2-2000m2 - Minor changes to external envelop of existing structures (less than 25%) - Minor changes in relation to bulk and height of immediately adjacent structures (less than 25%). <p>Category C: Moderate intensity development</p> <ul style="list-style-type: none"> - Rezoning of a site between 5000m2-10 000m2.

	<ul style="list-style-type: none"> - Linear development between 100m and 300m. - Building footprints between 2000m² and 5000m² - Substantial changes to external envelop of existing structures (more than 50%) - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 50%) <p>Category D: High intensity development</p> <ul style="list-style-type: none"> - Rezoning of a site in excess of 10 000m² - Linear development in excess of 300m. - Any development changing the character of a site exceeding 5000m² or involving the subdivision of a site into three or more erven. - Substantial increase in bulk and height in relation to immediately adjacent buildings (more than 100%)
--	--

11.4 Management and Mitigation Actions

The following table provides a guideline of relevant heritage resources management actions is vital to the conservation of heritage resources.

<p>No further action / Monitoring</p> <p>Where no heritage resources have been documented, heritage resources occur well outside the impact zone of any development or the primary context of the surroundings at a development footprint has been largely destroyed or altered, no further immediate action is required. Site monitoring during development, by an ECO or the heritage specialist are often added to this recommendation in order to ensure that no undetected heritage\ remains are destroyed.</p> <p>Avoidance</p> <p>This is appropriate where any type of development occurs within a formally protected or significant or sensitive heritage context and is likely to have a high negative impact. Mitigation is not acceptable or not possible. This measure often includes the change / alteration of development planning and therefore impact zones in order not to impact on resources.</p> <p>Mitigation</p> <p>This is appropriate where development occurs in a context of heritage significance and where the impact is such that it can be mitigated to a degree of medium to low significance, e.g. the high to medium impact of a development on an archaeological site could be mitigated through sampling/excavation of the remains. Not all negative impacts can be mitigated.</p> <p>Compensation</p> <p>Compensation is generally not an appropriate heritage management action. The main function of management actions should be to conserve the resource for the benefit of future generations. Once lost it cannot be renewed. The circumstances around the potential public or heritage benefits would need to be exceptional to warrant this type of action, especially in the case of where the impact was high.</p> <p>Rehabilitation</p> <p>Rehabilitation is considered in heritage management terms as a intervention typically involving the adding of a new heritage layer to enable a new sustainable use. It is not appropriate when the process necessitates the removal of previous historical layers, i.e. restoration of a building or place to the previous state/period. It is an appropriate heritage management action in the following cases:</p> <ul style="list-style-type: none"> - The heritage resource is degraded or in the process of degradation and would benefit from rehabilitation. - Where rehabilitation implies appropriate conservation interventions, i.e. adaptive reuse, repair and maintenance, consolidation and minimal loss of historical fabric. - Where the rehabilitation process will not result in a negative impact on the intrinsic value of the resource. <p>Enhancement</p> <p>Enhancement is appropriate where the overall heritage significance and its public appreciation value are improved. It does not imply creation of a condition that might never have occurred during the evolution of a place, e.g. the tendency to sanitize the past. This management action might result from the removal of previous layers where these layers are culturally of low significance and detract from the significance of the resource. It would be appropriate in a range of heritage contexts and applicable to a range of resources. In the case of formally protected or significant resources, appropriate enhancement action should be encouraged. Care should, however, be taken to ensure that the process does not have a negative impact on the character and context of the resource. It would thus have to be carefully monitored</p>

**PROPOSED UPGRADE OF THE NDABAKAZI INTERCHANGE BETWEEN THE N2 AND
THE R409, NEAR BUTTERWORTH**

AMATHOLE DISTRICT MUNICIPALITY, EASTERN CAPE

DRAFT ECOLOGICAL IMPACT ASSESSMENT

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Name	Responsibility	Date
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Mr Roy De Kock	Reviewer	6 December 2018
Dr Alan Carter	Reviewer	

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LIST OF ABBREVIATIONS

CBA	Critical Biodiversity Area
CES	Coastal & Environmental Services
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
DEDEAT	Department of Economic Development Environmental Affairs and Tourism
ECBCP	Eastern Cape Biodiversity Conservation Plan
ECO	Environmental Control Officer
EMP	Environmental Management Plan
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
NEMA	National Environmental Management Act
PNCO	Provincial Nature Conservation Ordinance
RDB	Red Data Book
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Frame
SPC	Species of Possible Concern
SSC	Species of Special Concern
STEP	Subtropical Thicket Ecosystem Programme

DRAFT

CONTENT OF THE SPECIALIST REPORT

The contents of this specialist report complies with the legislated requirements as described in Appendix 6 of the National Environmental Management Act (No 107 of 1998; NEMA) Regulations of 2014 and updated in 2017 (GN R. 326 of 2017) as listed below:

Appendix 6

Specialist Reports

1. (1) A specialist report prepared in terms of these 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;
 - (cA) an indication of the quality and age of base data used for the specialist report;
 - (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
 - (d) the duration, 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 inclusive of equipment and modelling used;
 - (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
 - (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 or activities;
 - (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) whether the proposed activity, activities or portions thereof should be authorised;
 - (iA) regarding the acceptability of the proposed activity or activities; and
 - (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
 - (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) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.

THE PROJECT TEAM

1. (1) A specialist report prepared in terms of these 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

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Project Expertise

Relevant projects CES has worked on include:

Name of project	Description of responsibility	Date completed
Waterfall Citrus Farm EIA for the development of a new citrus farm outside Peddie, Eastern Cape	Ecological Impact Assessment	April 2018
Indwe Biodiversity Study on the development of a new essential oils farm outside Kidds Beach, East London, Eastern Cape	Biodiversity study for an essential oil farming development	December 2017
Earth Free (Pty) Ltd Biodiversity study for a housing development in Kei Road, Eastern Cape	Biodiversity study for a housing development extension	October 2017
City of Johannesburg Biodiversity Assessment and Conservation management Plans for 4 Nature Reserves	Vegetation and Ridgeline Biodiversity Study	January - April 2017
Terreco Butterworth Bypass Alternatives EIA (EC)	Botanical Impact Assessment	Oct 2016
Terreco Idutywa Bypass Alternatives EIA (EC)	Botanical Impact Assessment	Oct 2016
SANRAL N2 between Tetyana & Sitebe Komkulu EIA (EC)	Ecological Impact Assessment	June 2015
Laman Mining renewal of Mining License (EC)	Botanical Impact Assessment	February 2015
ACSA East London Airport Vegetation Study (EC)	Botanical 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

Declarations

Role on Study Team	Declaration of independence
<i>Report Writing and Mapping</i>	I, Caryn Clarke , declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.
<i>Project Management and Report Review</i>	I, Roy de Kock , declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

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1 INTRODUCTION

1.1 PROJECT DESCRIPTION

The South African National Roads Agency SOC Ltd. (SANRAL) is proposing the construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province (see Figure 1.1 below).

The proposed Ndabakazi Interchange development will consist of the upgrading of the existing N2 and R409 roads at the intersection as well as the construction of a new N2 bridge over the R409 with corresponding interchanges. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2 Bridge.

In particular, the project will consist of the following:

1.1.1 EXISTING ROADS:

- Increasing the road reserve width from 30m to a minimum of 50m wide;
- General widening of the existing road cross section for passing lanes and 3.0m surfaced shoulders. The main carriageway is 10.4m and needs to be increased to 20.8m;
- Widening and/or new construction of existing drainage structures.

1.1.2 NEW INTERCHANGE (CALLED THE NDABAKAZI INTERCHANGE):

- Construction of a new bridge on the N2 over the R409;
- Substantial vertical geometric improvements will be required for the new N2 Bridge;
- Rehabilitation of pavement structure on existing alignment and construction of new pavement on new alignment, all for which suitable material will need to be sourced;
- Cut faces requiring stabilisation.

1.1.3 TEMPORARY DEVIATIONS:

- Temporary traffic diversion routes will be used during the construction phase of the Ndabakazi Interchange (refer to Figure 1.1);
- The temporary diversion routes will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndabakazi Interchange;
- All temporary diversion routes will be surfaced.
- Temporary diversion routes 1 (as shown in Figure 1.1) will require a Water Use License Application (WULA), as the route crosses a drainage channel and a wetland area. In addition, majority of the temporary diversion routes fall within 500 m of a wetland. A WULA will be submitted to the Department of Water Affairs and Sanitation (DWS) as required and will run concurrently with the Basic Assessment Process.

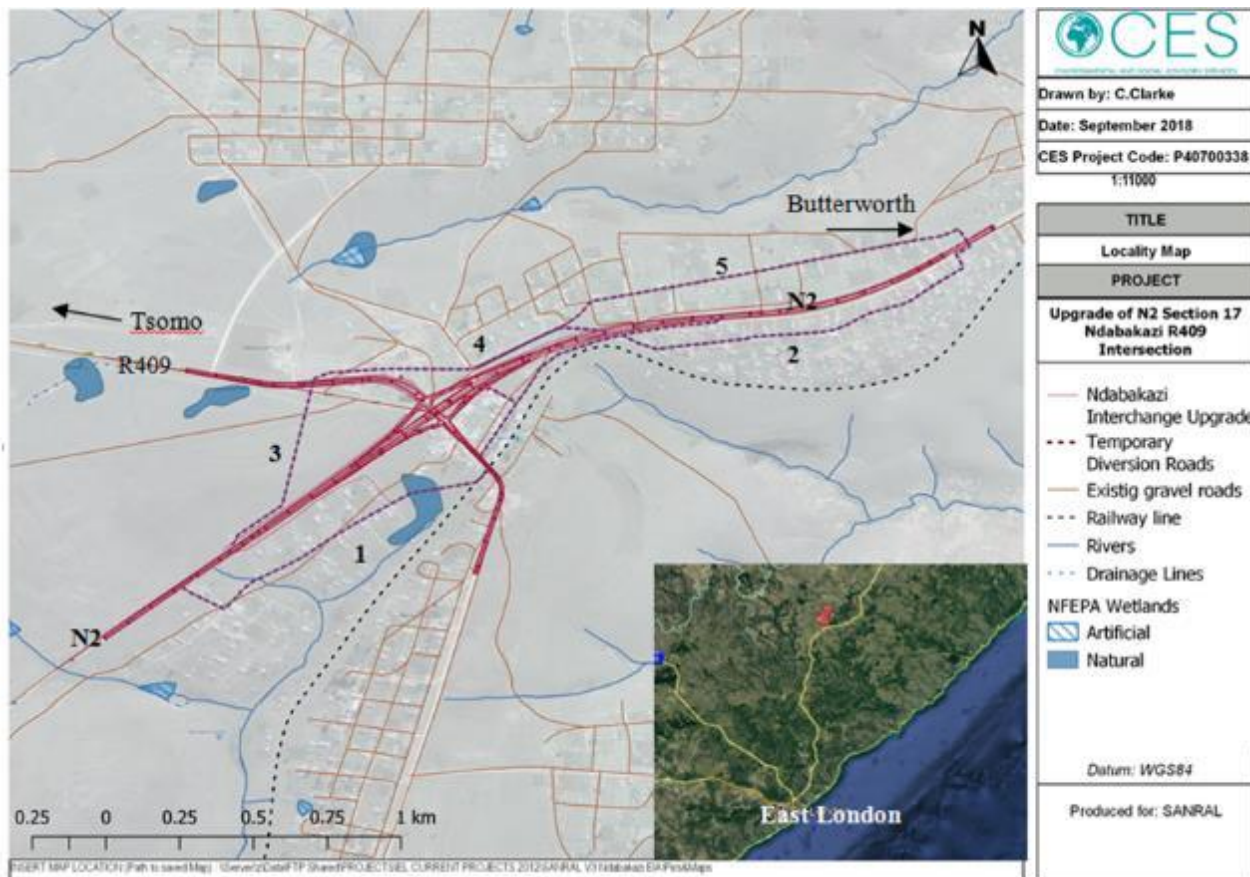


Figure 1.1: Proposed upgrading of the Ndbakazi Interchange.

1.1.4 SITE ACCESS

The proposed development is located within Section 17 along the National Route N2, therefore access to the site already exists.

The proposed temporary diversion routes (Figure 1.1 above) will largely follow existing gravel roads through the adjacent community areas located alongside the existing N2 and proposed Ndbakazi-R409 Interchange.

1.1.5 ALTERNATIVES

The following alternatives apply to the Ndbakazi N2-R409 Interchange Upgrade:

Site Alternative:

The site alternative assessed refers to the construction of the new Ndbakazi Interchange at the existing N2-R409 intersection. No other site alternatives have been assessed as the proposed development takes place on an existing national road. Therefore route/site alternatives are not deemed feasible.

No-Go alternative:

It is mandatory to consider the no-go (no development) alternative in the EIA process. In context of this project it implies the consideration that the proposed Ndbakazi N2-R409 Interchange Upgrade will not be constructed.

1.2 OBJECTIVES

The objectives of the ecological assessment were to:

- Provide a general description of the natural vegetation of the specific area to be developed and adjacent areas that will be impacted.
- Provide a general description of the indigenous fauna of the area, using a habitat approach and based on the natural vegetation of the site.
- Identify plant and animal species of conservation concern (SCC) and suitable species for rehabilitation.

1.3 APPROACH

The study site and surrounding areas were assessed 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 included the consideration of:

- The South African Vegetation Map (Mucina and Rutherford, 2006)
- Subtropical Thicket Ecosystem Programme (STEP)
- Eastern Cape Biodiversity Conservation Plan (ECBCP)
- South African National Biodiversity Institute (SANBI) wetlands database

Further to the above, site visits were conducted on 14 September 2018 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. The site visits also served to inform potential impacts of the proposed project and how significantly it would impact on the surrounding ecological environment.

1.4 TERMS OF REFERENCE

The following terms of reference were used as a guideline for the objectives of this study:

- Identify and map the main vegetation types and plant communities;
- Identify and record the main plant species that occur within the project area;
- Identify and record plant species that might be suitable for rehabilitation.
- Where possible identify any Red Data Book (RDB) flora and faunal species. In the absence of specific information on RDB species, adopt a habitat approach by identifying areas likely to contain RDB species;
- Identify any significant landscape features or rare or important vegetation/faunal associations such as seasonal wetlands, seeps or rocky areas that might support rare or important vegetation/faunal associations;
- Identify the main animal communities associated with the plant communities such as mammals, birds, fish (in the streams) and reptiles;
- Describe the likelihood of other RDB species or species of conservation concern occurring in the vicinity. In the absence of specific information on RDB species, adopt a habitat approach by identifying areas likely to contain RDB species;
- Assess the condition of the site in terms of current or previous land uses;
- Provide a general overview of the project area in terms of connectivity, corridors, rivers and streams and ecological viability in relation to the surrounding region;
- Place the project area within the biodiversity context of the wider area (i.e. provide the “bigger picture”);
- Identify (as far as is possible from the data collected) the principal ecological processes evident within the project site and its relative importance in determining the biodiversity characteristics present;

- An assessment of the potential direct and indirect impacts resulting from the proposed development and associated infrastructure, both on the footprint and the immediate surrounding area during construction and operation;
- A detailed description of appropriate mitigation measures that can be adopted to reduce negative impacts for each phase of the project where required.

1.5 ASSUMPTIONS AND LIMITATIONS

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

- The report is based on a project description taken from design specifications for the proposed construction of the Ndabakazi Interchange.
- Descriptions of the natural and social environments are based on limited fieldwork and available literature.
- Species of conservation concern (SCC) are difficult to find and difficult to identify, thus species described in this report do not comprise an exhaustive list. It is likely that additional SCC will be found during construction and operation of the development.
- The ecology of the site was assessed on a sample basis.

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2 RELEVANT LEGISLATION

The following legislation is relevant when considering ecological impacts identified during the Planning and Design, Construction, Operation and Decommissioning Phase of the Ndabakazi Interchange.

Table 2.1. Environmental legislation considered in the preparation of the Ecological Report

Title of Environmental legislation, policy or guideline	Implications for the Ndabakazi Interchange Development
Constitution Act (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.
National Environmental Management Act (NEMA) (107 of 1998)	The developer must apply 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 (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 Water Act (36 of 1998)	Provides details of measures intended to ensure the comprehensive protection of all water resources, including the water reserve and water quality.

The following policies are relevant to the project:

Municipal Policy

- Mquma Integrated Development Plan (IDP) and Spatial Development Frame (SDF) (2018/19).
- Mquma Environmental Management Plan (EMP) (2012).
- Amathole District Municipality Spatial Development Framework Review (2018/19)

Eastern Cape Province

- Eastern Cape Biodiversity Conservation Plan (2007)
- The Eastern Cape Provincial Spatial Development Plan (November 2011)
- The Provincial Growth and Development Plan (2004 - 2014)
- The Provincial White Paper on Transport for Sustainable Development (2001)
- The Rural Transport Plan Strategic Framework (2004)

3 ASSESSMENT METHODOLOGY

1. (1) A specialist report prepared in terms of these Regulations must contain—
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

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 areas is assessed as well as the 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 species of special concern 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 from, and expected to live on the site.

It is not the aim of this report 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 areas of high sensitivity as well as species of special concern 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. 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
 - Wetlands (including rivers)
 - Complex topographical features (especially steep and rocky slopes that provide niche habitats for both plants and animals).

3.1 SPECIES OF CONSERVATION CONCERN

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

- Plant species listed in the revised South African Red Data Books (Driver et al 2009);
- Plants listed in the Cape Nature and Environmental Conservation Ordinance (No. 19 of 1974; NECO/PNCO)
- Plant species listed in the NEMBA Threatened or Protected Species List (G.NR. 256 of 2015)
- Species included in other international lists (e.g., 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Plants).

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

- 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, 2017); and/or
- Species included in other international lists (e.g., 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Animals).

3.1.1 DEFINITIONS

The following definitions of the conservation status of plant and animal SSC are provided:

The South African (SA) Red List system contains nine categories, with the main purpose of classifying species from lowest (Least Concern) to highest (Critically Endangered) threat in terms of risk of extinction (see Figure 3.1). Species that are at high risk of extinction are placed in one of three categories: Vulnerable (VU), Endangered (EN) or Critically Endangered (CR). If a species is classified into one of these three categories, it is considered as a SCC.

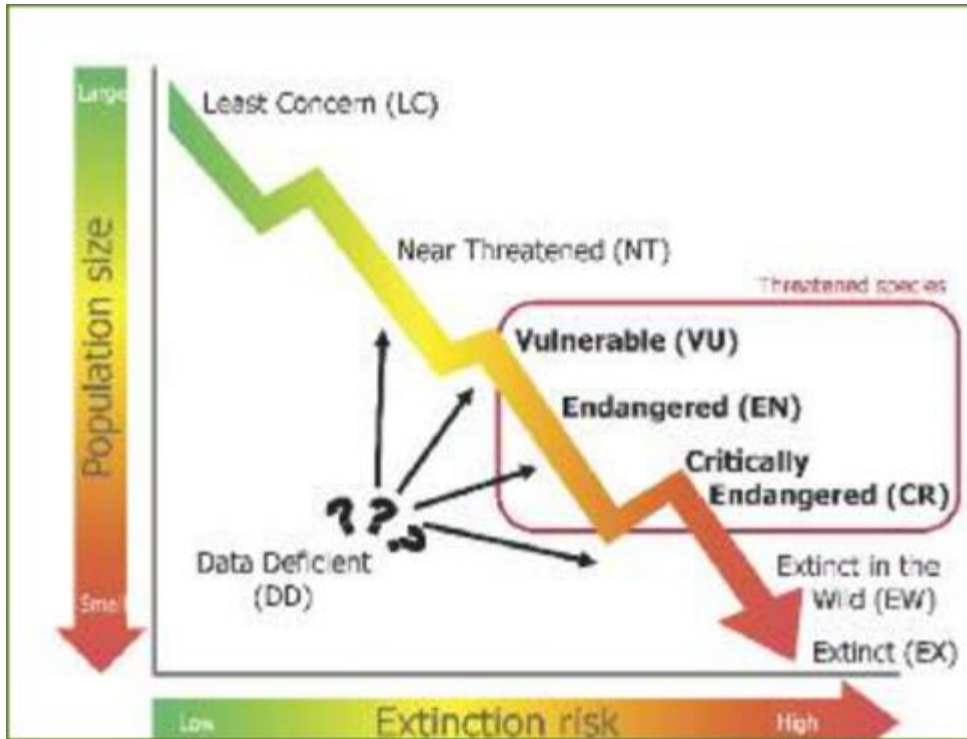


Figure 3.1: The SA Red List system categorizes species according to their risk of extinction (Source: SA Red Data Guidelines).

A species' classification is guided by five criteria relating to different biological factors that indicate danger of extinction (Table 3.1). A species should always be evaluated against all five criteria, but available data only need to meet the requirements for at least one criterion in order to classify a species as threatened. A species is always classified in the highest category of threat for which it meets the quantitative thresholds of at least one criterion.

Table 3.1: Biological indicators of extinction risk as contained in each of the five SANBI criteria

Criterion	Biological indicator	Risk factor	Quantitative thresholds		
			CR	EN	VU
A	Large and rapid reduction in population size relative to the life history of the species	Proportion by which population is reduced	>80%	>50%	>30%
B	Small geographic range and decline, population fluctuation or fragmentation	Extent of occurrence (EOO) Area of occupancy (AOO)	<100 km ² <10 km ²	<5 000 km ² <500 km ²	<20 000 km ² <2 000 km ²
C	Small population size and decline	Population size Number of mature individuals in largest subpopulation Proportion of population in largest subpopulation	<250 <50 >90%	<2 500 <250 >95%	<10 000 <1 000 100%
D	Critically small population size or very restricted distribution	Population size Area of occupancy (AOO) Number of locations	<50 	<250 	<1 000 <20 km ² Five or fewer
E	Quantitative analysis of extinction risk	Probability of extinction over a specified time period	50%	20%	10%

The following management guidelines for threatened species are provided in Table 3.2 below (Source: SA Red Data Guidelines):

Table 3.2: Guidelines for the management of the various categories

Status	Criterion*	Guidelines for Recommendation
<p>^a Please notify the Threatened Species Programme immediately and provide details of the location, size and threats to the subpopulation. The fact that a subpopulation of the species was found at a site zoned for development means that its Red List status has to be reviewed and is likely to be upgraded.</p>		
<p>* Refer to Table 2.2 for criteria descriptions</p>		
^a Critically Endangered	E	No further loss of natural habitat should be permitted as the species is on the brink of extinction, and all other known subpopulations have been lost. The subpopulation in question is likely to be newly discovered and the only remaining subpopulation of this species.
Critically Endangered	A,B,C,D	No further loss of natural habitat should be permitted as the species is on the verge of extinction.
Endangered	B,C,D	No further loss of habitat should be permitted as the species is likely to go extinct in the near future if current pressures continue. All remaining subpopulations have to be conserved if this species is to survive in the long term.
Endangered	A	If the species has a restricted range (< 2 000 km ²), recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003), and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
^a Vulnerable	D	This species either constitutes less than 1 000 individuals or is known from a very restricted range. No further loss of habitat should be permitted as the species' status will immediately become either Critically Endangered or Endangered, should habitat be lost.

Status	Criterion*	Guidelines for Recommendation
Vulnerable	B,C	The species is approaching extinction but there are still a number of subpopulations in existence. Recommend no further loss of habitat as this will increase the extinction risk of the species.
Vulnerable	A	If the species has a restricted range, < 2 000 km ² , recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the Protected Areas Act, and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
^aData Deficient	D	This species is very poorly known, with insufficient information on its habitat, population status or distribution to assess it. However, it is highly likely to be threatened. If a Data Deficient species will be affected by a proposed activity, the subpopulation should be well surveyed, and the data sent to the Threatened Species Programme. The species will be reassessed and the new status of the species, with a recommendation, will be provided within a short timeframe.
Data Deficient		There is uncertainty regarding the taxonomic status of this species, but it is likely to be threatened. Contact the taxonomist working on this group to resolve its taxonomic status; the species will then be reassessed by the Threatened Species Programme.
^aNear Threatened	D	Currently known from fewer than 10 locations, therefore preferably recommend no loss of habitat. Should loss of this species' habitat be considered, then an offset that includes conserving another viable subpopulation (in terms of the Protected Areas Act) should be implemented, provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
Near Threatened	B,C	The species is approaching thresholds for listing as threatened but there are still a number of subpopulations in existence and therefore there is need to minimise loss of habitat. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
Near Threatened	A	If the species has a restricted range, < 2 000 km ² , then recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant biodiversity conservation plan or (iii) on a site associated with additional ecological sensitivities.
^aCritically Rare		This is a highly range-restricted species, known from a single site, and therefore no loss of habitat should be permitted as it may lead to extinction of the species. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay.
^aRare		The species is likely to have a restricted range, or be highly habitat specific, or have small numbers of individuals, all of which makes it vulnerable to

Status	Criterion*	Guidelines for Recommendation
		extinction should it lose habitat. Recommend no loss of habitat. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay.
Declining		The species is declining but the population has not yet reached a threshold of concern; limited loss of habitat may be permitted. Should the species is known to be used for traditional medicine and if individuals will not be conserved <i>in situ</i> , plants should be rescued and used as mother stock for medicinal plant cultivation programmes.

3.1.2 SAMPLING PROTOCOL

Vegetation

The entire length of the proposed Ndabakazi Interchange development was inspected to evaluate vegetation and ecosystems and to provide more detailed information on the communities present. The site inspection took into account the amount of time available for the study and limitations such as the seasonality of the vegetation.

Vegetation communities were described according to the dominant species recorded from each type. These were mapped and assigned a sensitivity score. All animal species observed during the site assessment was listed.

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.

3.2 VEGETATION MAPPING

Mucina and Rutherford (2012) 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." This map (also called the SANBI VegMap) 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. This SANBI VegMap project has two main aims:

- to determine the variation in and between 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 SANBI VegMap 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. In this study the SANBI VegMap is used to inform anticipated site conditions regarding the vegetation type occurring on the property.

The Subtropical Thicket Ecosystem Planning (STEP) Project aims to identify priority areas that would ensure the long-term conservation of the subtropical thicket biome and to ensure that the conservation of this biome is considered in the policies and practices of the private and public sector that are responsible for land-use planning and the management of natural resources in the region (Pierce *et al.* 2005). STEP looked specifically at the thicket biome and has provided a finer scale map of the project area than the Mucina and Rutherford map explaining why the two vegetation maps look slightly different.

Vegetation classified as forest and its specific forest type classification is listed in the National Forestry Act (NFA). These maps were used to identify any forests within or near to the study site. The site visit was then used to identify any additional forest vegetation not identified in the BFA Maps.

3.3 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, medium and low sensitivity according to a system developed by CES and used in numerous proposed development studies. It must be noted that the sensitivity zonings in this study are based solely on ecological (primarily vegetation) 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 3.3).

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

Table 3.3. Criteria used for the analysis of the sensitivity of the area

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or habitat type in the region	Extensive	Restricted to a particular region / zone	Restricted to a specific locality / site
3	Conservation status 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	Species of special concern - 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	Habitat fragmentation leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation
6	Biodiversity contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	Visibility 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

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
8	Erosion potential 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	Rehabilitation 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	Disturbance 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 map was drawn up and with the aid of a satellite image so that the sensitive regions and vegetation types could be plotted.

3.4 BIODIVERSITY CONSERVATION

The ECBCP addresses the urgent need to identify and map critical biodiversity areas and priorities for conservation in the Province. It also provides land use planning guidelines, recommending biodiversity-friendly activities in priority areas.

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 (CBA3) = Functional Landscapes
- BLMC 4 (CBA 4) = Towns & Settlements, Woodlots & Plantations, 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 “coarse”. 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 DEDEAT as a strategic biodiversity plan for the Eastern Cape.

3.5 PROTECTED AREAS

The National Environmental Management Protected Areas Act (No 57 of 2003; NEMPAA) was developed to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. All protected areas within 15km of the study site will be listed. Impacts will be identified, and mitigations proposed.

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.

3.6 IMPACT ASSESSMENT

3.6.1 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 3.4. Significance Rating Table.

Temporal Scale (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.
Spatial Scale (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.
Degree of Confidence or Certainty (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 3.5 Impact Severity Rating.

Impact severity (The severity of negative impacts or how beneficial positive impacts would be on a particular affected system or affected party)	
Very severe	Very beneficial
An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated. For example, the permanent loss of land.	A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit. For example, the vast improvement of sewage effluent quality.
Severe	Beneficial
Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these. For example, the clearing of forest vegetation.	A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these. For example, an increase in the local economy.
Moderately severe	Moderately beneficial
Medium to long term impacts on the affected system(s) or party(ies), which could be mitigated. For example, constructing the sewage treatment facility where there was vegetation with a low conservation value.	A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way. For example, a 'slight' improvement in sewage effluent quality.
Slight	Slightly beneficial
Medium or short term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary. For example, a temporary fluctuation in the water table due to water abstraction.	A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect	Don't know/Can't know
The system(s) or party(ies) is not affected by the proposed development.	In certain cases, it may not be possible to determine the severity of an impact.

Table 3.6 Overall Significance Rating.

Overall Significance (The combination of all the above criteria as an overall significance)	
VERY HIGH NEGATIVE	VERY BENEFICIAL
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 severe or very severe effects, or beneficial or very beneficial effects. Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance. Example: 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.	
HIGH NEGATIVE	BENEFICIAL
These impacts will usually result in long term effects on the social and/or natural environment. Impacts	

<p>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>Example: 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>Example: 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>Example: 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>Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.</p> <p>Example: 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>Example: 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>Example: The effect of a particular development on people's psychological perspective of the environment.</p>	

4 DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

The study site 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, 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.

4.1 DESKTOP INVESTIGATION

4.1.1 PHYSICAL ENVIRONMENT

Topography

The Eastern Cape Province contains a wide variety of landscapes, from the stark Karoo (the semi-desert region of the central interior) to mountain ranges and gentle hills rolling down to the sea. The climate and topography give rise to the great diversity of vegetation types and habitats found in the region. The mountainous area on the northern border forms part of the Great Escarpment. Another part of the escarpment lies just north of Bisho, Somerset East and Graaff-Reinet. In the south of the province, the Cape Folded Mountains start between East London and Port Elizabeth and continue westward into the Western Cape. Similarly, to KwaZulu-Natal, the Eastern Cape is characterised by a large number of short, deeply incised rivers flowing parallel to each other.

The topography of the surrounding environment for the N2 Ndbakazi - Interchange ranges from 735 m to 770 m. Steeper gradients can be found to the east and west of the existing N2 along drainage channels.

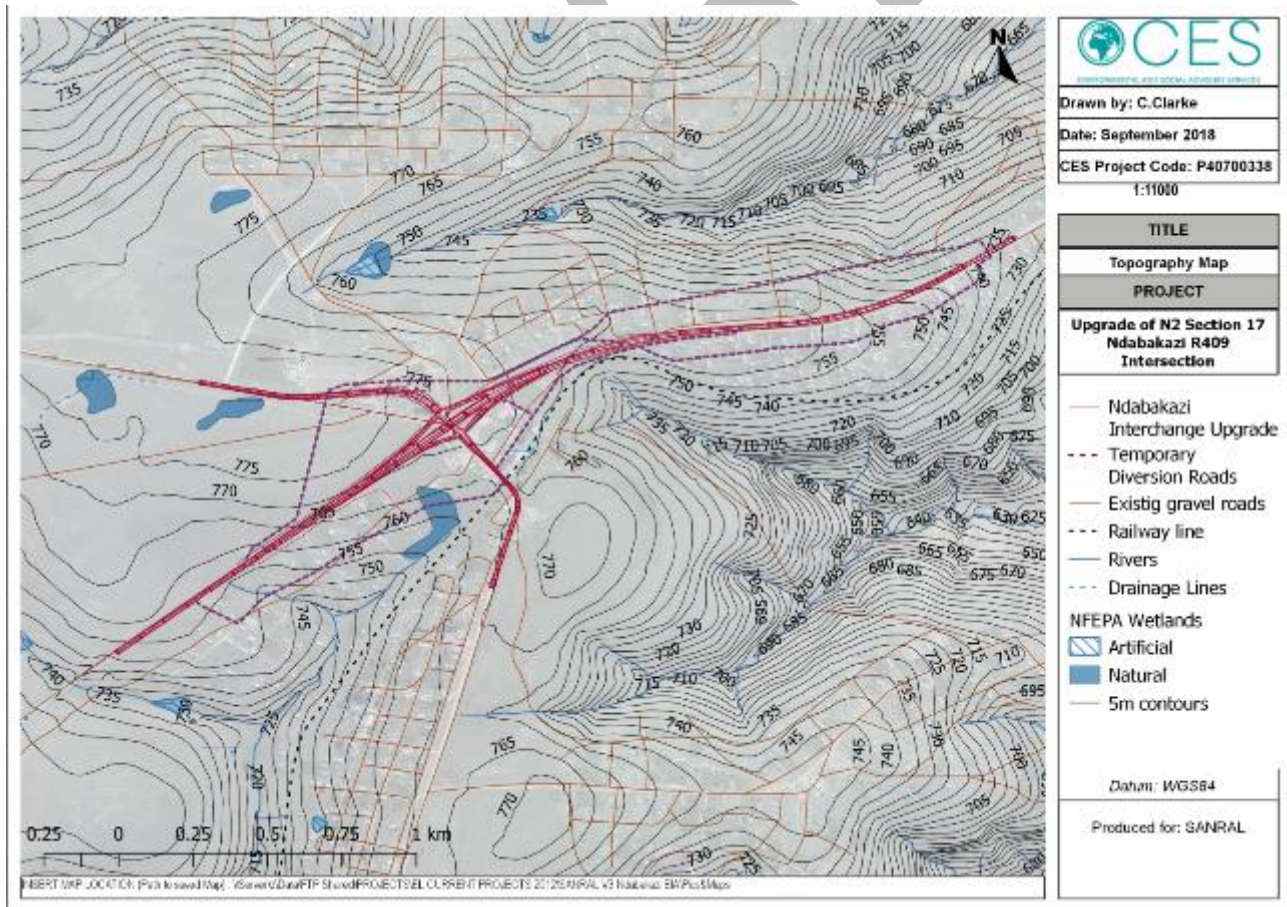


Figure 4.1: General topography of the study area.

Geology and soils

The proposed site for the N2 Ndbakazi - Interchange is mainly underlain by red and grey mudstones and sandstone of the Tarkastad Subgroups of the Beaufort Group and the Karoo Super Group.

Climate

The nearest available climate data for the Ndbakazi region was that of the adjacent town of Butterworth located 13 km to the north. Butterworth normally receives about 596mm of rain per year, with most rainfall occurring mainly during summer. The chart below (lower left) shows the average rainfall values for Butterworth per month. It receives the lowest rainfall (8mm) in June and the highest (89mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Butterworth range from 19.2°C in July to 25.6°C in February. The region is the coldest during July when the temperature drops to 6.2°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.

Land Use

The area for the proposed Ndbakazi Interchange is largely classified as a low-density urban area. The land is covered in natural grassland vegetation with little wildlife present. The surrounding natural areas are used as communal grazing land. The area is not irrigated and does not fall under any protected areas.

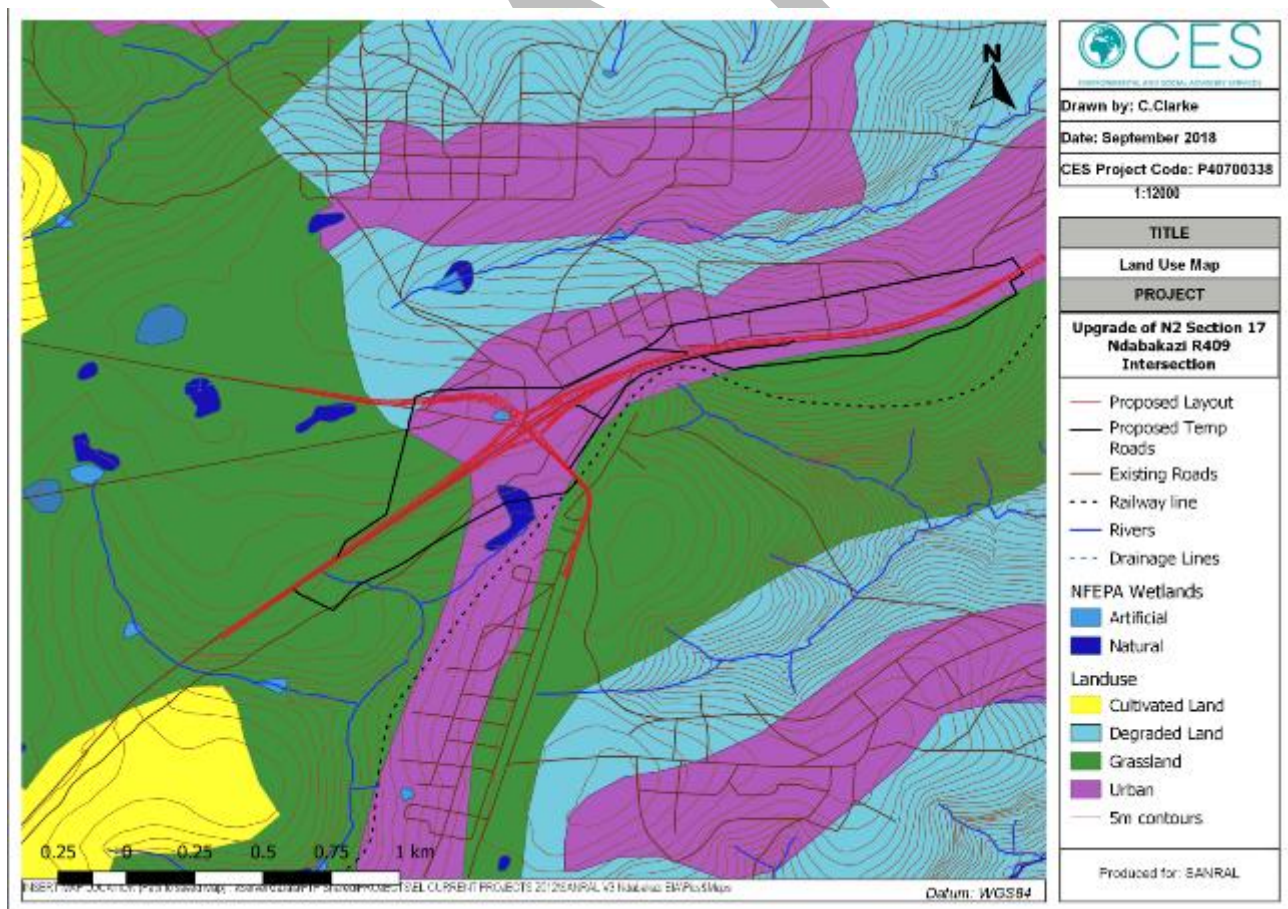


Figure 4.2: Land use of the study area.

4.1.2 BIOLOGICAL ENVIRONMENT

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
- SANBI Working for Wetlands
- STEP
- ECBCP
- CITES

SANBI Vegetation (Mucina and Rutherford, 2006)

The study area falls within one vegetation type, namely the Mthatha Moist Grassland (Mucina & Rutherford, 2012). Bisho Thornveld is also found within the region and surrounds the development site.

Mthatha Moist Grassland (Gs14)

Mthatha Moist Grassland is distributed in the Eastern Cape Province along the plains between Mthatha and Butterworth parallel to the coastline and excluding the river valleys that intrude landwards into this unit.

The undulating plains and hills support species poor, sour, wiry grassland with *Eragrostis plana* and *Sporobolus africanus*, dominated by *Themeda triandra*. In terms of the conservation status, Mucina and Rutherford (2012) classify Mthatha Moist Grassland as an ENDANGERED vegetation type. The NSBA Conservation Target for this vegetation type is 23%. More than 40% of Mthatha Moist Grassland has been transformed for cultivation, plantations or dense rural settlements.

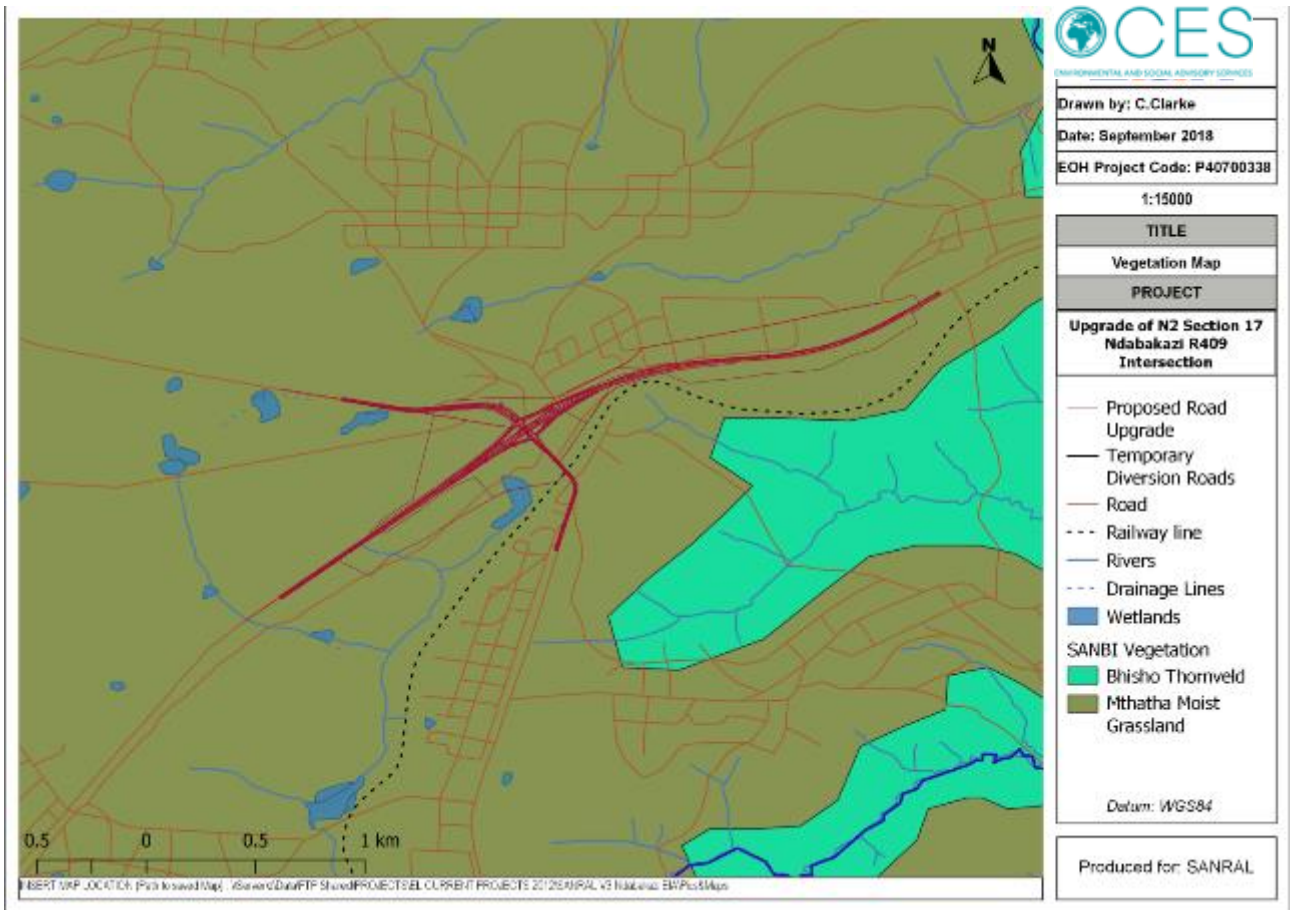


Figure 4.2: SANBI Vegetation Map of the study area.

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Subtropical Thicket Ecosystem Programme (STEP)

The STEP Conservation Priority Map classifies areas into a number of categories, based on plant and animal biodiversity of the planning domain, with emphasis on Thicket biomes (Pierce, 2003). The Conservation Priority map for the study area is presented in Figure 4.3. STEP classifies the vegetation type of the study site as Inland Thornveld, with Butterworth Savanna Thicket falling adjacent to the area (Figure 4.3). In terms of the conservation status of the thicket type, STEP classifies this region as CURRENTLY NOT VULNERABLE.

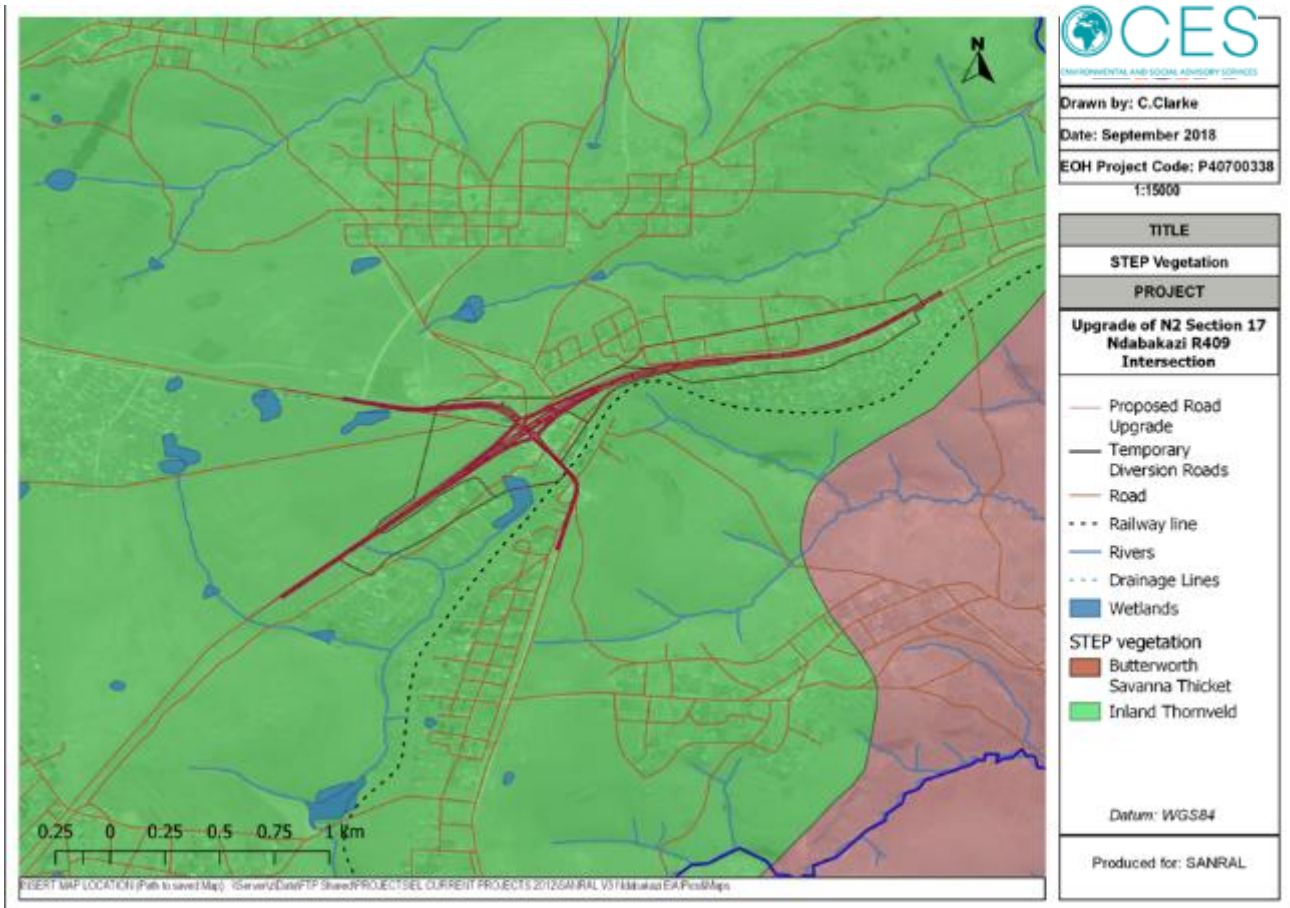


Figure 4.3: STEP thicket types of the study area.

Eastern Cape Biodiversity Conservation Plan (ECBCP)

The Ndabakazi Interchange falls within terrestrial areas that are classified as CBA 2. Furthermore a portion of the proposed intersection upgrade falls within Aquatic areas classified as CBA 2 (Figure 4.4).

The CBA 2 areas have a corresponding BLMC 2 category as described in the ECBCP Handbook. BLMC class 2 denotes 'Near Natural Landscape' and has an associated 'recommended land use objective' of 'maintaining biodiversity in a near natural state with minimal loss of ecosystem integrity [and] no transformation of natural habitats should be permitted.' To this effect, recommended land uses for BLMC 2 include conservation, game farming and communal livestock.

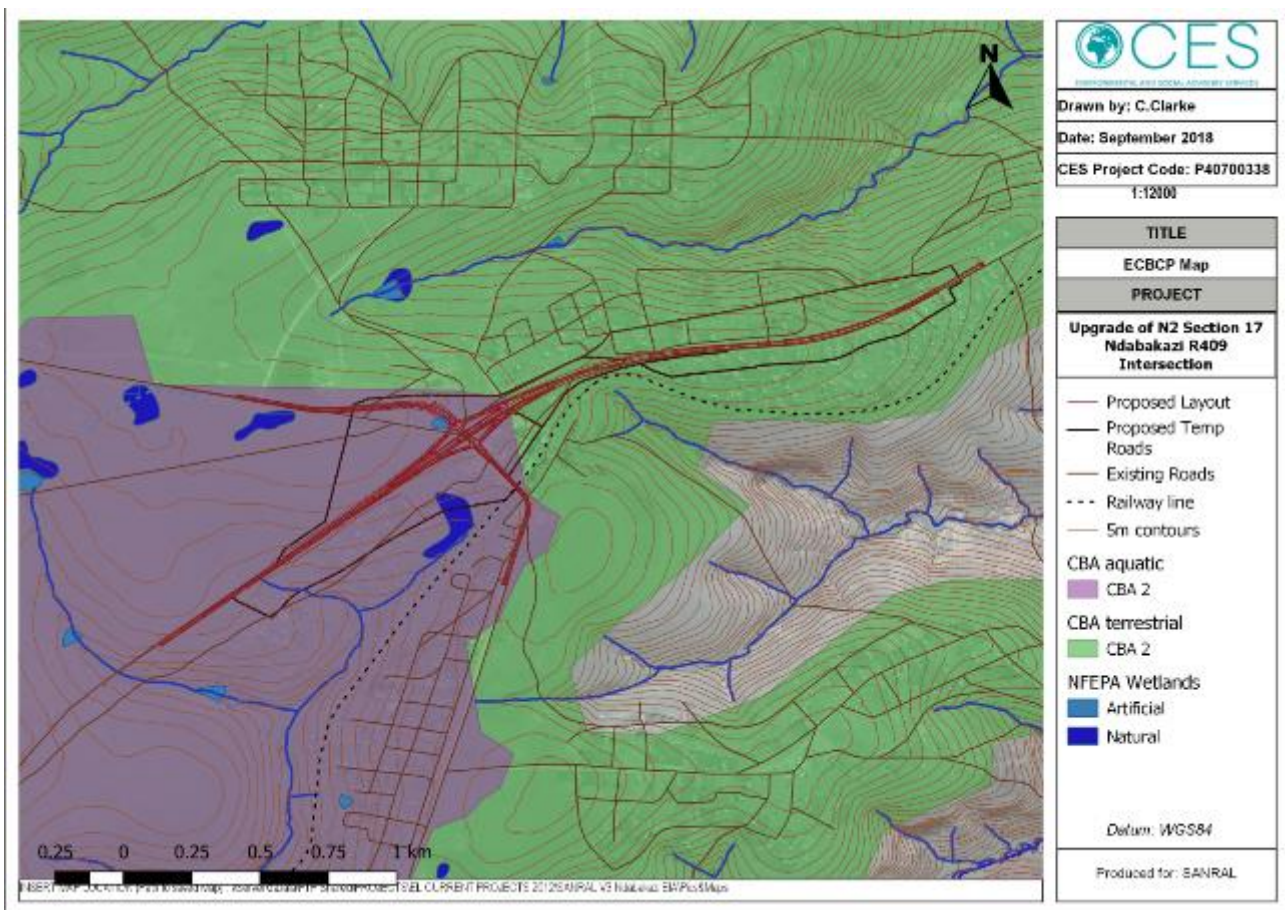


Figure 4.4: ECBCP map of study area.

SANBI Working for Wetlands

The South African National Biodiversity Institute (SANBI) compiled a National Wetland Inventory, which aims to map and classify (i.e. type) the major wetlands and water bodies in the country at a coarse spatial scale. A wetland classification system is required for application to the National Wetland Inventory, so that different types of wetlands can be distinguished for management and conservation purposes.

This classification system is intended to be used throughout the country for a number of different applications, largely with a view to facilitating common usage of terminology amongst wetland scientists and managers. However, at the same time, it is envisaged that further refinements to the classification system may be necessary in the future, to address problems that may be encountered in its application by a wide range of different users for a number of different purposes. As such, the classification system presented in this report should not be seen as the final word but, rather, as a “living” work in progress that will be continuously improved.

The following wetland types were identified on site (Figure 4.5):

- **Bench flat** - a near-level wetland area (i.e. with little or no relief) with little or no gradient, situated on a plain or a bench in terms of landscape setting. The primary source of water is precipitation, with the exception of flats along the coast (usually in a plain setting) where the water table (i.e. groundwater) may rise to the surface or near to the surface in areas of little or no relief because of the location near to the base level of the land surface represented by the presence of the ocean. Dominant hydrodynamics are bidirectional vertical fluctuations, although there may be limited multidirectional horizontal water flow in some cases. Water exits in a flat through evaporation and infiltration.

- **Slope seep** - seeps are located on gently to steeply sloping land and dominated by the colluvial (gravity-driven), unidirectional movement of water and material down-slope. Seeps are often located on the side-slopes of a valley but they do not typically extend onto a valley floor. Water inputs are primarily via subsurface flows from an up-slope direction. Seeps are often associated with diffuse overland flow during and after rainfall events. It is important to note that a seep can share a boundary with a distinct river channel and feed into the channel via diffuse surface flow or subsurface flow.

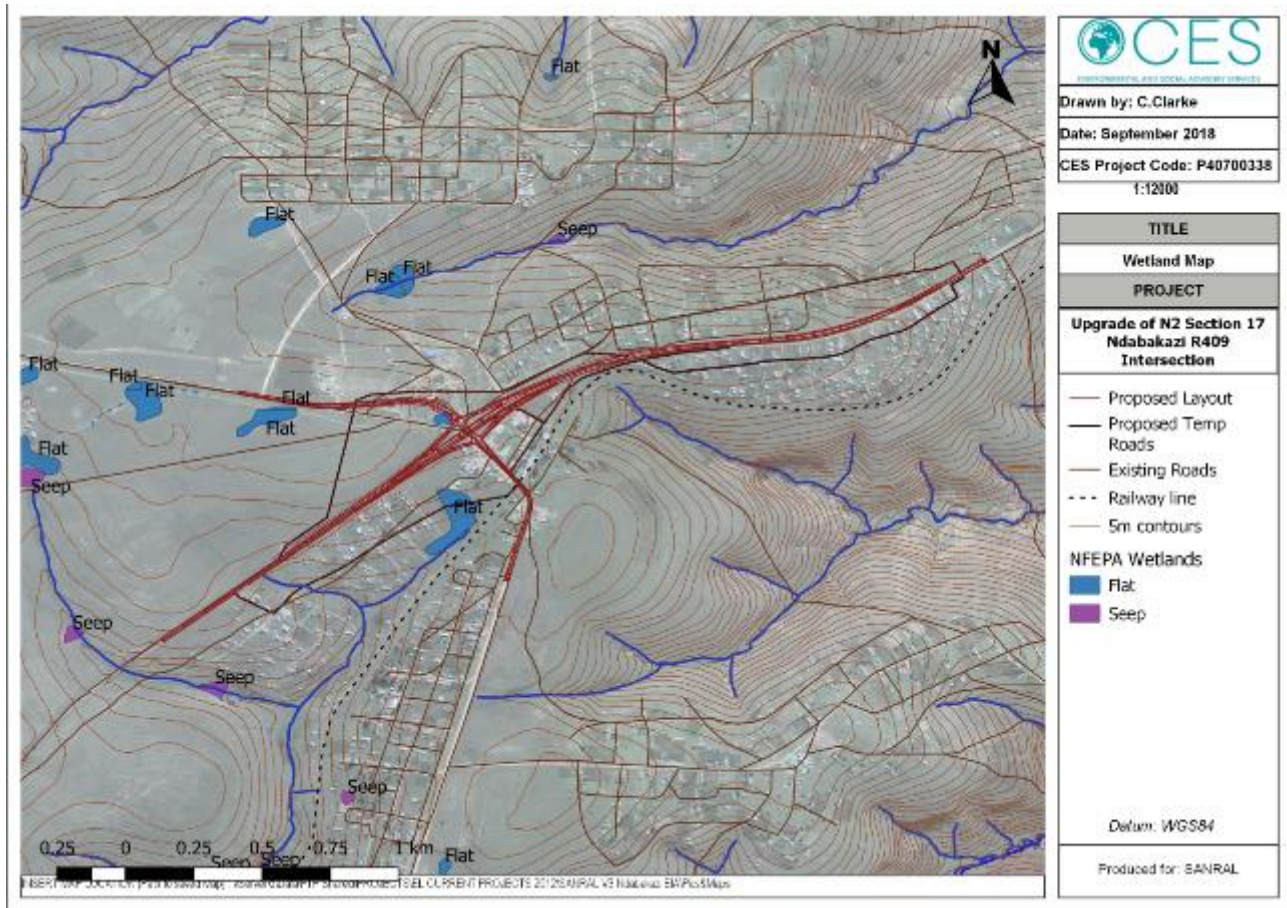


Figure 4.5: Wetland map of the study area.

Conservation Status of plant species: Rare, Endangered or Threatened species

The following list of potential plant SCC were derived from current literature for vegetation found in the area as well as the international IUCN Red Data list, the South African Red Data List, DAFF protected trees, PNCO, and CITES. The results are summarised in Table 4.1 while a full species list appears in Appendix A.

Table 4.1: List of potential plant SCC that may be found onsite

Family	Species	RED DATA	Threat Status
ASPHODELACEAE	<i>Haworthia cymbiformis</i> var. <i>setulifera</i>	NE	PNCO (Protected)
CRASSULACEAE	<i>Crassula arborescens</i> subsp. <i>undulatifolia</i>	Critically rare	PNCO (Protected)
GESNERIACEAE	<i>Streptocarpus meyeri</i>	LC	PNCO (Protected)
IRIDACEAE	<i>Gladiolus ochroleucus</i>	LC	PNCO (Protected)
ORCHIDACEAE	<i>Disa crassicornis</i>	LC	PNCO (Protected)
	<i>Eulophia streptopetala</i>	LC	PNCO (Protected)
SCROPHULARIACEAE	<i>Diascia racemulosa</i>	LC	PNCO (Protected)

Alien invasive species

A list of potential alien invasive floral species that may be found onsite are summarised in Table 4.2 below.

Table 4.2: List of potential Alien Invasive Species that are likely to be found onsite (Source: POSA Website)

Family	Species	Conservation Status	CARA	NEMBA: Alien Invasives
ASTERACEAE	<i>Xanthium spinosum</i>	Invasive	1	1b
FABACEAE	<i>Acacia mearnsii</i>	Invasive	2	2
	<i>Acacia melanoxylon</i>	Invasive	2	2
	<i>Acacia saligna</i>	Invasive	2	1b

4.1.3 POTENTIAL ISSUES IDENTIFIED

The following issues were identified from the desktop investigation:

Table 4.3: Potential issues identified

ISSUES IDENTIFIED	RECOMMENDATIONS	IMPACT
Development in sensitive ECBCP area	Although the site for the proposed N2 Ndabakazi - Interchange Development falls under BLMC 2 (Near natural landscapes) according to ECBCP, the recommended land use for this classification is not valid as the entire site is considered degraded due to high level informal livestock grazing and low-density urban sprawl activities. The site is dominated primarily by degraded grassland and therefore the recommendation of the Ecological Specialist is that the proposed development may take place.	HIGH
Loss of indigenous vegetation (Mthatha Moist Grassland)	Development in Mthatha Moist Grassland areas will require specific mitigation to reduce the impact on the vegetation. Endangered Mthatha Moist Grassland will have to be incorporated into design plans to conserve some of the non-impacted areas.	HIGH
Loss of Species of Conservation Concern (SCC)	The proposed development will involve the clearing of natural vegetation which may lead to the destruction of habitats and the loss of identified and unidentified plant SCC.	HIGH
The development could result in permanent loss of wetlands	Ensure that a buffer zone of 32 metres is maintained. No development activities may occur within wetland areas without prior approval by Department of Water and Sanitation (DWS). Temporary access roads through wetland/watercourses must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed.	HIGH
Invasion of alien species	An alien removal plan must be implemented and executed during construction.	MODERATE

4.2 SITE INVESTIGATION

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 14 September 2018 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.

4.2.1 PLANT SPECIES OBSERVED

Based on site investigations, the areas adjacent to the proposed N2 Ndabakazi - Interchange consists of grassland situated on flat areas. The most common grasses identified were *Themeda triandra*, *Eragrostis plana* and *Sporobolus africanus*. The entire area is currently used as commonage for domestic grazing and is considered degraded grassland impacted by grazing. The proposed development area is almost entirely surrounded by existing development, classified as low-urban density (as shown in Figure 4.2 above).

Below is a photo sequence showing the vegetative condition of the study area during the site investigation.





Photo 1



Photo 2



Photo 3



Photo 4



Photo 5

Figure 4.6: Site photos of the surrounding natural vegetation

The plant species identified at the study site have been grouped in Table 4.1 below.

Table 4.1 Plant species identified in the study area.

Graminoids (grasses)	Herbs
<i>Themeda triandra</i>	<i>Senecio coronatus</i>
<i>Eragrostis plana</i>	<i>Helichrysum rugulosum</i>
<i>Sporobolus africanus</i>	<i>Indigofera hedyantha</i>
Succelents	Invasives
<i>Aloe maculata</i>	<i>Solanum mauritianum</i>

4.2.2 PLANT SPECIES OF CONSERVATION CONCERN OBSERVED

A patch of *Aloe maculata* was found on site at GPS coordinates: S 32° 20.945' E28° 2.049' (Figure 4.7). These Aloes are protected under the Provincial Nature and Environmental Conservation Ordinance (No. 19 of 1974). This Ordinance protects Endangered (Schedule 3) and Protected (Schedule 4) Species. A permit from the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) (the Provincial Authority) is required for the removal or destruction of species listed in the Schedules prior to construction.





Figure 4.7: *Aloe maculata* found within the study area (GPS coordinates: S 32° 20.945' E 28° 2.049').

4.2.3 ANIMAL SPECIES

No amphibians, reptiles, terrestrial invertebrates, birds and nesting areas as well as large mammals were observed onsite. Small mammals such as rodents, ground squirrels, bats and a variety of insects and reptiles are expected to occur on site. There might be some animal species associated with the wetland areas.

4.2.4 WATER BODIES

Various existing water bodies were found on site as shown in Figure 4.5 above. Two natural bench flat wetlands are in close proximity to the proposed development (photos 1 and 2 below). A temporary access road is proposed to pass through one of the natural bench flat wetlands on the eastern side of the proposed development (photo 2). A man-made dam (old borrow pit) is located to the west of the existing N2-R409 interchange. Several non-perennial drainage channels are located to the east of the proposed development.

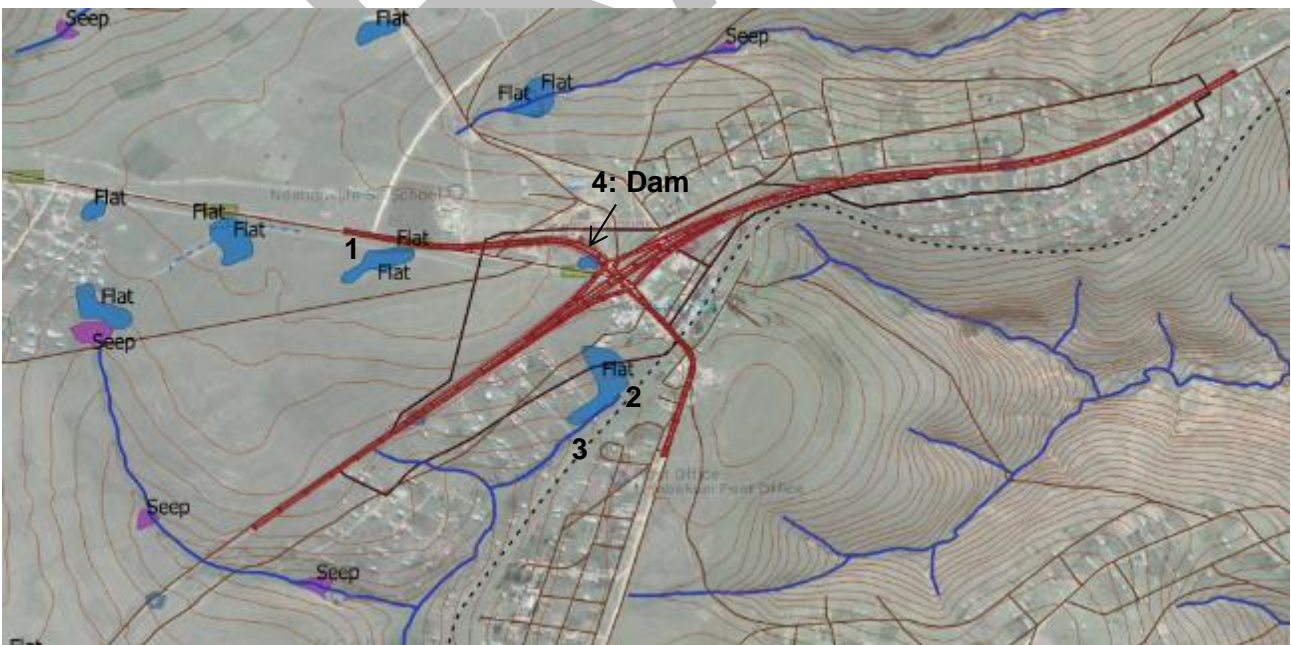




Photo 1: Bench Flat Wetland (Taken in January 2019)



Photo 2: Bench Flat Wetland (Taken in September 2018)



Photo 3: Drainage channel downstream of the bench flat wetland (photo 2)



Photo 4: Dam

Figures 4.8: Waterbodies present within the study area.

4.2.5 POTENTIAL ISSUES IDENTIFIED

The following issues were identified in this section:

ISSUES IDENTIFIED	RECOMMENDATIONS	IMPACT
Wetland ecosystems maybe damaged during construction	Ensure that a buffer zone of 32 metres is maintained. No development activities may occur within wetland areas without prior approval by Department of Water and Sanitation (DWS). Temporary access roads through wetland/watercourses (photo 2) must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed.	HIGH
Loss of plant SSC	A permit from the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) (the Provincial Authority) is required for the removal or destruction of species listed in the Schedules prior to construction. The aloe patch (<i>Aloe maculata</i>) must be conserved onsite through transplanting. The appointed Environmental Control Officer (ECO), Construction Manager and a vegetation specialist must be consulted during the transplanting process and the final site must be approved by the ECO and vegetation specialist.	MODERATE

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5 SENSITIVITY ASSESSMENT

A site assessment was conducted in order to confirm desktop information and infer accurate descriptions of the current ecological integrity of the site at a more detailed level. A further objective is to assist in impact identification and assessment. This study discusses fauna, flora and potential sensitive ecosystems.

5.1 CONSERVATION AND SPATIAL PLANNING TOOLS

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

The following tools identified as relevant to the project are summarised below:

- SANBI Vegetation threat status;
- Land cover;
- Rivers and wetlands;
- NEMBA Protected Ecosystems; and
- ECBCP CBA's.

5.1.1 SANBI VEGETATION THREAT STATUS

The Mthatha Moist Grassland (as identified in Mucina and Rutherford, 2012) occurs along portions of the road upgrade and development, which is classified as Endangered. Some vegetation has been completely transformed by cultivation and urban development and encroachment.

5.1.2 LAND COVER

Two applicable land covers were identified namely:

- Natural vegetation – Mthatha Moist Grassland
- Urban and developed areas.

Natural vegetation is mostly intact with a large degree of transformation in some areas. Alien and Invasive vegetation were also observed. Urban areas have no biodiversity value as no natural vegetation remains.

5.1.3 RIVERS AND WETLANDS

Water is considered as a scarce resource in South Africa. All identified rivers (including drainages) and wetlands (artificial and natural) are protected by legislation and requires licencing from DWS to impact on them. The surrounding watercourses and wetlands within the study area are considered to be highly sensitive.

5.1.4 ECBCP CBA'S

The study area falls within a terrestrial CBA 2, with a portion falling within an aquatic CBA 2.

5.2 SENSITIVITY ALLOCATION

Sensitivity maps were developed based on the methodology presented in Table 5.1 below, for the study area. The allocation of criteria was based on both the desktop biophysical description of the site as well as observations made during the site visit.

Table 5.1: Sensitivity criteria

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or habitat type in the region	Extensive throughout the region	Restricted to a particular region / zone	Restricted to a specific locality / site
3	Conservation status 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	Species of conservation concern - Presence and number	None, although occasional regional endemics	No Species of Conservation Concern, some indeterminate or rare endemics	One or more Species of Conservation Concern, or more than 2 endemics or rare species
5	Habitat fragmentation leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation
6	Biodiversity contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High diversity and species richness
7	Erosion potential 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
8	Rehabilitation 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
9	Disturbance due to human	Site is very disturbed or	There is some degree of disturbance of the site	The site is hardly or very slightly impacted upon

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
	habitation or other influences (alien invasive species)	degraded		by human disturbance
10	Ecological function	Habitat widely represented in the landscape not specifically harbouring any unique habitat features...etc.	Intermediate role in ecological function	Key habitat involved in ecological processes (ecological corridors and network areas or key niche habitats)
11	Ecological Services	Little to no ecological services	Some ecological services.	Various ecological services. Areas should be conserved.

The proposed Ndakakazi Interchange largely falls on already developed land (within the road reserve). A small patch of Aloes found on the western side of the interchange have a **HIGH** sensitivity rating and should be avoided if possible.

A small portion of the proposed temporary diversion road transverse areas of **HIGH** sensitivity. The primary reasons for the high sensitivity areas (red) in Figure 5.1 below are the presence of existing water bodies, (rivers, drainage lines and wetlands). In addition, identified sensitive heritage features have been allocated a **HIGH** sensitivity rating.

Portions of the proposed temporary diversion roads fall within undisturbed natural vegetated areas containing Mthatha Moist Grassland (Endangered) and has been allocated a **MODERATE** sensitivity rating. Portions of the temporary traffic diversion roads which pass through areas of disturbed Mthatha Moist Grassland have been allocated a **LOW** sensitivity rating.

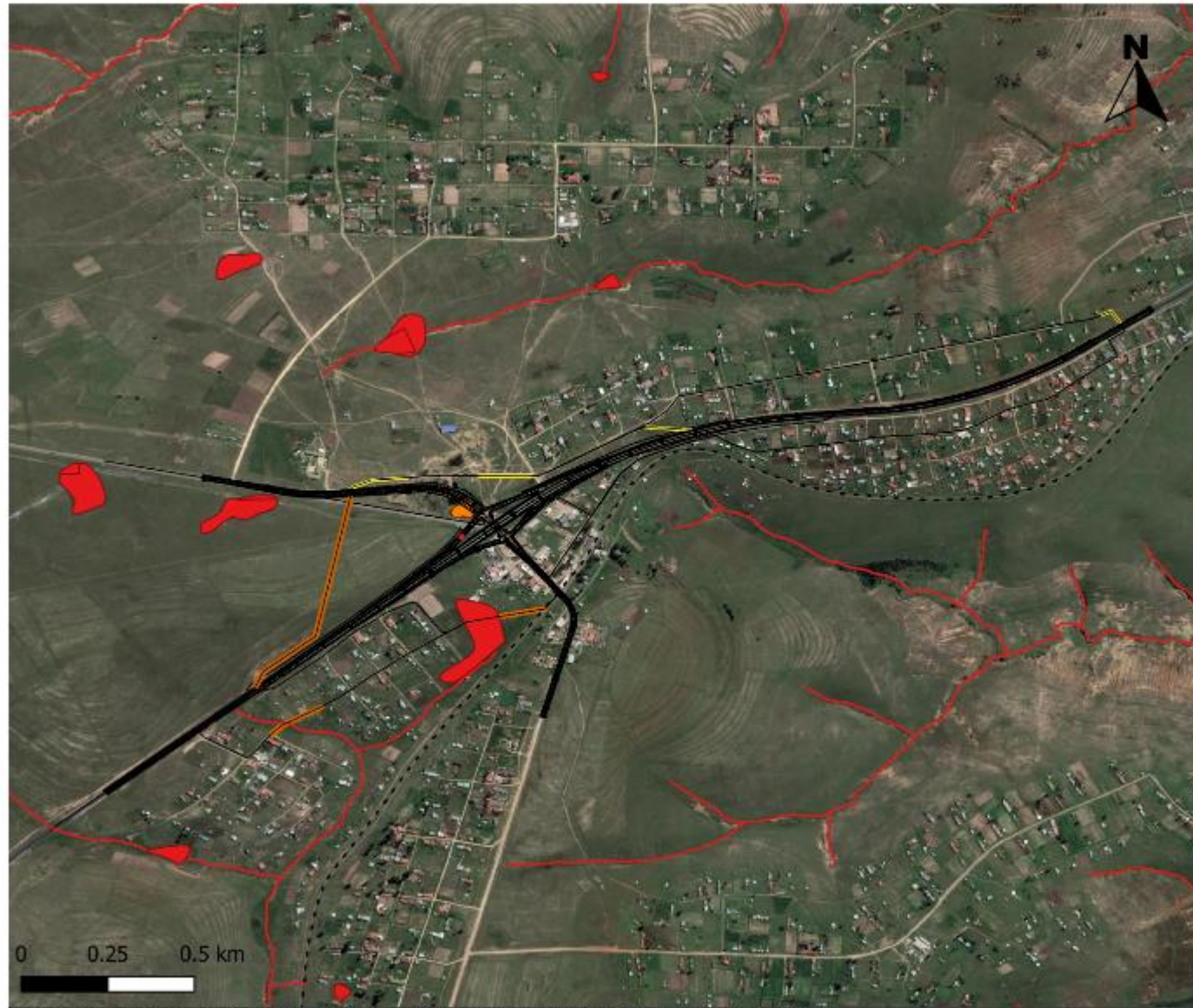
Houses may also be affected by the proposed development by increased traffic diverted through the residential areas, however this can be adequately mitigated through implementation of the recommended mitigations.

Table 5.2: Sensitive assessment of the study area

SENSITIVE ENVIRONMENT	DESCRIPTION	RISK
Aquatic Environment	<ul style="list-style-type: none"> Watercourses Wetlands 	HIGH
Species of Conservation Concern	A patch of <i>Aloe maculata</i> was found on site	HIGH
Natural Vegetated Areas – Grassland; Conservation Status of Vegetation type	Natural occurring Mthatha Moist grassland; The SANBI Vegetation type, Mthatha Moist Grassland, is	MODERATE

SENSITIVE ENVIRONMENT	DESCRIPTION	RISK
	considered ENDANGERED and has a high degree of transformation (more than 40%).	
Natural Vegetated Areas – Grassland	Degraded/disturbed areas of Mthatha Moist Grassland	LOW

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 <small>ENVIRONMENTAL AND SOCIAL ADMINISTRATION SERVICES</small>	
Drawn by: C. Clarke	
Date: May 2019	
CES Project Code: P40700338	
1:11000	
TITLE	
Sensitivity Map	
PROJECT	
Upgrade of N2 Section 17 Ndabakazi R409 Intersection	
<ul style="list-style-type: none"> — Proposed Road Upgrade — Temporary Diversion Roads - - - Railway line 	
Sensitivity	
<ul style="list-style-type: none"> ■ High ■ Medium ■ Low 	
Datum: WGS84	
Produced for: SANRAL	

Figure 5.1 Sensitivity map of the study area.

5.3 RECOMMENDATIONS

Various mitigations are recommended (based on the level of sensitivity of the affected area) to reduce the impacts of the proposed N2 Ndabakazi - Interchange on the surrounding natural environment.

5.3.1 HIGH SENSITIVE AREAS

All water bodies are considered as “*high sensitive*”, (coloured red in Figure 5.1) and as such are considered as “**No-Go Areas**”. No further loss of natural areas and no further impacts must be allowed in these areas. If any development is proposed in these areas (such as temporary access roads), authorisation must be obtained from the DWS for any construction which takes place inside or within 32 meters of any water body including wetlands. Temporary access roads through wetland/watercourses (photo 2) must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed.

A small patch of *Aloe maculata* was found in the proposed site (Figure 4.7). This patch will have to be transplanted in order to avoid loss of species.

5.3.2 MODERATE SENSITIVE AREAS

These areas include pristine (undisturbed) and semi-pristine (low level of disturbance) areas. Depending on constraints (such as concentrations of protected species, or infrastructure limitations), these areas can withstand a limited loss of, or disturbance to, natural areas.

5.3.3 LOW SENSITIVE AREAS

These areas include semi-pristine (low level of disturbance) to disturbed areas of natural vegetation and are not considered of high conservation value.

6 IMPACT IDENTIFICATION AND ASSESSMENT

6.1 IDENTIFIED IMPACTS

Ecological impacts were identified during the Planning and Design, Construction, Operation and Decommissioning Phase of the proposed N2 Ndabakazi - Interchange are described below. These included the consideration of direct, indirect and cumulative impacts that may occur.

Table 6.1: Technical scope of the impacts identified during all phases of the proposed Ndabakazi Interchange

	POTENTIAL ISSUES	SOURCE OF ISSUE	POTENTIAL RECEPTORS	PHASE			
				PLANNING & DESIGN	CONSTRUCTION	OPERATIONAL	DECOMMISSIONING
THEME	Changes to fluvial geomorphology and hydrology	Earthworks	Surrounding water courses & wetlands	X	X	X	
	Loss of Natural vegetation	Vegetation clearance	Flora in study area, endangered grasslands	X	X		
	Species of Conservation Concern (SCC)	Vegetation clearance	SCC in study area	X	X		
	Control of alien plant species	Inappropriate alien vegetation management plan	Disturbed areas	X	X		X

6.2 IMPACT ASSESSMENT

The impacts identified in Section 6.1 are assessed in terms of the criteria described in Section 3.46 and are summarised in the tables below (Table 6.2 – 6.5).

Table 6.2. Assessment and mitigation of impacts identified in the Planning and Design Phase.

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	EXTENT	DURATION	LIKELIHOOD	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
PLANNING & DESIGN PHASE									
Changes to fluvial geomorphology and hydrology	During the planning and design phase, the inappropriate design of stormwater management infrastructure and culverts may cause the degradation of watercourses, wetlands and associated natural habitats and sensitive aquatic systems.	Direct Cumulative	Localised	Long Term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The road engineer must ensure that appropriate stormwater structures are designed in line with both SANRAL and DWS requirements. Any upgraded culverts must be designed in such a manner so as not to impede or divert base flows or increase upstream flood inundation. If any planned construction takes place inside or within 32m of any watercourse, authorisation must be obtained from DWS. 	LOW NEGATIVE
Loss of natural vegetation	During the planning and design phase, the inappropriate design of the road upgrade will lead to the unnecessary loss of natural vegetation.	Direct, Indirect, Cumulative	Project Level	Long Term	Definite	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The design and layout of the road must have as minimal impact on the natural vegetation as possible. 	LOW NEGATIVE

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	EXTENT	DURATION	LIKELIHOOD	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Loss of Species of Conservation Concern (SCC)	During the planning and design phase the inappropriate design and alignment of the Ndabakazi Interchange will lead to the loss of identified and unidentified plant and animal SCC.	Direct	Project Level	Permanent	Definite	Moderately severe	HIGH NEGATIVE	<ul style="list-style-type: none"> • A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area. • All plant SCC (aloes) must be relocated to outside the construction footprint prior to commencement of activities. • The relevant permits must be obtained from the competent authority in order to remove any SCC. 	MODERATE NEGATIVE
Control of alien plant species	During the planning and design phase, inadequate planning for the removal and management of alien vegetation could result in the invasion of alien vegetation in both terrestrial and riparian areas during the construction and	Indirect	Localised	Long Term	Probable	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> • During the planning and design phase a Rehabilitation, Alien Vegetation Management Plan must be compiled to reduce the establishment and spread of undesirable alien plant species. 	MODERATE NEGATIVE

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	EXTENT	DURATION	LIKELIHOOD	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
	operation phase.								

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Table 6.3. Assessment and mitigation of impacts identified in the Construction Phase.

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	EXTENT	DURATION	LIKELIHOOD	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
CONSTRUCTION PHASE									
Changes to fluvial geomorphology and hydrology	During the construction phase activities within licensed watercourses/drainage channels may impede the flow of watercourses, affecting the local hydrology, should it not be undertaken in the correct manner.	Direct Cumulative	Localised	Medium term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The construction within licensed water crossings should be as minimal as practically possible. Construction must adhere to the conditions of the Water Use License All work within the watercourses and drainage channels should be completed during the dry season, when flows are at their lowest, if possible. Temporary access roads through wetland/watercourses must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed. 	MODERATE NEGATIVE
Loss of natural vegetation	During the construction phase, the clearing of natural vegetation for construction will lead to the loss of natural vegetation.	Direct Cumulative	Project level	Medium term	Definite	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is 	LOW NEGATIVE

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	EXTENT	DURATION	LIKELIHOOD	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								<p>no unnecessary loss of natural vegetation outside the approved road upgrade footprint.</p> <ul style="list-style-type: none"> Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken. 	
Loss of Species of Conservation Concern (SCC)	During the construction phase the clearing of natural vegetation may lead to the destruction of habitats and the loss of identified and unidentified plant SCC.	Direct Indirect Cumulative	Localised	Permanent	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them. Identified SCC's (aloes) must be relocated immediately outside of the construction and operational footprint. Search and rescue must be undertaken by a professional and qualified botanist. 	LOW NEGATIVE

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	EXTENT	DURATION	LIKELIHOOD	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
								<ul style="list-style-type: none"> The contractor's staff must not poach or trap wild animals. The contractor's staff must not harvest any natural vegetation. 	
Control of alien plant species	During the construction phase, poor continuous rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow for alien vegetation species to expand.	Direct Indirect Cumulative	Localised	Long Term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated back to their original condition. Only topsoil from the immediate area must be used for rehabilitation. All temporarily impacted areas must be restored as per the Rehabilitation Management Plan. 	LOW NEGATIVE

Table 6.4. Assessment and mitigation of impacts identified in the Operation Phase.

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	EXTENT	DURATION	LIKELIHOOD	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
OPERATION PHASE									
Changes to fluvial geomorphology and hydrology	During the operational phase, inadequate management and maintenance of stormwater infrastructure and culverts may cause the degradation of watercourses, wetlands and associated natural habitats and sensitive aquatic systems.	Direct Cumulative	Localised	Medium term	Possible	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The Storm Water & Contingency Management Plan must be implemented and infrastructure monitored and maintained by SANRAL. 	LOW NEGATIVE

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Table 6.5. Assessment and mitigation of impacts identified in the Decommissioning Phase.

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	EXTENT	DURATION	LIKELIHOOD	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
DECOMMISSIONING PHASE									
Control of alien plant species	During the decommissioning phase, poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow for alien vegetation species to expand.	Direct Indirect Cumulative	Localised	Long Term	Probable	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated back to their original condition. Only topsoil from the immediate area must be used for rehabilitation. All temporarily impacted areas must be restored as per the Rehabilitation Management Plan. 	LOW NEGATIVE

7 IMPACT STATEMENT, CONCLUSION & RECOMMENDATIONS

7.1 CONCLUSIONS

SANRAL is proposing the construction of the new Ndabakazi Interchange between the N2 and the R409, near Butterworth within the Amathole District Municipality of the Eastern Cape Province. The proposed Ndabakazi Interchange development will consist of the upgrading of the existing N2 and R409 roads at the intersection as well as the construction of a new N2 bridge over the R409 with corresponding interchanges. These improvements will include extensive earth and drainage works, layer works, new surfacing, road repairs, road construction, construction of reinforced concrete structures, improvements/construction of drainage structures and vertical geometric improvements for the new N2 Bridge.

All HIGH impacts could be mitigated to a MODERATE or LOW level with the implementation of appropriate mitigation measures. It must be emphasised that a Storm Water Management Plan, Waste Management Plan, Erosion Management Plan, and Alien Vegetation Rehabilitation Management Plan must be developed prior to construction.

Table 7.1 Assessment of pre- and post-mitigation impact significance.

STAGES	PRE-MITIGATION			POST-MITIGATION		
	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
Planning and Design	0	2	2	2	2	0
Construction	0	3	1	3	1	0
Operation	0	1	0	1	0	0
Decommissioning	0	1	0	1	0	0
TOTAL	0	7	3	6	4	0

7.2 RECOMMENDATIONS FOR THE PROPOSED NDABAKAZI INTERCHANGE

All the mitigation measures provided below are to be implemented in the Planning and Design, Construction, Operation and Decommissioning Phases of the proposed Ndabakazi Interchange development.

7.2.1 PLANNING AND DESIGN

- The road engineer must ensure that appropriate stormwater structures are designed in line with both SANRAL and DWS requirements.
- Any upgraded culverts must be designed in such a manner so as not to impede or divert base flows or increase upstream flood inundation.
- If any planned construction takes place inside or within 32m of any watercourse, authorisation must be obtained from DWS.
- The design and layout of the road must have as minimal impact on the natural vegetation as possible.
- A walkthrough must be done by a suitably qualified individual to confirm the occurrence of SCC's in the study area.
- All plant SCC (aloes) must be relocated to outside the construction footprint prior to commencement of activities.

- The relevant permits must be obtained from the competent authority in order to remove any SCC.
- During the planning and design phase a Rehabilitation, Alien Vegetation Management Plan must be compiled to reduce the establishment and spread of undesirable alien plant species.

7.2.2 CONSTRUCTION

- The construction within licensed water crossings should be as minimal as practically possible.
- Construction must adhere to the conditions of the Water Use License
- All work within the watercourses and drainage channels should be completed during the dry season, when flows are at their lowest, if possible.
- Temporary access roads through wetland/watercourses must be rehabilitated to the satisfaction of the DWS and ECO once construction is completed.
- The construction footprint must be surveyed and demarcated prior to construction commencing to ensure that there is no unnecessary loss of natural vegetation outside the approved road upgrade footprint.
- Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and revegetation must be undertaken.
- All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them.
- Identified SCC's (aloes) must be relocated immediately outside of the construction and operational footprint.
- Search and rescue must be undertaken by a professional and qualified botanist.
- The contractor's staff must not poach or trap wild animals.
- The contractor's staff must not harvest any natural vegetation.
- All temporarily impacted areas must be rehabilitated back to their original condition.
- Only topsoil from the immediate area must be used for rehabilitation.
- All temporarily impacted areas must be restored as per the Rehabilitation Management Plan.

7.2.3 OPERATION

- The Storm Water & Contingency Management Plan must be implemented and infrastructure monitored and maintained by SANRAL.

7.2.4 DECOMMISSIONING

- All temporarily impacted areas must be rehabilitated back to their original condition.
- Only topsoil from the immediate area must be used for rehabilitation.
- All temporarily impacted areas must be restored as per the Rehabilitation Management Plan.

7.3 ENVIRONMENTAL STATEMENT AND OPINION OF THE SPECIALIST

The ecological impacts of all the aspects of the proposed Ndabakazi Interchange development were considered and deemed to be ecological acceptable, provided that the mitigation measures provided in this report are implemented.

As the proposed Ndabakazi Interchange development will largely involve the upgrade of the existing N2-R409 Interchange (as well as existing temporary roads), the impact on the natural surrounding vegetation will be minimal.

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APPENDIX A: VEGETATION LIST

Family	Species	Threat status	Lifecycle	Growth forms
ACANTHACEAE	<i>Barleria obtusa</i>	LC	Perennial	Dwarf shrub, herb, shrub
AMARYLLIDACEAE	<i>Crinum macowanii</i>	PNCO (Protected)	Perennial	Geophyte
AMARYLLIDACEAE	<i>Crinum moorei</i>	Red Data (VU)	Perennial	Geophyte
ANTHERICACEAE	<i>Chlorophytum cooperi</i>	LC	Perennial	Herb
APOCYNACEAE	<i>Asclepias gibba</i> var. <i>gibba</i>	PNCO (Protected)	Perennial	Herb
APOCYNACEAE	<i>Ceropegia africana</i> subsp. <i>barklyi</i>	PNCO (Protected)	Perennial	Climber, geophyte, succulent
APOCYNACEAE	<i>Pachycarpus reflectens</i>	PNCO (Protected)	Perennial	Herb, succulent
ASPARAGACEAE	<i>Asparagus oxyacanthus</i>	LC	Perennial	Shrub
ASPARAGACEAE	<i>Asparagus suaveolens</i>	LC	Perennial	Shrub
ASPHODELACEAE	<i>Aloe africana</i>	PNCO (Protected)	Perennial	Succulent, tree
ASPHODELACEAE	<i>Aloe barberae</i>	PNCO (Protected)	Perennial	Succulent, tree
ASPHODELACEAE	<i>Aloe tenuior</i> var. <i>tenuior</i>	PNCO (Protected)	Perennial	Shrub, succulent
ASPHODELACEAE	<i>Bulbine abyssinica</i>	LC	Perennial	Geophyte, herb, succulent
ASPHODELACEAE	<i>Bulbine frutescens</i>	LC	Perennial	Dwarf shrub, succulent
ASPHODELACEAE	<i>Haworthia cymbiformis</i> var. <i>setulifera</i>	PNCO (Protected)	Perennial	Succulent
ASPHODELACEAE	<i>Trachyandra affinis</i>	LC	Perennial	Geophyte, succulent
ASTERACEAE	<i>Arctotis arctotoides</i>	LC	Perennial	Herb
ASTERACEAE	<i>Denekia capensis</i>	LC	Perennial	Herb
ASTERACEAE	<i>Helichrysum psilolepis</i>	LC	Perennial	Herb
ASTERACEAE	<i>Hilliardiella hirsuta</i>	LC	Perennial	Herb
ASTERACEAE	<i>Senecio retrorsus</i>	LC	Perennial	Herb
ASTERACEAE	<i>Xanthium spinosum</i>	Not Evaluated	Annual	Herb
ASTERACEAE	<i>Zinnia peruviana</i>	Not Evaluated	Annual	Herb
BUDDLEJACEAE	<i>Nuxia congesta</i>	LC	Perennial	Shrub, tree
COLCHICACEAE	<i>Colchicum striatum</i>	LC	[No lifecycle defined]	Geophyte

Family	Species	Threat status	Lifecycle	Growth forms
CRASSULACEAE	<i>Crassula multicava</i> subsp. <i>multicava</i>	LC	Perennial	Herb, lithophyte, succulent
CRASSULACEAE	<i>Crassula ovata</i>	LC	Perennial	Shrub, succulent
CRASSULACEAE	<i>Kalanchoe rotundifolia</i>	LC	Perennial	Dwarf shrub, succulent
CYPERACEAE	<i>Ficinia dunensis</i>	LC	Perennial	Cyperoid, herb, mesophyte
EBENACEAE	<i>Diospyros lycioides</i> subsp. <i>sericea</i>	LC	Perennial	Shrub, tree
ERIOSPERMACEAE	<i>Eriospermum porphyrium</i>	LC	Perennial	Geophyte
FABACEAE	<i>Dichilus strictus</i>	LC	Perennial	Dwarf shrub, herb, shrub
FABACEAE	<i>Eriosema squarrosum</i>	LC	Perennial	Herb
FABACEAE	<i>Erythrina latissima</i>	LC	Perennial	Tree
FABACEAE	<i>Indigofera torulosa</i> var. <i>torulosa</i>	LC	Annual	Herb
FABACEAE	<i>Lotononis stricta</i>	LC	Perennial	Dwarf shrub, shrub
FABACEAE	<i>Schotia afra</i> var. <i>angustifolia</i>	LC	Perennial	Shrub, tree
FABACEAE	<i>Trifolium burchellianum</i> subsp. <i>burchellianum</i>	LC	Perennial	Herb
FABACEAE	<i>Zornia capensis</i> subsp. <i>capensis</i>	LC	Perennial	Herb
GERANIACEAE	<i>Pelargonium bowkeri</i>	LC	Perennial	Geophyte, succulent
HYACINTHACEAE	<i>Drimia capensis</i>	LC	Perennial	Geophyte
ICACINACEAE	<i>Cassinopsis ilicifolia</i>	LC	Perennial	Shrub, tree
IRIDACEAE	<i>Gladiolus ochroleucus</i>	PNCO (Protected)	Perennial	Geophyte, herb
LAMIACEAE	<i>Plectranthus ecklonii</i>	LC	Perennial	Shrub
LAMIACEAE	<i>Plectranthus madagascariensis</i> var. <i>madagascariensis</i>	LC	Perennial	Herb, succulent
LAMIACEAE	<i>Plectranthus spicatus</i>	LC	Perennial	Herb, succulent

Family	Species	Threat status	Lifecycle	Growth forms
LAMIACEAE	<i>Salvia repens</i> var. <i>keiensis</i>	DDD	Perennial	Herb
LAMIACEAE	<i>Teucrium trifidum</i> .	LC	Perennial	Herb
MALVACEAE	<i>Grewia occidentalis</i> var. <i>occidentalis</i>	LC	Perennial	Shrub, tree
ORCHIDACEAE	<i>Disa crassicornis</i>	PNCO (Protected)	Perennial	Geophyte, herb
ORCHIDACEAE	<i>Eulophia streptopetala</i>	PNCO (Protected)	Perennial	Geophyte, herb, succulent
POACEAE	<i>Agrostis eriantha</i> var. <i>eriantha</i>	LC	Perennial	Graminoid
POACEAE	<i>Eragrostis cilianensis</i>	LC	Annual	Graminoid
POACEAE	<i>Eragrostis curvula</i>	LC	Perennial	Graminoid
POACEAE	<i>Hyparrhenia dregeana</i>	LC	Perennial	Graminoid
POACEAE	<i>Hyparrhenia hirta</i>	LC	Perennial	Graminoid
POACEAE	<i>Themeda triandra</i>	LC	Perennial	Graminoid
POACEAE	<i>Tristachya leucothrix</i>	LC	Perennial	Graminoid
RESTIONACEAE	<i>Thamnochortus glaber</i>	LC	Perennial	Dwarf shrub, restioid
RHAMNACEAE	<i>Scutia myrtina</i>	LC	Perennial	Shrub, tree
ROSACEAE	<i>Rubus pinnatus</i>	LC	Perennial	Scrambler, shrub
ROSACEAE	<i>Rubus rigidus</i>	LC	Perennial	Shrub
RUBIACEAE	<i>Burchellia bubalina</i>	LC	Perennial	Shrub, tree
SCROPHULARIACEAE	<i>Diascia racemulosa</i>	LC	Annual	Herb
SCROPHULARIACEAE	<i>Jamesbrittenia phlogiflora</i>	LC	Perennial	Dwarf shrub
SCROPHULARIACEAE	<i>Nemesia denticulata</i>	LC	Perennial	Herb
SCROPHULARIACEAE	<i>Selago dolosa</i>	LC	Perennial	Dwarf shrub
SCROPHULARIACEAE	<i>Selago hyssopifolia</i> subsp. <i>hyssopifolia</i>	LC	Perennial	Herb
SCROPHULARIACEAE	<i>Selago intermedia</i>	LC	Perennial	Dwarf shrub
SINOPTERIDACEAE	<i>Cheilanthes involuta</i> var. <i>involuta</i>	LC	Perennial	Geophyte, herb, lithophyte
SOLANACEAE	<i>Lycium cinereum</i>	LC	Perennial	Dwarf shrub, shrub

Family	Species	Threat status	Lifecycle	Growth forms
TYPHACEAE	<i>Typha capensis</i>	LC	Perennial	Herb, hydrophyte, hyperhydrite
VISCACEAE	<i>Viscum anceps</i>	LC	Perennial	Parasite, shrub, succulent
ZAMIACEAE	<i>Encephalartos princeps</i>	Red Data (VU) PNCO (Endangered)	Perennial	Shrub, tree

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APPENDIX E: ADDITIONAL INFORMATION

Coordinates taken every 250 m along the proposed Ndabakazi Interchange route

Figure 13-1 displays the location of each coordinate point taken, which is then detailed in Table 13-1 below.



Figure 13-2: Coordinates taken every 250 m along the proposed Ndabakazi Interchange

Table 13-1: Coordinates taken every 250 m along the proposed Ndabakazi Interchange

Coordinate Point	Lat (DDMMSS)	Long (DDMMSS)
1 (Start Point A)	32° 21.412'S	28° 1.402'E
2	32° 21.327'S	28° 1.526'E
3	32° 21.243'S	28° 1.652'E
4	32° 21.157'S	28° 1.776'E
5	32° 21.072'S	28° 1.900'E
6	32° 20.988'S	28° 2.024'E
7	32° 20.903'S	28° 2.149'E
8	32° 20.828'S	28° 2.282'E
9	32° 20.771'S	28° 2.424'E
10	32° 20.738'S	28° 2.579'E
11	32° 20.723'S	28° 2.737'E
12	32° 20.705'S	28° 2.895'E
13	32° 20.668'S	28° 3.047'E
14	32° 20.604'S	28° 3.189'E
15	32° 20.527'S	28° 3.320'E
16 (Start Point C)	32° 20.490'S	28° 3.379'E
17 (Start Point B)	32° 20.827'S	28° 1.503'E
18	32° 20.854'S	28° 1.661'E
19	32° 20.868'S	28° 1.819'E
20	32° 20.871'S	28° 1.980'E
21 (Centre Point)	32° 20.930'S	28° 2.107'E
22	32° 21.034'S	28° 2.211'E



Coordinate Point	Lat (DDMMSS)	Long (DDMMSS)
23	32° 21.157'S	28° 2.239'E
24 (Start Point D)	32° 21.284'S	28° 2.196'E

Coordinates taken every 250 m along the proposed temporary diversion roads

Figure 13-2 displays the location of each coordinate point taken for the temporary diversion roads, which are then detailed in Table 13-2 below.







Figure 13-3: Coordinate points taken for the temporary diversion roads

Table 13-2: Coordinates taken every 250 m along the temporary diversion roads

Coordinate Point	Lat (DDMMSS)	Long (DDMMSS)
Temp1 1	32° 21.055'S	28° 2.223'E
Temp1 2	32° 21.081'S	28° 2.198'E
Temp1 3	32° 21.104'S	28° 2.056'E
Temp1 4	32° 21.128'S	28° 2.010'E
Temp1 5	32° 21.257'S	28° 1.795'E
Temp1 6	32° 21.295'S	28° 1.715'E
Temp1 7	32° 21.354'S	28° 1.654'E
Temp1 8	32° 21.307'S	28° 1.565'E
Temp2 1	32° 21.023'S	28° 2.208'E
Temp2 2	32° 20.909'S	28° 2.285'E
Temp2 3	32° 20.878'S	28° 2.225'E
Temp2 4	32° 20.832'S	28° 2.341'E
Temp2 5	32° 20.805'S	28° 2.375'E
Temp2 6	32° 20.763'S	28° 2.513'E
Temp2 7	32° 20.735'S	28° 2.713'E
Temp2 8	32° 20.726'S	28° 2.731'E
Temp2 9	32° 20.794'S	28° 2.591'E
Temp2 10	32° 20.767'S	28° 2.795'E
Temp2 11	32° 20.751'S	28° 2.970'E
Temp2 12	32° 20.717'S	28° 3.046'E
Temp2 13	32° 20.696'S	28° 3.125'E
Temp2 14	32° 20.618'S	28° 3.251'E
Temp2 15	32° 20.589'S	28° 3.235'E
Temp2 16	32° 20.570'S	28° 3.265'E
Temp3 1	32° 20.875'S	28° 1.842'E
Temp3 2	32° 21.130'S	28° 1.778'E
Temp3 3	32° 21.195'S	28° 1.683'E
Temp3 4	32° 21.227'S	28° 1.666'E
Temp3 5	32° 21.222'S	28° 1.667'E



Coordinate Point	Lat (DDMMSS)	Long (DDMMSS)
Temp4 1	32° 20.754'S	28° 2.474'E
Temp4 2	32° 20.747'S	28° 2.383'E
Temp4 3	32° 20.838'S	28° 2.189'E
Temp4 4	32° 20.844'S	28° 1.881'E
Temp4 5	32° 20.857'S	28° 1.847'E
Temp5 1	32° 20.750'S	28° 2.384'E
Temp5 2	32° 20.690'S	28° 2.445'E
Temp5 3	32° 20.536'S	28° 3.242'E
Temp5 4	32° 20.557'S	28° 3.256'E
Temp6 1	32° 21.128'S	28° 2.010'E
Temp6 2	32° 21.257'S	28° 1.795'E
Temp6 3	32° 21.295'S	28° 1.715'E
Temp6 4	32° 21.354'S	28° 1.654'E
Temp6 5	32° 21.307'S	28° 1.565'E