

BASIC ASSESSMENT REPORT

**STONE CRESCENT STABILISATION WORKS PROJECT ALONG THE N2
IN MAKHANDA IN THE EASTERN CAPE PROVINCE**

DFFE REF:

14/12/16/3/3/1/2425



REPORT INFORMATION

Report Title:	BASIC ASSESSMENT REPORT FOR STONE CRESCENT STABILISATION WORKS PROJECT ALONG THE N2 IN MAKHANDA IN THE EASTERN CAPE PROVINCE		
Report Reference:	BAR_REP2/OCT '21		
Report Status:	DRAFT		
Author(s):	MILELA MARAWU AND ANDISIWE STUURMAN XUMA (Pr.Sci.Nat.)		
Client:	ZUTARI (PTY) LTD		
Prepared By:	Isipho Environmental Consultants		
☎ 081 410 2569 ✉ andisiwe@isiphoseco.co.za or enviro.isipho@gmail.com			
Report Quality Control	Name	Signature	Date
Client Review	Noluyolo Xorile		28/10/2021
Reviewed By:	Andisiwe Stuurman Xuma		28/10/2021
Approved By:			

NB: Compliance with the Protection of Personal Information Act, 2013 (Act No. 14 of 2013) (POPIA)

The EAP acknowledges the responsibility to protect personal information of interested and affected parties (I&APs) while conducting the Basic Assessment/Environmental Impact Assessment process. In order to ensure that the requirements of the Environmental Impact Assessment Regulations, 2014 are fulfilled while ensuring compliance with the POPI Act, two different versions of this report will be prepared. In the first version, the EAP will submit the full BA report to the competent authority which includes I&AP names, contact details, comments etc in order to ensure the CA has sufficient information to make a decision. However, in the second version, which will be made available in the public domain, personal information of I&APs will be redacted or omitted from the reports so as to protect the privacy of the I&APs. This implies that the report that will be placed in the library and or distributed electronically will exclude the I&AP database, Comments and Responses report, Summary of Issues Raised, I&AP registration forms and email correspondences between the EAP and the I&APs.

Contents

REPORT INFORMATION.....	2
ABBREVIATIONS	7
NEMA REQUIREMENTS FOR BASIC ASSESSMENT REPORTS	8
1. INTRODUCTION.....	12
1.1. DETAILS OF THE EAP	12
1.2. EXPERTISE OF THE EAP.....	13
1.3. SUMMARY OF EAP’S PAST EXPERIENCE.....	13
2. PROPERTY DESCRIPTION.....	14
2.1. ACTIVITY LOCATION	14
2.2. LAND OWNERSHIP	18
3. DESCRIPTION OF PROJECT	19
3.1. PROPOSED ACTIVITY	19
3.2. FOOTPRINT OF THE ACTIVITY.....	20
4. POLICY AND LEGISLATIVE CONTEXT.....	21
4.1. APPLICABLE LEGISLATION	21
4.2. LISTED ACTIVITIES TRIGGERED.....	30
5. NEED AND DESIRABILITY	31
6. ALTERNATIVES.....	38
6.1. PROPERTY OR LOCATION ALTERNATIVES	38
6.2. ACTIVITY ALTERNATIVES	39
6.3. DESIGN OR LAYOUT ALTERNATIVES.....	39
6.4. TECHNOLOGY ALTERNATIVES	41
6.5. OPERATIONAL ALTERNATIVES	41
6.6. OPTION OF NOT IMPLEMENTING- “NO-GO ALTERNATIVE”	41
6.7. SUMMARY OF ALTERNATIVES.....	42
6.8. ALTERNATIVES TO BE ASSESSED	47
7. PUBLIC PARTICIPATION	48
7.1. PPP COMMUNICATION METHODS	48
7.2. IDENTIFICATION AND REGISTRATION OF IAPs.....	49
7.3. NOTIFICATION OF IAPS	50
7.4. DESCRIPTION OF THE INFORMATION PROVIDED TO THE COMMUNITY, LANDOWNERS AND I&APS	50
7.5. PROJECT PPP TIMEFRAMES.....	52
7.6. SUMMARY OF ISSUES RAISED BY IAPs	54

8.	DESCRIPTION OF THE ENVIRONMENT	58
8.1.	CLIMATE	58
8.2.	TOPOGRAPHY.....	58
8.3.	GEOLOGY AND SOILS	58
8.4.	SURFACE HYDROLOGY	59
8.5.	VEGETATION	61
8.6.	CRITICAL BIODIVERSITY AREAS	63
8.7.	PROTECTED AREAS.....	64
8.8.	PALAEONTOLOGICAL RESOURCES	64
8.9.	LAND-USE /LAND COVER	65
8.10.	LAND CAPABILITY	66
8.11.	SOCIOECONOMIC PROFILE.....	67
9.	SENSITIVITY SENSITIVITIES IDENTIFIED BY THE NATIONAL WEB-BSED SCREENING TOOL	68
9.1.	AGRICULTURAL SENSITIVITY	68
9.2.	ANIMAL SPECIES.....	69
9.3.	AQUATIC BIODIVERSITY	70
9.4.	ARCHAEOLOGY AND CULTURAL HERITAGE	71
9.5.	PALAEONTOLOGY SENSITIVITY	72
9.6.	PLANT SPECIES SENSITIVITY	73
9.1.	TERRESTRIAL BIODIVERSITY THEME SENSITIVITY	75
9.2.	RESPONSE TO INCENTIVES, RESTRICTIONS AND SPECIALIST ASSESSMENTS IDENTIFIED IN THE SCREENING TOOL REPORT.....	76
9.3.	OVERALL SITE SENSITIVITY	80
10.	IMPACT ASSESSMENT	81
10.1.	IMPACT ASSESSMENT METHODOLOGY	81
10.2.	IMPACT IDENTIFICATION	86
10.3.	SUMMARY OF SPECIALST FINDINGS	92
10.3.1	FRESHWATER IMPACT ASSESSMENT	92
10.3.2	BOTANICAL IMPACT ASSESSMENT.....	102
10.3.3	PALAEONTOLOGY DESKTOP ASSESSMENT	108
10.4.	IMPACT RATINGS	112
11.	IMPACT STATEMENT	145
11.1.	PREFERRED ALTERNATIVE	145
11.2.	NO-GO ALTERNATIVE	149
11.3.	CUMULATIVE IMPACTS	149

11.4.	FATAL FLAWS	149
12.	RECOMMENDATIONS AND CONCLUSIONS.....	150
13.	REFERENCES	151
14.	APPENDICES	152

LIST OF FIGURES

Figure 1: Locality Map	14
Figure 2: Undercut embankment along the Berg river at about chainage km 43.300.	15
Figure 3: Gaps in the existing bitumen pre-mix curbs and resultant erosion and slumping down the embankment at approximate chainage km 43.130.....	15
Figure 4: Existing cobble riverbed adjacent the N2.....	16
Figure 5: Layout Alternatives Considered.....	40
Figure 6: Geology of Makana (MLM Draft SDF, 2013)	59
Figure 7: Tributaries within 500m of project area (TBC, 2021).....	60
Figure 8: SAIIAE wetland Ecosystem Protection Level in proximity to the project area	60
Figure 9: Vegetation Types associated with the project area.	62
Figure 10: Eastern Cape Biodiversity Conservation Plan Map - CBAs	63
Figure 11: Palaeontological sensitivity of the project area	65
Figure 12: Land Cover- dark green represents natural vegetation in the project area surroundings	66
Figure 13: Land capability of Makana (MLM SDF, 2013)	67
Figure 14: Agricultural sensitivity	69
Figure 15: Animal species sensitivity	70
Figure 16: Aquatic Biodiversity	71
Figure 17: Archaeology and cultural heritage sensitivity	72
Figure 18: Palaeontological sensitivity	73
Figure 19: Plant species sensitivity	74
Figure 20: Updated Plant species sensitivity by botanical specialist	74
Figure 21: Terrestrial Biodiversity Theme Sensitivity	75
Figure 22: Sampling sites within 500m regulated area of the project	93
Figure 23: Map illustrating SAIIAE wetland Ecosystem Threat Status within to the project area	95
Figure 24: Depiction of the overall composition of the riparian area at Site 2 (left) and Site 6 (right)	96
Figure 25: Impact of grazing on the vegetation	104
Figure 26: Extract of the 1:250 000 3326 Makhanda Geological Map (1976) (Council of Geoscience, Pretoria) indicating the geology of the proposed SANRAL Stone Crescent Embankment Stabilisation Works along the National Route N2 near Makhanda in the Eastern Cape. Development is indicated in white.....	110

LIST OF TABLES

Table 1: EAP Details.....	12
Table 2: coordinates of the application area	16
Table 3: 21 Digit SG Codes of affected properties.....	17
Table 4: Details of identified landowners.....	18
Table 5: Legislation applicable to this project.....	21
Table 6: NEMA Listed activities triggered by the development	30
Table 7: Properties affected by the proposed development.....	38
Table 8: Summary of Alternatives	42
TABLE 9: PRE-IDENTIFIED I&APS	49
Table 10: PPP Timeframes	52
Table 11: Summary of issues raised by IAPs.....	54
Table 12: EAP response to incentives, restrictions and specialist assessments identified in the screening tool report.....	76
Table 13: Evaluation Criteria for Rating Impacts	82
Table 14: Significance ranking matrix	83
Table 15: Description Significance Ratings.....	84
Table 16: Potential impacts identified during all phases of the proposed Stone Crescent Stabilisation Works	86
Table 17: Expected fish species.....	93
Table 18: Freshwater Impacts identified.....	97
Table 19: List of sampled plant species	105
Table 20: Biodiversity Impacts identified.....	106
Table 21: Legend of the 1:250 000 3326 Makhanda Geological Map (1976) (Council of Geoscience, Pretoria).....	110
Table 22: Significance rating of impacts identified	112
Table 23: Impact Assessment of Each Identified Potentially Significant Impact and Risk.....	122
Table 24: Comparison of impact significance of each alternative considered	145

ABBREVIATIONS

BA	Basic Assessment
BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
CA	Competent Authority
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water and Sanitation
DRDLR	Department of Rural Development and Land Reform
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECPHRA	Eastern Cape Provincial Heritage Authority
GDP	Gross Domestic Product
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
NEMA	National Environmental Management Act
MLM	Makana Local Municipality
OHSA	Occupational Health and Safety Act
S&EIR	Scoping and Environmental Impact Assessment Report
SANRAL	South African National Roads Agency SOC Ltd
SAHRA	South African Heritage Resources Authority
SAHRIS	South African Heritage Resources Information System
SBDM	Sarah Baartman District Municipality
SDF	Spatial Development Framework

NEMA REQUIREMENTS FOR BASIC ASSESSMENT REPORTS

APPENDIX 1	CONTENT AS REQUIRED BY NEMA	SECTION/CHAPTER
3(a)	(i) details of the EAP who prepared the report; and	Section 1
	(ii) details of the expertise of the EAP, including a curriculum vitae.	
(b)	the location of the activity, including-	Section 2
	(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-	Section 2
	(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;	
(d)	a description of the scope of the proposed activity, including-	Section 3
	(i) all listed and specified activities triggered;	Section 4.2
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 3
(e)	a description of the policy and legislative context within which the development is proposed including <ul style="list-style-type: none"> i. an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process; ii. how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments; 	Section 4
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 5
(g)	a motivation for the preferred site, activity and technology alternative;	6.8
(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including -	Section 6
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 7

APPENDIX 1	CONTENT AS REQUIRED BY NEMA	SECTION/CHAPTER
	(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;	Section 7.6
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 8
	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts - (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 10
	(vi) the methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 10.1
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 10.2
	(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 10.3.1.4, 10.3.2.4 & 10.3.2.3
	(ix) the outcome of the site selection matrix;	Section 10.4
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	N/A
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 11.1
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 10
(j)	an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring;	Section 10.4

APPENDIX 1	CONTENT AS REQUIRED BY NEMA	SECTION/CHAPTER
	(v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated;	
(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Section 10.3
(l)	an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 11
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPR;	Section 10.3
(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 12
(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 12
(q)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	N/A
(r)	an undertaking under oath or affirmation by the EAP in relation to- (i) the correctness of the information provided in the report; (ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	Appendix A

APPENDIX 1	CONTENT AS REQUIRED BY NEMA	SECTION/CHAPTER
	(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(s)	where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t)	any specific information required by the competent authority; and	
(2)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	

1. INTRODUCTION

The South African National Roads Agency SOC Ltd (SANRAL) is proposing to undertake geotechnical slope stabilisation works along a section of the N2 outside Makhanda (previously known as Grahamstown). The project is located approximately 10 km south of Makhanda, on the National Route 2 Section 13, km 42.5 to 43.5, opposite Stone Crescent Hotel (33°21'28.0"S 26°29'17.9"E). The site itself comprises a fill embankment immediately adjacent to the national route. The road embankment is showing signs of slope instability that could be aggravated by scour during a flood event along the Berg River, which is a tributary of the Palmiet River to the southwest. Various stabilisation options could be implemented, depending on the level of risk and site conditions. The proposed activities trigger the need for Environmental authorisation due to proximity to a watercourse and clearance of vegetation that will be done in a Critical Biodiversity Area (CBA).

As the Applicant cannot undertake all the various application processes itself, an independent Environmental Assessment Practitioner (EAP), Isipho Environmental Consultants, has been appointed by Zutari South Africa (Pty) Ltd on behalf of SANRAL to provide environmental sub-services for the proposed project.

Regulation 15 of the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA), 2014 Regulations (as amended) requires that the EAP determines whether a Basic Assessment or S&EIR must be applied to the application. The process that has been identified for this application is the Basic Assessment (BA) Process as only listed activities in Listing Notice 1 and 3 are triggered by the proposed project. As guided by Section 24C of the NEMA Act, the National Department of Forestry, Fisheries and Environment (DFFE) has been determined to be the competent authority for application process.

An Application for Environmental Authorisation (EA) has been submitted to DFFE on 7 September 2021 and the Department acknowledged the application on the same date. This Basic Assessment Report (BAR) is prepared in compliance with Regulation 19 of the EIA Regulations and will be subjected to a public participation process of at least 30 days prior to submission of the Final BAR inclusive of specialist reports, an EMPr, and which reflects the incorporation of comments received, including any comments of the competent authority.

1.1. DETAILS OF THE EAP

Isipho Environmental Consultants was appointed by Zutari as the Environmental Assessment Practitioner (EAP) to undertake the BA process. The contact details of the consultant who compiled the report are as follows:

Table 1: EAP Details

Name of Practitioner	Ms Andisiwe Stuurman Xuma
SACNASP Reg No.:	114735
Phone No.:	0814102569
Fax No.:	086 685 1304

Name of Practitioner	Ms Andisiwe Stuurman Xuma
E-mail:	enviro.isipho@gmail.com or andisiwe@isiphoseco.co.za

1.2. EXPERTISE OF THE EAP

In terms of Regulation 13 of the EIA Regulations, 2014, an independent Environmental Assessment Practitioner (EAP), must be appointed by the applicant to manage the application. Isipho has been appointed by the Applicant as the EAP and is compliant with the definition of an EAP as defined in Regulations 1 and 13 of the EIA Regulations and Section 1 of the NEMA. This includes, inter alia, the requirement that EAP is:

- 1) Objective and independent;
- 2) Has expertise in conducting EIA's;
- 3) Comply with the NEMA, the Regulations and all other applicable legislation;
- 4) Takes into account all relevant factors relating to the application; and
- 5) Provides full disclosure to the applicant and the relevant environmental authority.

The declaration of independence of the EAP and the Curriculum Vitae of the consultant that compiled this report and managed the BAR process is attached as Appendix A.

1.3. SUMMARY OF EAP'S PAST EXPERIENCE

Ms Andisiwe Stuurman Xuma holds a M.Sc. degree in Geography and Environmental Resources from Southern Illinois University, Carbondale. She is the Senior Environmental Consultant and Director of Isipho Environmental Consultants. Andisiwe has over 8 years post graduate experience, a majority of which she worked as an Environmental Consultant and before that she worked as a Product Development Scientist in Research and Development at Johnson & Johnson. To date, Andisiwe has been in various large scale and small projects in the Eastern Cape and Northern Cape and has experience on several aspects of environmental management including basic assessments, water quality monitoring and environmental compliance audits. Andisiwe is a registered Professional Natural Scientist (114735) with the South African Council for Natural Scientific Professions (SACNASP) and completed an ISO14001:2015 Lead Auditor course at Bureau Veritas in 2016.

Ms Milela Marawu holds a Bachelor of Science degree in Environmental Studies from Walter Sisulu University. She started as an intern and junior Environmental Consultant at Isipho Environmental Consultants in March 2021 and has been responsible for environmental monitoring of the Albatross Bridge construction as well as the Mdantsane Cluster 2 Phase 4A project, both by Mvezo Plant and Civils. Milela has gained experience in some aspects of environmental management, including basic assessments, water quality monitoring, ECO Monitoring and report writing.

2. PROPERTY DESCRIPTION

2.1. ACTIVITY LOCATION

The project is located approximately 10 km south of Makhanda, on the National Route 2 Section 13, km 42.5 to 43.5, opposite Stone Crescent Hotel (33°21'28.0"S 26°29'17.9"E). The site itself comprises a fill embankment immediately adjacent to the national route on the Left-hand side (Refer to Figure 1). The site falls in Makana Local Municipality and Sarah Baartman District Municipality in the Eastern Cape Province. Properties that will be affected by this project are Farm Zyfer Fonteyn 253 (Portion 0, 11 and 12RE) and Farm Palmiet Rivier 305 (Portion 34, 36).

The study area is located on the left side of the northbound carriageway of National Route 2 Section 13, approximately between km 42.5 and km 43.5. The study area is close to Makhanda (Makhanda) in the Eastern Cape where the road embankment is showing signs of slope instability that could be aggravated by scour during a flood event along the Berg River, which is a tributary of the Palmiet River to the Southwest. Various stabilisation options could be implemented, depending on the level of risk and site conditions.

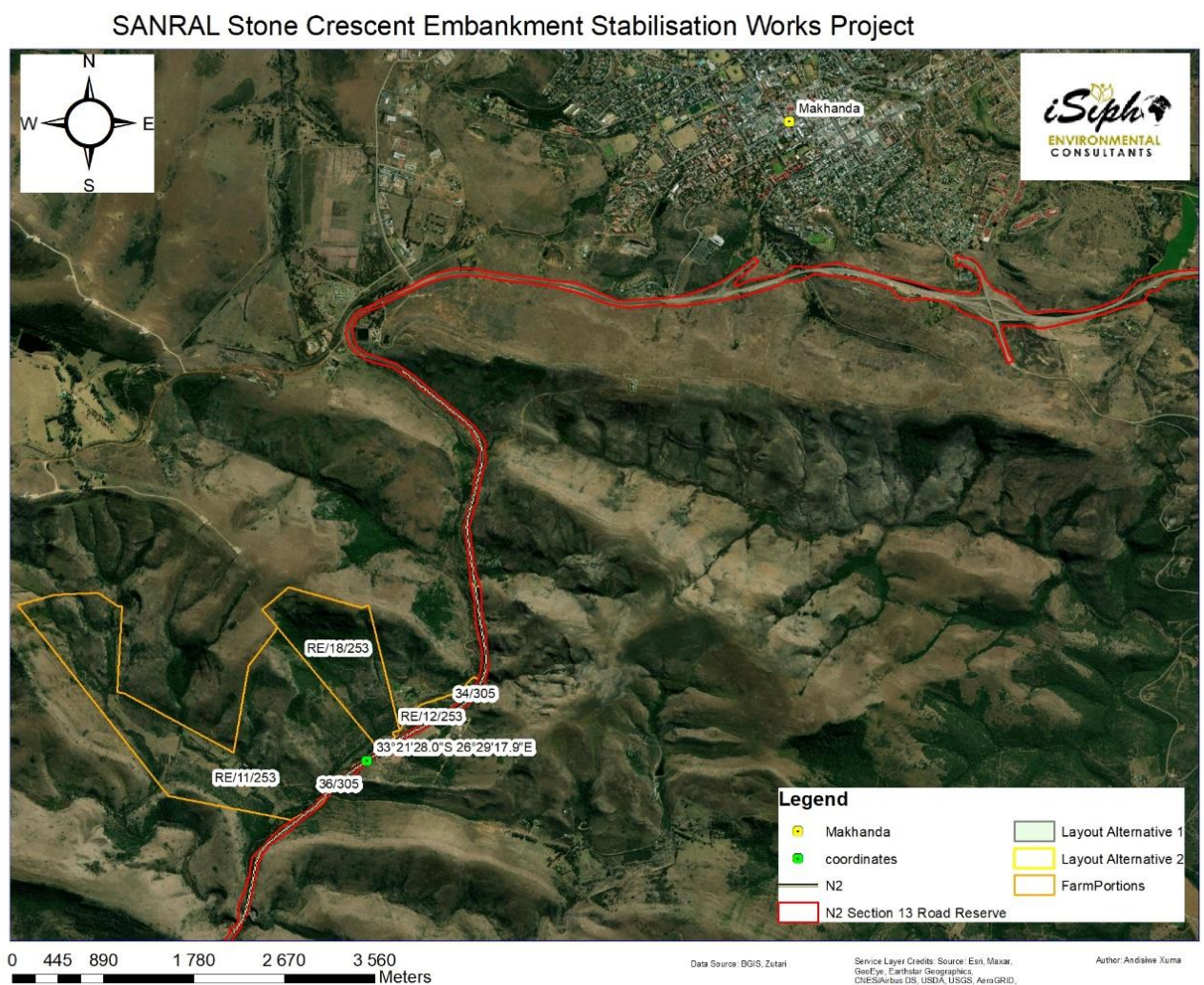


Figure 1: Locality Map



Figure 2: Undercut embankment along the Berg river at about chainage km 43.300.



Figure 3: Gaps in the existing bitumen pre-mix curbs and resultant erosion and slumping down the embankment at approximate chainage km 43.130



Figure 4: Existing cobble riverbed adjacent the N2

The boundary coordinates as well as 21-digit SG codes of the application properties are provided in Table 2 and Table 3 below:

Table 2: coordinates of the application area

ID	Latitude (DMS)	Longitude (DMS)
A	33°21'21.56"S	26°29'28.26"E
B	33°21'21.93"S	26°29'28.41"E
C	33°21'31.85"S	26°29'11.11"E
D	33°21'31.43"S	26°29'10.72"E

Table 3: 21 Digit SG Codes of affected properties

C	0	0	2	0	0	0	0	0	0	0	0	0	2	5	3	0	0	0	1	1
C	0	0	2	0	0	0	0	0	0	0	0	0	2	5	3	0	0	0	1	2
C	0	0	2	0	0	0	0	0	0	0	0	0	2	5	3	0	0	0	0	0
C	0	0	2	0	0	0	0	0	0	0	0	0	3	0	5	0	0	0	3	4
C	0	0	2	0	0	0	0	0	0	0	0	0	3	0	5	0	0	0	3	6
1	2		3				4					5								

2.2. LAND OWNERSHIP

The proposed project will affect 4 properties or farm portions as illustrated in Table 4. Portions 34 and 36 of Farm 305 fall within the National Route 2 Section 13 road reserve and are thus owned by SANRAL. Farm 253 portion 11RE and 253 portion 12RE are privately owned properties. Details of pre-identified landowners for the portions affected by the proposed are included below. Landowners have been notified of the proposed development and provided an opportunity to comment as interested and affected parties (I&APs). The requirement for landowner consent stipulated in Regulation 39(1) of the NEMA EIA Regulations 2014, as amended does not apply to this project as it is a linear activity development.

Table 4: Details of identified landowners

Name	Surname	Organization	Landowner status	Property	Number	Email
------	---------	--------------	------------------	----------	--------	-------

3. DESCRIPTION OF PROJECT

3.1. PROPOSED ACTIVITY

SANRAL is proposing to undertake geotechnical slope stabilisation works along a section of the N2 outside Makhanda. The project is located approximately 10 km south of Makhanda, on the National Route 2 Section 13, km 42.5 to 43.5, opposite Stone Crescent Hotel (33°21'28.0"S 26°29'17.9"E). The site itself comprises a fill embankment immediately adjacent to the national route.

The major aspects of this project include the following:

- Extension of existing 1.8m high concrete retaining wall at toe of embankment (Wall 1) adjacent river course by means of a reinforced concrete or gabion structure, between about chainage 43.110 to 43.160 (approximately 50m distance). Backfilling behind new wall will be required.
- Stabilisation of upper fill embankment at about chainage 43.130, with slumping of embankment slope in this area immediately adjacent road (see Figure 3). Stabilisation may be with soil nails.
- Extension of existing 3.0m high concrete retaining wall at toe of embankment (Wall 2) adjacent the river course by means of a reinforced concrete or gabion structure, between about chainage 42.920 to 42.950 (approximately 30m distance). Backfilling behind new wall. In this regard slumping of the lower embankment at about chainage 42.950 (adjacent eastern end of Wall 2) has occurred.
- Undercutting in places of Wall 1 foundation via scour erosion of river (approximate chainage 42.210) requiring infilling via concrete and/or erosion protection support such as reno mattresses.
- Gabion buttress walls in places to stabilise river eroded and undercut toe areas of existing embankment, with or possibly without soil nails. These areas are located at about chainages 43.300 and 43.430.
- Overall length of area to be stabilised anticipated to extend from chainage 42.8 to 43.5 (left hand side). Envisaged not to extend along the entire chainage section as stated but rather in localised key areas identified by the investigation and design process.

Thus, stabilisation works are envisaged on the existing fill embankment within the road reserve but also encroaching slightly into river zone beyond road reserve in places. The construction is anticipated to be approximately 12 months duration.

3.2. FOOTPRINT OF THE ACTIVITY

The application area is approximately 8 000 m² in size however, it is anticipated that vegetation clearance will be limited to the required areas and thus the actual footprint may be approximately 3000 m². The site is accessible via the N2 therefore, no new access roads will be constructed.

4. POLICY AND LEGISLATIVE CONTEXT

This section describes the National, Provincial, District as well as Local legislation that has been taken into consideration during the BA process for the proposed development.

4.1. APPLICABLE LEGISLATION

Table 5: Legislation applicable to this project

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
<p>THE CONSTITUTION (ACT NO. 108 OF 1996)</p> <p>The constitution is the highest law of South Africa. Consequently, all laws, including those pertaining to the proposed development, must adhere to the Constitution. According to the Bill of Rights enshrined in Chapter 2 of the Constitution, “everyone has the right –</p> <ul style="list-style-type: none"> (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– <ul style="list-style-type: none"> (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.” 	<p>The applicant has the responsibility to ensure that the proposed development does not result in pollution or ecological degradation and ensure that natural resources within the project area are conserved for future generations.</p>
<p>NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998)</p>	<p>The applicant has the responsibility to comply with the requirements of the NEMA EIA Regulations, 2014 as amended and has in response to that applied for</p>

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
<p>The objective of the National Environmental Management Act (NEMA) is “provide for cooperative 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.”</p> <p>NEMA provides the basis for environmental governance in South Africa by establishing principles and institutions for decision-making on issues 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.</p>	<p>environmental authorisation (EA) to the Department of Forestry, Fisheries and Environment. The proposed activity may not commence without prior authorisation of the triggered listed activities. Once the activity is authorised, the applicant will have to ensure compliance with the conditions of the EA during construction and operation phases of the project.</p>
<p>National Water Act (No. 36 of 1998) (NWA)</p> <p>The National Water Act ensures that South Africa's water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all people.</p>	<p>The proposed activity will occur within 500m of a watercourse, which is a regulated area. Therefore, the proposed project requires authorisation for NWA Section 21 (c) and (i) water uses. Should any water be abstracted from the nearby watercourses for construction purposes, Section 21 (a) will also be triggered. These activities may</p>

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
	not commence without prior authorisation from the Department of Water and Sanitation.
<p>NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (ACT NO. 59 OF 2008)</p> <p>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. The objectives of the Act are "to protect health, well-being and the environment by providing reasonable measures for—</p> <ul style="list-style-type: none"> • 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 to health or the environment; and • achieving integrated waste management reporting and planning." 	<p>The applicant has the responsibility to ensure that waste is managed in a manner that is integrated and sustainable. Measures will have to implemented to avoid the generation of waste, and where this cannot be avoided, the amounts of waste generated must be reduced through recycling and re-use. The waste hierarchy must be followed as much as practically possible during the construction phase. Waste must be managed in such a way that it does not pose a health risk to humans or the surrounding environment. No toxic chemicals, litter or rubble must be disposed indiscriminately in the project area. Records of safe disposal must be always maintained.</p>
<p>NATIONAL ENVIRONMENTAL MANAGEMENT: PROTECTED AREAS ACT (ACT NO. 57 OF 2003)</p>	<p>The proposed activity does not fall within any protected areas, however it is located within 5km of the Thomas Baines Nature Reserve. All due caution will be taken</p>

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
<p>The purpose of the National Environmental Management: Protected Areas Amendment Act (NEMPAA) is to provide for the protection and conservation of ecologically sensitive areas representative of South Africa's biological diversity and its natural landscapes and seascapes.</p> <p>The objectives of NEMPAA are:</p> <ul style="list-style-type: none"> (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. 	<p>during construction and operation to ensure that the proposed activity does not lead to ecological degradation of the surrounding natural areas.</p>
<p>NATIONAL ENVIRONMENT MANAGEMENT: BIODIVERSITY ACT (ACT NO. 10 OF 2004)</p>	<p>The natural vegetation on the site has been identified as Suurberg Shale Fynbos. According to Mucina & Rutherford 2006, the conservation status of this vegetation type is rated as least threatened. No protected species were identified in the application area by the specialist studies. Mitigation measures relating to the</p>

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
<p>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.</p> <p>The objectives of NEMBA are:</p> <p>(a) within the framework of the National Environmental Management Act, to provide for—</p> <p>(i) the management and conservation of biological diversity within the Republic and of the components of such biological diversity;</p> <p>(ii) the use of indigenous biological resources in a sustainable manner; and</p> <p>(iii) the fair and equitable sharing among stakeholders of benefits arising from bioprospecting involving indigenous biological resources;</p> <p>(b) to give effect to ratified international agreements relating to biodiversity which are binding on the Republic;</p> <p>(c) to provide for co-operative governance in biodiversity management and conservation; and</p> <p>(d) to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.</p> <p>Regulations published under NEMBA provides a list of protected species (flora and fauna), according to the Act (GN R. 151 dated 23 February 2007, as amended in GN R. 1187 dated 14 December 2007) which require a permit to be disturbed or destroyed.</p>	<p>management of indigenous vegetation and alien invasive plants will be included in the EMPr.</p>

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
<p>NATIONAL HERITAGE RESOURCES ACT (ACT NO. 25 OF 1999)</p> <p>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”.</p> <p>According to Section 34 of NHRA, No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.</p> <p>Section 38 Listed Activities:</p> <p>(a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;</p> <p>(b) the construction of a bridge or similar structure exceeding 50 m in length;</p> <p>(c) any development or other activity which will change the character of a site—</p> <p>(i) exceeding 5 000 m² in extent; or</p> <p>(ii) involving three or more existing erven or subdivisions thereof; or</p> <p>(iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or</p> <p>(iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;</p> <p>(d) the re-zoning of a site exceeding 10 000 m² in extent; or</p>	<p>Any heritage structures or features identified within close proximity to the proposed activity must be protected. Should any of the activities require disturbance of these features, then relevant permits must be applied for.</p> <ul style="list-style-type: none"> • 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) will be informed of the project. Since the activity triggers Section 38 a

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
(e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,	
<p>National Forests Act (No. 84 of 1998) and Regulations</p> <p>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:</p> <ul style="list-style-type: none"> • 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. <p>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.</p>	<p>The Botanical Assessment conducted by the specialist did not identify any protected trees within the project area. No protected tree species may be damaged or destroyed without a permit from the Department of Agriculture, Forestry and Fisheries (DAFF).</p>
<p>CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO. 43 OF 1983)</p> <p>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 eradication of weeds and invader plants. Regulations 15 and 16 under this Act, which relate problem plants, were amended in March 2001.</p> <p>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:</p>	<p>Mitigation measures relating to the management of indigenous vegetation and alien invasive plants will be included in the EMPr.</p>

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> o Establish, plant, maintain, multiply or propagate weeds and invader plants; o Import or sell propagating material of category weeds and invader plants; and o Acquire propagating material of weeds and invader plants. <p>These lists include:</p> <ul style="list-style-type: none"> • 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) 	
National Environmental Management: Air Quality Act (No. 39 of 2004) and National Dust Control Regulations (2013)	Mitigation measures relating to the management of dust impacts are included in the EMPr.
SANS 10103 (Noise Regulations)	Mitigation measures relating to the management of noise impacts are included in the EMPr.
<p>OCCUPATIONAL HEALTH AND SAFETY ACT (ACT NO. 85 OF 1993)</p> <p>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”.</p>	<p>The Applicant has the responsibility to ensure that all facilities such as potable water, ablutions, eating areas etc are provided for all workers who will be working in the project area. A safe working environment must be provided and relevant PPE to reduce the risk of injuries on site. Proper training must be provided to all workers prior to carrying out of tasks. Mitigation measures regarding safety will be included in the EMPr</p>

Description of Policy/Legislation	How the proposed activity complies and responds to the Policy/Legislation
<p>OTHER RELEVANT LEGISLATION</p> <p>Other legislation that may be relevant to the proposed development includes:</p> <ul style="list-style-type: none"> • 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 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). 	<p>Mitigation measures will be included in the EMPr to ensure that noise level is kept to allowable limits. The Specialist studies undertaken did not identify any species of special concern in the project area. The Makana Local Municipality Draft Spatial Development Framework has been taken into consideration. In this document, it is clear that the Makana Municipality prioritises the conservation of critical biodiversity areas, protected nature reserves and parks, forestry areas and high potential agricultural areas as it navigates its development objectives.</p>

4.2. LISTED ACTIVITIES TRIGGERED

It is anticipated that the proposed project will trigger the following listed activities:

Table 6: NEMA Listed activities triggered by the development

Listed Activity	Description	Applicability to project
Listing Notice 1 Activity 12	The development of- (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; Excluding- (ee) where such development occurs within existing roads, [or] road reserves	Stabilisation works will include construction of retaining walls within 32 metres of a watercourse. This listed activity will only be applicable if any works are undertaken outside the N2 road reserve.
Listing Notice 1 Activity 19	The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from- (i) a watercourse;	Works may require infilling or extraction of earth material along the banks of a watercourse.
Listing Notice 1 Activity 49	The expansion of – (v) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion or expansion and related operation occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;	Existing retaining wall will be extended by approximately 50 m
Listing Notice 3 Activity 12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for	Clearance of vegetation will be required prior to excavation and construction.

Listed Activity	Description	Applicability to project
	maintenance undertaken in accordance with a maintenance management plan.	
Listing Notice 3 Activity 14	The development of- xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse.	The footprint of the proposed development will be greater than 10 square meters . Some sections of the proposed works may be within a watercourse or within 32 meters of a watercourse which has been identified as the Berg river.

The Department of Forestry, Fisheries and the Environment has been identified as the Competent Authority (CA) responsible for consideration of all information provided as part of the EA application submitted. The applicant may only commence with the listed activities referred to in **Table 6** above once the CA has decided whether to grant the applicant authorisation.

In addition to the requirements for an environmental authorisation in terms of NEMA, there are 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).

According to the SAHRIS Palaeomap, the project site is located in an area of moderate palaeontological sensitivity and a desktop Palaeontological assessment is required.

The proposed activity will occur within 500m of a watercourse, which is a regulated area. Therefore, the proposed project requires authorisation for NWA Section 21 (c) and (i) water uses. Should any water be abstracted from the nearby watercourses for construction purposes, Section 21 (a) will also be triggered. These activities may not commence without prior authorisation from the Department of Water and Sanitation. A water Use registration application will be submitted to the Department of Water and Sanitation for the Section 21 water uses that are triggered by the proposed project.

5. NEED AND DESIRABILITY

One of the objectives of the EIA process is to motivate for “the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint”. Consideration should be given to the need and desirability of development in determining whether

this is the right time and place for the proposed land use or activity to be established. Hence, it is therefore, equated with rational land use and should be able to answer the question of what the most sustainable use of land is.

QUESTION: NEED (TIMING) OF PROPOSED PROJECT

1. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved Spatial Development Framework (SDF) agreed to by the relevant environmental authority i.e. is the proposed development in line with the projects and programmes identified as priorities within the Integrated Development Plan (IDP)?

The area proposed for the road embankment stabilization occurs mostly within the existing road reserve and in some sections goes beyond the reserve and affects properties that are adjacent to the reserve. Alternative land uses do exist on the properties adjacent to the road reserve such as grazing, tourism and hospitality, however, once construction is completed, the embankment stabilization would ensure that these land-uses continue safely without the risk of the road collapsing. The Makana Local Municipality IDP identifies the N2 as a strategic network linkage which connects Makhanda to Qonce (King Williams Town) and Gqeberha (Port Elizabeth). The IDP sets aside budget for road infrastructure improvements for local roads which connect to the N2 and acknowledges the importance of good roads in attracting to Makhanda which is the District centre in terms of nodes for economic opportunity. 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 applicant, SANRAL, is responsible for improving, managing and maintaining the network of national roads which act as the “economic arteries” of South Africa. Thus, the proposed project is in line with the projects identified as priorities in the IDP.

2. Should development, or if applicable, expansion of the town/ area concerned in terms of this land use (associated with the activity being applied for) occur at this point in time?

Yes. The proposed project should occur at this time because the embankment erosion may lead to collapsing of the N2 road and cause injuries and fatalities that could have been avoided.

3. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? This refers to the strategic as well as local level (e.g. development is a National priority, but within a specific local context it could be inappropriate).

Yes. The Makana Local Municipality IDP identifies the N2 as a strategic network linkage which connects Makhanda to Qonce (King Williams Town) and Gqeberha (Port Elizabeth). The IDP sets aside budget for road infrastructure improvements for local roads which connect to the N2 and acknowledges the importance of good roads in attracting to Makhanda which is the District centre in terms of nodes for economic opportunity. The community of Makhanda needs safe roads in order to continue with economic activities. The national road network (N2) is an economic link between Port Elizabeth and East London and is the west-east link between Western Cape and KwaZulu-Natal. The National Route 2 Section 13, km 42.5 to 43.5, in the vicinity

of Stone Crescent Hotel 33°21'28.0"S 26°29'17.9"E), is a section which suffers from steep grades and poor geotechnical slopes which could later result in this section being prone to an abnormal number of heavy vehicle road accidents. Improvement of slope stabilisation is therefore required to ensure current and future road user safety. The N2 routing is critical to the movement of people for the purposes of recreation and economic development and has very clear growth potential in both areas. Improving the N2 is essential to the success of any of the government's strategic integrated projects linking Port Elizabeth and East London.

QUESTION: NEED (TIMING) OF PROPOSED PROJECT

4. Are the necessary services with appropriate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?

No additional capacity from the municipality will be required.

5. Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority and placements of services)?

The proposed stabilization of the N2 road embankment does not specifically have to be provided for in the infrastructure planning of the municipality. The applicant, SANRAL, is responsible for improving, managing and maintaining the network of national roads which act as the "economic arteries" of South Africa. Thus, the applicant will be responsible for ensuring all required services for the construction phase,

6. Is this project part of a national programme to address an issue of national concern or importance?

No. Although the N2 Section 13 is critical linkage for tourism and the general economy of the district.

7. How will this development (and its separate elements/aspects) impact on the ecological integrity of the area?

The proposed project is located in a natural area that has been transformed through existing developments. The project includes a terrestrial and aquatic ecosystem within an open space agricultural landscape, adjacent to a motorway. It is divided by a wire fence along its length into a western and eastern portion. At about a third from its northern edge another wire fence which runs perpendicular to the first one, separating the two adjacent farms from each other. The western portion is low lying farmland with scattered rocks in places that includes the aquatic ecosystem (Berg River). Towards the northern end the river is controlled by numerous water channels. The eastern portion of the site is a steep road embankment that is separated from the motorway by a steel barrier. Storm water channels that run from the road verge towards the river as well as a retaining wall are also present on the site. In the north and south the site is connected to vacant farmland. Thus, although the project will have some negative ecological impacts, none will be significantly high.

8. How were the following integrity considerations taken into account?

8.1. Threatened ecosystems

8.2. Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

8.3. Environmental Management Framework

8.4. Spatial Development Framework (SDF).

There are no threatened ecosystems within the project.

The project area is located in a terrestrial CBA 3 and Aquatic CBA (ESA 1)

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 or the provincial and Local SDF.

9. How will this development pollute/ degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

The proposed project may result in some erosion and sedimentation of watercourses due to excavation and backfilling. There is also a possibility of contamination of watercourses due to spillages caused by plant and equipment used during undertaking of works. The mitigation hierarchy has been taken into consideration. Environmental awareness training, daily inspection of plant and equipment for faults as well as storage of plant and equipment at least 32m from a watercourse are some of the measures that will be implemented to avoid contamination and pollution. Where pollution and contamination cannot be avoided, measures such as recycling, waste separation, disposal of waste at licensed facilities will be implemented in order to reduce the impacts. Positive impacts are enhanced through employment of local labour and ongoing monitoring post construction to evaluate the effectiveness of the stabilization measures implemented.

10. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialised growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life).

No, the proposed development does not exacerbate the increased dependency on increased use of resources to maintain economic growth. Sustainable and energy efficient methods will be used during construction, where applicable.

11. Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?

The unemployment rate in Makana local Municipality is estimated at 45.5 % which is slightly higher than the Provincial average (44.6 %) and significantly higher than the unemployment rate in the Sarah Baartman District Municipality (38.7 %). The proposed project will create employment opportunities to individuals and

businesses in the municipality for a period of approximately 12 months. The N2 is a key route for tourism and economic activity in the Municipality, therefore ensuring stability of Section 13 road embankment will improve road user safety and continued access into and out of Makhanda.

12. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?

The LED strategy of Makana LM recognizes that investment in critical infrastructure will reduce service delivery backlogs and ensure the provision and maintenance of an enabling and conducive environment for economic development. Improvement of the roads and transport infrastructure maintenance is one of the objectives of the LED strategy and therefore this project will complement the local socioeconomic initiatives.

13. What measures were taken to ensure the participation of all interested and affected parties (I&APs)?

Please refer to Section 7 of this report for more detail on the public participation process throughout this EIA process.

QUESTION: DESIRABILITY (PLACING) OF PROPOSED PROJECT

1. Is the development the best practicable environmental option (BPEO) for this land/ site?

Yes. The property on which the development is proposed to be situated is currently used for the activity applied for i.e. the existing N2 Reserve and similar land-uses, there is a small portion of the development that will impact natural areas which are used for conservation and tourism. However, once construction is completed, rehabilitation will be undertaken and other land uses such as grazing, hunting, bird watching and tourism can continue safely.

2. Would the approval of this application compromise the integrity of the existing approved Municipal IDP and SDF as agreed to by the relevant authorities?

No. The approval of the project would not the integrity of the existing approved Municipal IDP and SDF as agreed to by the relevant authorities.

3. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in Environmental Management Framework (EMF)), and if so, can it be justified in terms of sustainability considerations?

No. Although the proposed site falls within the Renewable energy development zones 3-Cookhouse and Strategic Gas Pipeline Corridors-Phase 7: Coega to Richards Bay, this application does not interfere with these strategic development types.

4. Do location factors favour this land use (associated with the activity applied for) at this place?

Yes. The stabilization works need to be undertaken at specific locations along the road which are showing signs of erosion and instability. As such there are no alternative sites considered for this project.

5. How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/ natural environment)?

During the construction phase, clearing of vegetation may lead to loss of habitat and biodiversity, The excavation and movement of earth materials may result in erosion and sedimentation of the adjacent watercourse, however, mitigation measures such as silt traps will be installed and rehabilitation will be undertaken when construction is completed. The site area itself is not completely natural and has been

transformed to a certain degree. A majority of the works will be undertaken within the N2 road reserve which is already disturbed.

6. How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?

It is anticipated that the proposed project may impact the adjacent landowners and occupants during the construction phase due to noise and visual impact of operating equipment. However, working hours will be kept between 07:00 and 17:00 and house-keeping will be done on a daily basis to maintain a good visual aesthetic.

7. Will the proposed activity or the land use associated with the activity applied for, result in unacceptable opportunity costs?

No. The stabilization works are done to improve stability of the existing N2 road thus no significant opportunity costs are anticipated.

8. Will the proposed land use result in unacceptable cumulative impacts?

No unacceptable cumulative impacts have been identified by the specialist studies undertaken. Please refer to Chapter 10 for more information on the assessed impacts and proposed mitigation measures.

9. In terms of location, describe how the placement of the proposed development will:

9.1. Result in the creation of residential and employment opportunities in close proximity to or integrated with each other.

9.2. Be in line with the planning for the area

9.3. Encourage environmentally sustainable land development practices and processes.

QUESTION: DESIRABILITY (PLACING) OF PROPOSED PROJECT

The proposed project will create employment opportunities to individuals and businesses in the municipality for a period of approximately 12 months. The N2 is a key route for tourism and economic activity in the Municipality, therefore ensuring stability of Section 13 road embankment will improve road user safety and continued access into and out of Makhanda. Both skilled and unskilled labour will be employed. The location of the project is in line with the land use plans as the activity is located mostly within the existing N2 road reserve.

10. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?

The applicant is fulfilling its mandate to develop and maintain National Roads across South Africa. A multi-disciplinary team consisting of engineers, contractors and consultants are appointed to manage various risks associated with the proposed development. Due diligence is undertaken to confirm the knowledge and expertise of these parties thus it is anticipated that the level of risk due to limits of current knowledge is very low.

11. What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?

Safety and Environmental Awareness training will be provided to all workers on commencement of the construction phase. The applicant and its contractors are responsible to comply with the Occupational Health and Safety Act (OHSA) and all employees will be informed of their labor laws in terms of the labour laws of South Africa. A procedure will be in place to record all complaints and monthly audits will be undertaken.

12. How will this development use and/or impact on non-renewable natural resources?

The proposed development will make use of diesel for construction vehicles, plant and equipment. Electricity will also be required for site offices and cooking facilities within the site camp. The main energy source for these activities is non-renewable natural resources.

13. How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?

The proposed project will result in a more stable and safe N2 road which is used by the communities in their daily social and economic activities. The social needs of the relevant communities will be addressed through the provision of jobs and income. Moreover, a safe and stable road will also create access between Gqeberha and Makhanda ensuring that transportation of products and tourism continues.

14. What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socioeconomic considerations?

The best practicable environmental option in terms of the socioeconomic context has been selected by ensuring consultation with interested and affected parties throughout the BA process. The municipal plans such as IDP, LED strategy, SDF have been reviewed to ensure that the proposed project is aligned with municipal objectives. Mitigation measures will be included in the EMP, which includes use of local labour and businesses as well as environmental awareness training of employees.

15. How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage?

It is unlikely that this project will disturb/enhance *landscapes and/or sites that constitute the nation's cultural heritage*? The NWBEST report indicates that there archaeological and heritage sensitivity of the application area is low.

16. Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?

Humans and the environment are interdependent, we need the environment to sustain our livelihoods and wellbeing and the environment requires that we manage our anthropogenic activities in a manner that does not lead to depletion of natural resources. Although aspects of the proposed development such as clearance of vegetation may lead to loss of habitat, this impact will be reversed through rehabilitation which will attempt to return the environment to its previous state.

17. Describe how the development will impact on job creation in terms of, amongst other aspects:

Employment opportunities are created from the planning phase, where scientists and engineers are appointed to carefully design and plan the proposed project. Both skilled and unskilled labour will be required during the construction phase of this project.

18. Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?

The EMP describes all reasonable and feasible mitigation measures and addresses long-term environmental management.

19. Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?

Please refer to Chapter 10 of this Report for more information on the significance of all potential impacts that have been identified and assessed for the proposed design of.

6. ALTERNATIVES

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

“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;
- d) the technology to be used in the activity;
- e) the operational aspects of the activity; and
- f) the option of not implementing the activity.

6.1. PROPERTY OR LOCATION ALTERNATIVES

The proposed project requires stabilisation of the road at specific sections along the river in places at the toe of the fill embankment. There are a few critical sections that contain stability issues, these are at the following approximate chainages:

- 42.90 – 43.00
- 43.05 - 43.15
- 43.25 – 43.33
- 43.35 – 43.45

Thus, no other property or location alternatives are feasible except for the proposed Site Alternative 1 which falls on the properties listed in the table below.

Table 7: Properties affected by the proposed development

Item no.	Farm Name	Portion number	21 Digit SG Code
1	Zyfer Fonteyn 253	0	C00200000000025300000
2	Zyfer Fonteyn 253	11	C00200000000025300011
3	Zyfer Fonteyn 253	12RE	C00200000000025300012
4	Palmiet Rivier 305	34	C00200000000030500034
5	Palmiet Rivier 305	36	C00200000000030500036

6.2. ACTIVITY ALTERNATIVES

The activity involves geotechnical stabilisation of the road embankment which is showing signs of slope instability. This could be aggravated by scour during a flood event along the Berg River, which is a tributary of the Palmiet River to the south west. There is no other alternative activity type that can be implemented at this location.

6.3. DESIGN OR LAYOUT ALTERNATIVES

Two layout alternatives have been considered for this project as illustrated in Figure 5. The first alternative (purple polygon) is based on preliminary designs that detail where site assessment conducted indicated slope stability issues. This layout alternative has stabilisation measures that go beyond the current N2 road reserve and thus affects other properties that are privately owned, and some erosion protection measures reach the riverbanks. The second layout alternative (yellow polygon) considered is similar to Alternative 1 however it stays within the N2 Reserve and does not extend to the adjacent private properties. This alternative was considered due to comments received from IAPs that the project should avoid the riverbanks as well as Farm 253 Portion 11RE.

SANRAL Stone Crescent Embankment Stabilisation Works Project

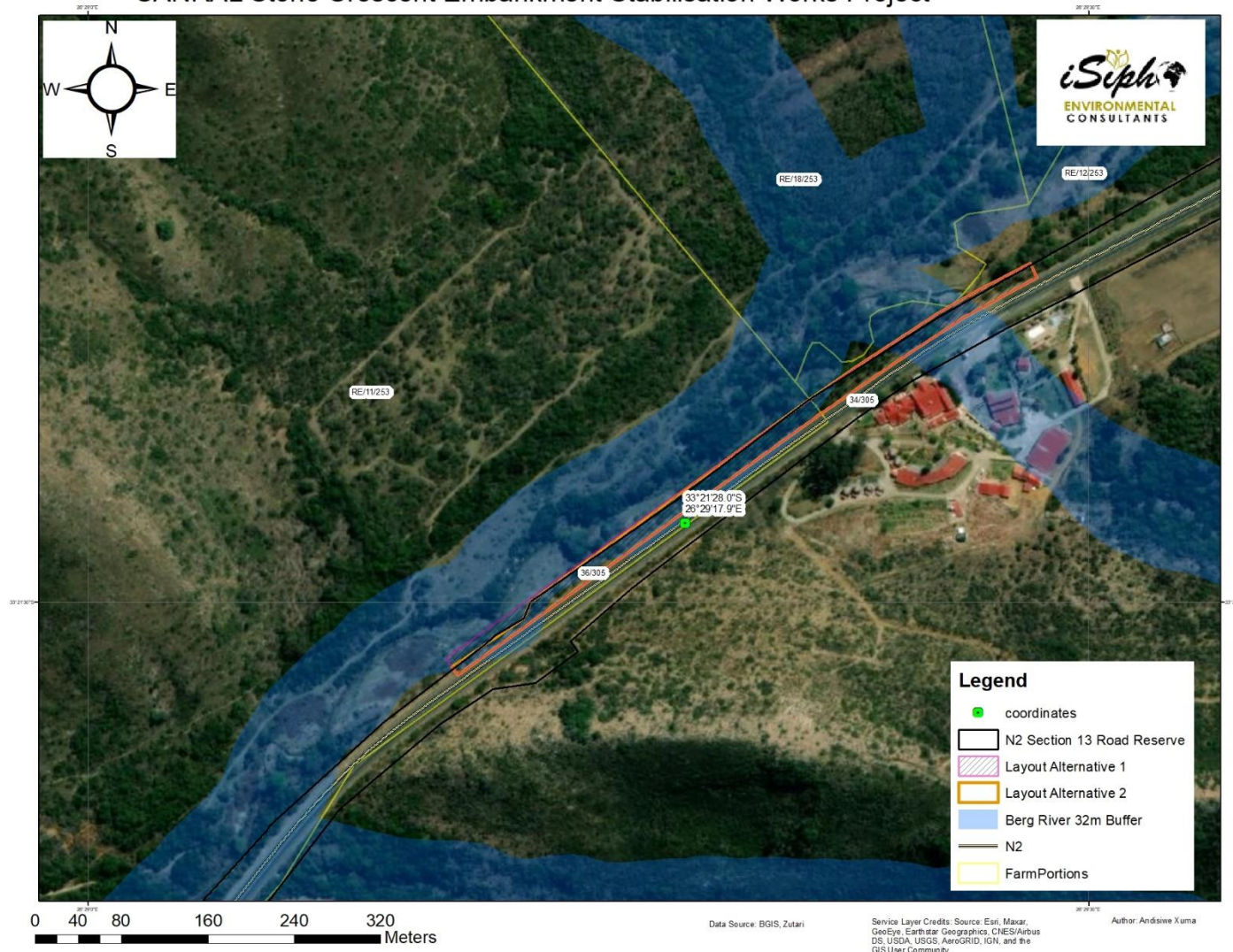


Figure 5: Layout Alternatives Considered

6.4. TECHNOLOGY ALTERNATIVES

Various stabilisation options could be implemented, depending on the level of risk and site conditions. Methods that have been considered for stabilisation include the following:

1. Extension of retaining walls by means of a reinforced concrete.
2. Extension of retaining walls by means of a gabion structure.
3. Stabilisation of embankment with soil nails.
4. Infilling via concrete and/or erosion protection support such as reno mattresses.

A combination of these methods may be implemented depending on the severity of the instability at the particular area. Thus, no technology alternatives are assessed for this project.

6.5. OPERATIONAL ALTERNATIVES

No operational alternatives have been considered in this assessment

6.6. OPTION OF NOT IMPLEMENTING- “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 stability etc.). The environment will remain relatively undisturbed and there would be no contribution to road stability at the N2 Section 13 near Makhanda. The no-go alternative will allow the status quo to continue, which means persistence of the degraded and transformed terrestrial ecosystem with the likely increase in the number of problem and weedy plant species. The no-go alternative is thus not considered the preferred alternative in terms of this development.

6.7. SUMMARY OF ALTERNATIVES

Table 8: Summary of Alternatives

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
Property or Location	Site Alternative 1	<ul style="list-style-type: none"> - The majority of the embankment stabilisation 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"> -Some sections will fall on privately owned land. -Infilling and disturbance of riverbank will be required 	YES	YES	
Type of Activity	Alternative 1- Only activity alternative.	<ul style="list-style-type: none"> -Geotechnical stabilisation of the embankment in areas showing signs of instability. -Project will improve road stability 		YES	YES	
Layout	Layout Alternative 1	-Overall length of area to be stabilised	Encroachment of riverbanks will lead	YES	YES	

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
		<p>anticipated to extend from chainage 42.8 to 43.5 (left hand side). Envisaged not to extend along the entire chainage section as stated but rather in localised key areas.</p> <p>-Stabilisation works are envisaged on the existing fill embankment within the road reserve but also encroaching slightly into river zone beyond road reserve in places. Takes into consideration the recommendations by specialist and tries to minimize the ecological impact.</p>	<p>to sedimentation and ecological impacts.</p>			

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
		<p>This alternative would allow the implementation of the chutes that are recommended to convey stormwater all the way down to the riverbed at several locations along the project area and thus prevent further erosion of the embankment.</p>				
	<p>Layout Alternative 2- Avoids the riverbanks as much as possible and does not encroach on Farm Zyferfontein 253 portion 11</p>	<p>Considered due to comments received from land owner at Farm 253 Portion 11 RE. Takes into consideration the recommendations by specialist and tries to minimize the ecological impact.</p>	<p>It would be impossible to implement the chutes that are recommended to convey stormwater all the way down to the riverbed at several locations along the project</p>			

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
			area and thus further erosion of the embankment would not be adequately prevented.			
Technology	Various stabilisation options could be implemented, depending on the level of risk and site conditions. Methods that have been considered for stabilisation include the following: 1. Extension of retaining walls by means of a reinforced concrete. 2. Extension of retaining walls by	Selection of technology type/ method will be based on site conditions and severity of instability.	Efficiency of stabilisation techniques will need to be monitored immediately after construction until such time that the vegetation establishes and embankment is stable.	YES	YES	

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
	<p>means of a gabion structure.</p> <p>3. Stabilisation of embankment with soil nails.</p> <p>4. Infilling via concrete and/or erosion protection support such as reno mattresses.</p> <p>A combination of these methods may be implemented depending of the severity of the instability at the particular area.</p>					
Operational	N/A					
No-Go Alternative Mandatory to consider the option	No stabilisation of the road embankment	No disturbance of the environment	-Risk of scouring during flooding and associated instability remains unchanged	YES	YES	

Alternative level	Alternatives	Advantages	Disadvantages	Reasonable and feasible	Further assessment	Comment
of not implementing the project			-No job creation			

6.8. ALTERNATIVES TO BE ASSESSED

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

- Site Alternative 1;
- Layout Alternative 1;
- Layout Alternative 2;
- No-Go Option (land to remain unaltered).

The assessment will therefore only consider these four alternatives. The No-Go option does not contribute to improved road stability and will not create employment opportunities for individuals and businesses in Makhanda. The No-Go alternative maintains the status quo, including the erosion and stability risks that currently exist. Therefore, the No-Go alternative is not identified as the preferred alternative for this project. The impacts assessment will thus focus on layout alternative 1 and layout alternative 2, which are located on the same area except that alternative 1 affects some properties that are outside the reserve.

7. PUBLIC PARTICIPATION

The Public Participation Process (PPP) is a requirement of several pieces of South African Legislation and aims to ensure that all relevant I&AP's are consulted, involved and their opinions are taken into account and a record included in the reports submitted to Authorities. The process ensures that all stakeholders are provided this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study.

The public participation (PP) process will be undertaken in line with the requirements of Regulations 39 to 44 of the EIA Regulations as amended. The primary aim of the public participation process is to ensure that:

- Information that reasonably has or may have the potential to influence any decision regarding an application is made available to potential stakeholders and I&APs;
- Potential or registered interested and affected parties, including the competent authority, may be provided with an opportunity to comment on reports and plans; and
- Comments received from potential stakeholders and I&APs are recorded and incorporated into the BAR to be submitted to the Competent Authority.

7.1. PPP COMMUNICATION METHODS

The public participation process will focus on dissemination of project information through electronic methods and minimize physical interaction with interested and affected parties. No public meetings will be held due to the limitations applied by the Disaster Management Act Regulations prohibiting the gathering of people. Project background information will be posted on the company website so that I&APs can take time to understand the proposed activity and potential impacts identified, comments and feedback will be received via registered letters, email and fax. In order to cater for I&APS without access to email, notices will be published in the local news paper and site notices also placed near the site. Registered letters will be posted to Landowners and occupants where postal addresses are available. In summary, methods that will be used to ensure that no one is excluded from the public participation process due to covid-19 include:

1. Digital platform: Project background information will be posted on Isipho Environmental Consultants website (www.isiphoseco.co.za). The I&APs will then be able to read through information from their home and provide feedback through the questionnaire which can be returned to the EAP via email, fax or post.
2. Electronic Messaging: Emails and SMS notifications were sent out to pre-identified and registered I&APs notifying them of the proposed project and how to participate and comment on the BA process. All comments received will be included in the Final BAR which will be submitted to the CA for decision making. Email notifications will be sent to all registered I&APs, informing them of the decision issued by the CA and the right to appeal that decision including details of the appeal process.

3. Telephonic Records: Contact details of the EAP were published in the local newspaper and provincial gazette. Should the I&AP wish to provide feedback in such a manner, a record of this conversation will be written down and included as part of the public participation report.
4. Site Notices: A2 size corex boards have been physically placed on the boundary of the application area which is along the N2 so that I&APs that are passing by may be able to read the project information and contact the EAP for further details.
5. Newspaper adverts: An advert was placed in the local newspaper, the Grocott's Mail during application stage as well as when the BAR is available for review to ensure that no I&AP misses an opportunity to participate.
6. Provincial Gazette: Notice of the Environmental application process was placed on the Eastern Cape Provincial Gazette so that I&APs that are outside of Makana Local Municipality area are also reached. The notice is attached in Appendix B of this report

7.2. IDENTIFICATION AND REGISTRATION OF IAPs

An initial I&AP list will be compiled using records from previous studies undertaken to determine the contact details of government officials and traditional authorities. Landowners will be identified using winded searches and through consultation with known landowners. Additionally, landowners and occupants will be identified through consultation with ward councillors, traditional authority structures and the local municipalities. It is also anticipated that some IAPs will respond to the adverts and notices that will be placed in the newspaper and on site. The I&AP database will be compiled containing the following categories of stakeholders:

- The competent authority
- Directly impacted landowners/occupiers
- Adjacent landowners/occupiers
- Relevant organs of state departments
- Municipalities
- Ward councillors and other key stakeholders.

Registered IAPS will be kept abreast of the application and BA process and received notification when there is opportunity to provide comment.

TABLE 9: PRE-IDENTIFIED I&APS

I&AP Category	Name	Organization	Contact Detail
---------------	------	--------------	----------------

7.3. NOTIFICATION OF IAPS

Consultation with other IAPS

The following will be undertaken as part of the public participation process:

- Placement of 2 site notices (in English and isiXhosa) near the project area;
- Placement of an advert in English and isiXhosa in the Provincial Gazette/ Local Newspaper;
- Distribution of registered letters to landowners, occupants and adjacent landowners/occupants
- Notification of interested and affected parties by email and messaging

A questionnaire will be distributed to all interested and affected parties along with a notification letter, background information document containing the project description, locality map of the project and anticipated impacts. The questionnaire will provide I&APs an opportunity to share their knowledge on the sensitivities of the application area, comments as well as any objections they may have. Contact details of I&APs will be registered in a database for subsequent notification as the BA Process progresses.

The draft BAR will be made available for public review for 30 days before it is submitted to the Competent Authority for decision making. All comments received from interested and affected parties will be included in the final BAR to be submitted to the CA.

7.4. DESCRIPTION OF THE INFORMATION PROVIDED TO THE COMMUNITY, LANDOWNERS AND I&APS

Notification documents to be sent to all pre-identified I&AP's will include the following information:

- The site plan;
- List of activities to be authorised;
- Scale and extent of activities to be authorised;
- Typical impacts of activities to be authorised;
- The duration of the activity;
- Sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land);
- The purpose of the proposed project;
- Details of the affected properties (including parent farm and portion);
- Details of the NEMA Regulations that must be adhered to;
- The information contained in the BAR and EMPR;
- Date by which comment, concerns and objections must be forwarded through to the EAP; and
- Contact details of the Environmental Assessment Practitioner (EAP).

In addition, a questionnaire will be included in the registered letters, emails and request the following information from I&AP's:

- To provide information on how they consider that the proposed activities will impact on them or their socio-economic conditions;
- To provide written responses stating their suggestions to mitigate the anticipated impacts of each activity;
- To provide information on current land uses and their location within the area under consideration;
- To provide information on the location of environmental features on site, to make written proposals as to how and to what standard the impacts on site can be remedied;
- To mitigate the potential impacts on their socio-economic conditions to make proposals as to how the potential impacts on their infrastructure can be managed, avoided or remedied;
- Details of the landowner and information on lawful occupiers;
- Details of any communities existing within the area;
- Details of any Traditional Authorities within the area;
- Details of any other I&AP's that need to be notified;
- Details on any land developments proposed;
- Details of any perceived impacts to the environment that should be considered in the BAR; and
- Any specific comments, concerns or objections to the proposed project.

As a result of the public notification, a register will be opened and maintained, which recorded all contact details of persons whom have submitted written comments or responded to the notifications, and who have requested that they be registered as Interested and Affected Parties (I&APs). All registered I&APs will be informed of the required process of involvement as defined by the EIA regulations. A detailed Public Consultation Report will be prepared and maintained throughout the process. This will serve to record all comments and response received from and sent to I&AP's and included as Appendix B of this BA report.

As part of the PPP the registered I&APs will be given an opportunity to comment on the BAR to be submitted to the Competent Authority.

One (1) hard copy of the Draft version of the BAR will be made available at the Makhanda Public Library located at 45 Hill Street in Makhanda, all registered I&APs will be notified of its availability. The Final BAR will be submitted to the Competent Authorities in accordance with the Competent Authorities requirements. All comments received from I&APs will be submitted together with the BAR to the Competent Authorities for decision-making.

7.5. PROJECT PPP TIMEFRAMES

Table 10: PPP Timeframes

Notification Type	Description	Anticipation Date
Advert (Local Newspaper)	An Advert was placed in the Grocott's Mail Newspaper providing detail on the proposed project, the applicant, affected properties and contact details of the EAP for more information. The Advert was posted in English and IsiXhosa.	30 August 2021
Advert (Provincial Gazette)	An Advert was placed in the Provincial Gazette providing detail on the proposed project, the applicant, affected properties and contact details of the EAP for more information	30 August 2021
Site Notices	Two A2 size corex notices were placed near the application area. The Notices contain information on the proposed project, the applicant, affected properties and contact details of the EAP for more information. A map of the application area and identified sensitivities will be included in the notices. The notices will be posted in English and IsiXhosa.	30 August 2021
Notification Letters	Letters were sent out by email to identified IAPs with project background information as well as questionnaires for providing feedback and comment on the proposed project	31 August 2021
Availability of Basic Assessment Report	Notification regarding availability of the report will be sent out by email, registered letters and sms notification. IAPs will be provided an opportunity to comment on the report for 30 days. The BAR will be placed at Makhanda library and will also be available by email upon request by the EAP. A summary of the DBAR will be uploaded on the company website.	28 October 2021

Notification Type	Description	Anticipation Date
Submission of FBAR to Competent Authority	Once the Draft BAR has gone through public review process for 30 days, all comments received will be incorporated into the report received and submitted to the competent authority for decision making.	30 November 2021
Notification of decision on application	Notification letter with details as outlined in the EA issued will be sent via email, fax or post.	April 2022

7.6. SUMMARY OF ISSUES RAISED BY IAPs

Table 11: Summary of issues raised by IAPs

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an x where those who must be consulted were in fact consulted	Contacted	Date comments received	Issues Raised	EAPs response to issue as mandated by the applicant	Report Reference
Affected Parties					
Landowners					
Lawful occupier/s of the land					
The occupants of the affected properties are the same as the land owners identified					
Landowners or lawful occupiers on adjacent properties					
Municipality					
Makana Local Municipality	x	10/09/2021	No response has been received yet	Notification email was sent to environmental contact person at Makana Local Municipality	

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an x where those who must be consulted were in fact consulted	Contacted	Date comments received	Issues Raised	EAPs response to issue as mandated by the applicant	Report Reference
Municipal councillor					
	X	10/09/2021	No response has been received yet	Notification email was sent to the councillor	
Organs of state (Responsible for infrastructure that may affected Roads Department, Eskom, Telkom, DWA etc					
Department of Water and Sanitation			It is anticipated that the DWS will respond as the application for approval in terms of Section 21 c and I of the NWA proceeds.	A pre-application enquiry has been created on the ewulaas system	
Communities					
Public Meetings				No public meetings have been held	
Dept. Land Affairs					
Eastern Cape Department of Rural Development and Land Reform	X	25/09/2021	DRDLR has responded and confirmed that there are no land claims on the affected properties.	DRDLR was contacted to confirm of there are any existing land claims for the identified properties, however, no response has been received.	

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an x where those who must be consulted were in fact consulted	Contacted	Date comments received	Issues Raised	EAPs response to issue as mandated by the applicant	Report Reference
Traditional Authorities					
No traditional authorities have been identified					
Department of Forestry, Fisheries and Environmental	x	10/09/2021	DFFE responded and confirmed that no preapplication meeting was required, the PP Plan approved and the EA application submitted has been acknowledged	Several engagements have been had with DFFE including pre-application meeting request, submission of PP Plan and submission of EA Application.	
Other Competent Authorities affected					
ECDEDEAT	X	10/09/2021	No response received yet	Initial notification email regarding the proposed project has been submitted.	
ECPTA	X	10/09/2021	No response received yet	Initial notification email regarding the proposed project has been submitted.	
ECPHRA	X	10/09/2021	No response received yet	Initial notification email regarding the proposed project has been submitted.	

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an x where those who must be consulted were in fact consulted	Contacted	Date comments received	Issues Raised	EAPs response to issue as mandated by the applicant	Report Reference
Other Affected Parties					
N/A					
Interested Parties					
N/A					

8. DESCRIPTION OF THE ENVIRONMENT

This chapter outlines the biophysical features of the properties on which the proposed N2 Section 13 Stone Crescent Stabilisation Works will be developed. In addition, the socio-economic baseline of the region is provided. The section draws on existing available information within the municipal area as well as findings of specialist reports. 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 climate in Makhanda is temperate and is characterized by relatively high temperatures and evenly distributed precipitation throughout the year. Summers are usually somewhat wetter than winters, with much of the rainfall coming from convectional thunderstorm activity. Winter rain comes mainly from cold fronts (KC Phyto, 2021). Makhanda receives about 680 mm of rainfall per year of which the most falls in March and the least in June. The average yearly temperature for the town is 17.6°C. Summer temperatures (January) vary from an average maximum of 26°C to a minimum of 15°C. In winter (July) temperatures vary from an average maximum of 18°C to an average minimum of 4°C. The prevailing wind direction is from the west and southwest (Makana Draft SDF, 2013).

8.2. TOPOGRAPHY

The central part of the Makana Local Municipality that contains Makhanda and Riebeeck East has the highest elevation of between 600m and 900m above sea level. Makhanda is situated in a valley that cuts into a plateau. The highest point on the plateau is 770m above sea level and the lowest point in the valley is 490m above sea level (Makana Draft SDF, 2013).

8.3. GEOLOGY AND SOILS

The site falls within the Witteberg Group, as indicated in **Figure 6** below. Soils associated with the area are an Association of Classes 13 and 16: Undifferentiated shallow soils and land classes. These Soils with minimal development, usually shallow, on hard or weathering rock, with or without intermittent diverse soils. Lime rare or absent in the landscape (BGIS, 2021).

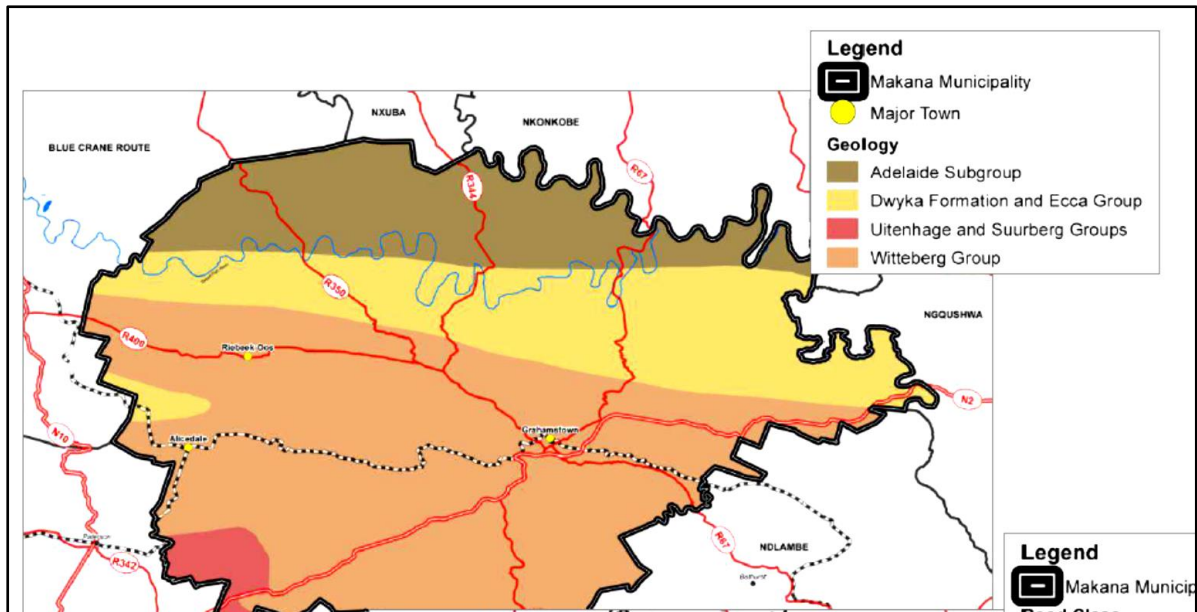


Figure 6: Geology of Makana (MLM Draft SDF, 2013)

8.4. SURFACE HYDROLOGY

The descriptions below are extracted from the Freshwater Impact Assessment Report prepared by the appointed specialist. Please kindly refer to the attached report for further details.

The site is located within the Mzimvubu to Tsitsikamma Water Management Area and P30A quaternary catchment. The Berg River (**Figure 7**) forms a tributary of the P30A - 08534 SQR. The P30A - 08534 SQR forms a 10.40 km reach which constitutes the entire Palmiet River from its source in the north to its confluence with the Kariega River in the south. The Present Ecological State (PES) category of the reach is classed as moderately modified (class C) (TBC, 2021).

According to the South African Inventory of Inland Aquatic Ecosystems (SAIIAE, 2018), the Ecosystem Threat Status (ETS) of aquatic ecosystem types is based on the extent to which each aquatic ecosystem type had been altered from its natural condition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), with CR, EN and VU ecosystem types collectively referred to as 'threatened' (Van Deventer et al., 2019; Skowno et al., 2019). **Figure 8** shows that CV and EN wetlands can be found outside the project area and associated 500 m regulated area.

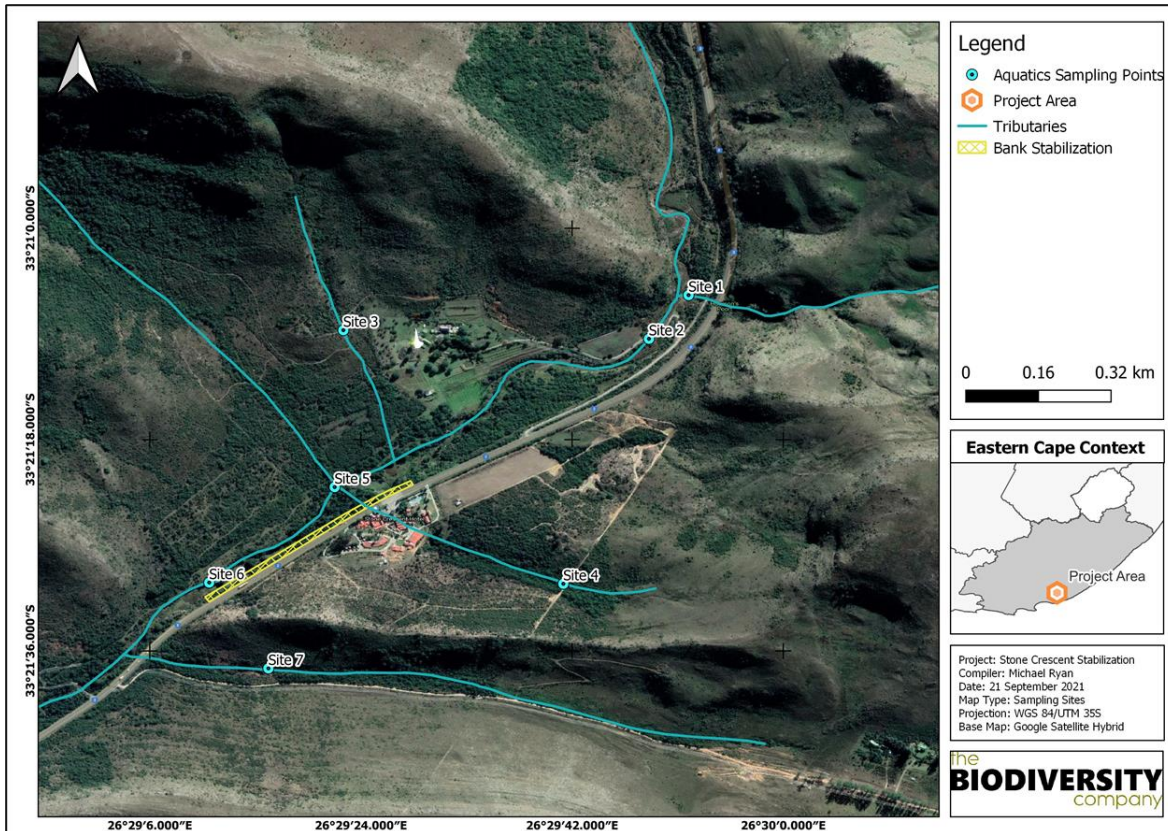


Figure 7: Tributaries within 500m of project area (TBC, 2021)

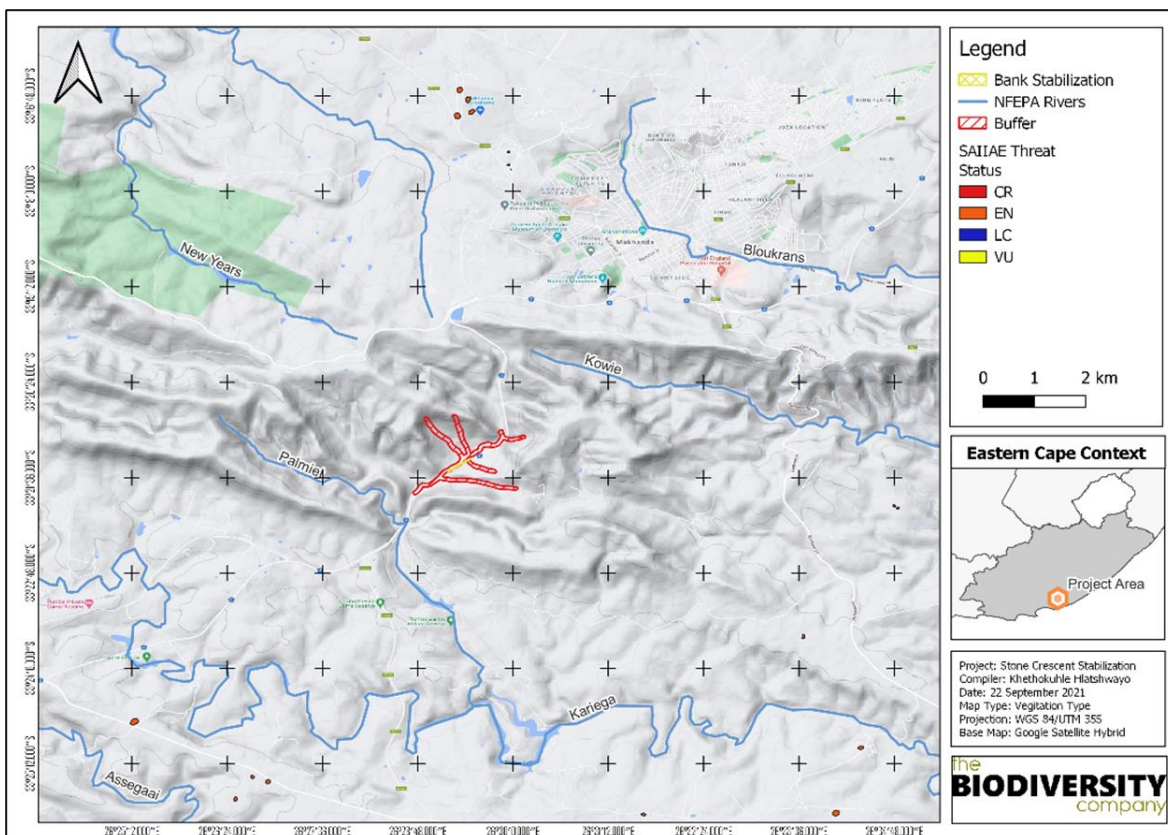


Figure 8: SAIIE wetland Ecosystem Protection Level in proximity to the project area

8.5. VEGETATION

The descriptions below are extracted from the Botanical Impact Assessment Report prepared by the appointed specialist. Please kindly refer to the attached report for further details.

In the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina & Rutherford 2006 & updated e-versions), the natural vegetation on the site is mapped as Suurberg Shale Fynbos (**Figure 9**). It is characterised as a low to medium high, closed, ericoid and proteoid shrubland or grassland, with closed restioid and or grass understorey, occurring on low mountains or hills in acidic, moist clay-loam soils in the Eastern Cape Province. Suurberg Shale Fynbos is found from the Klein Winterberg at Baroe in the west, Suurberg, and highly fragmented distributions around Riebeek East and Makhanda at altitudes between 400 and 900 m (Rebelo et al. 2006).

The conservation status of vegetation type (Rebelo et al. 2006) and terrestrial ecosystem (Government Gazette 2011 and subsequent published maps & reports, 2014, 2016 & 2019) are rated as least threatened.

According to the site assessment conducted by the botanical specialist, the underlying natural vegetation that is mapped as Suurberg Shale Fynbos is no longer evident on the site. Typical fynbos elements from the families Proteaceae, Ericaceae and Restionaceae are absent. Instead, they and many associated fynbos species were replaced by a plant cover that is dominated by indigenous and alien woody elements with a grass understorey of annual and perennial species. Perhaps the vegetation can best be described as degraded Makhanda Grassland Thicket.

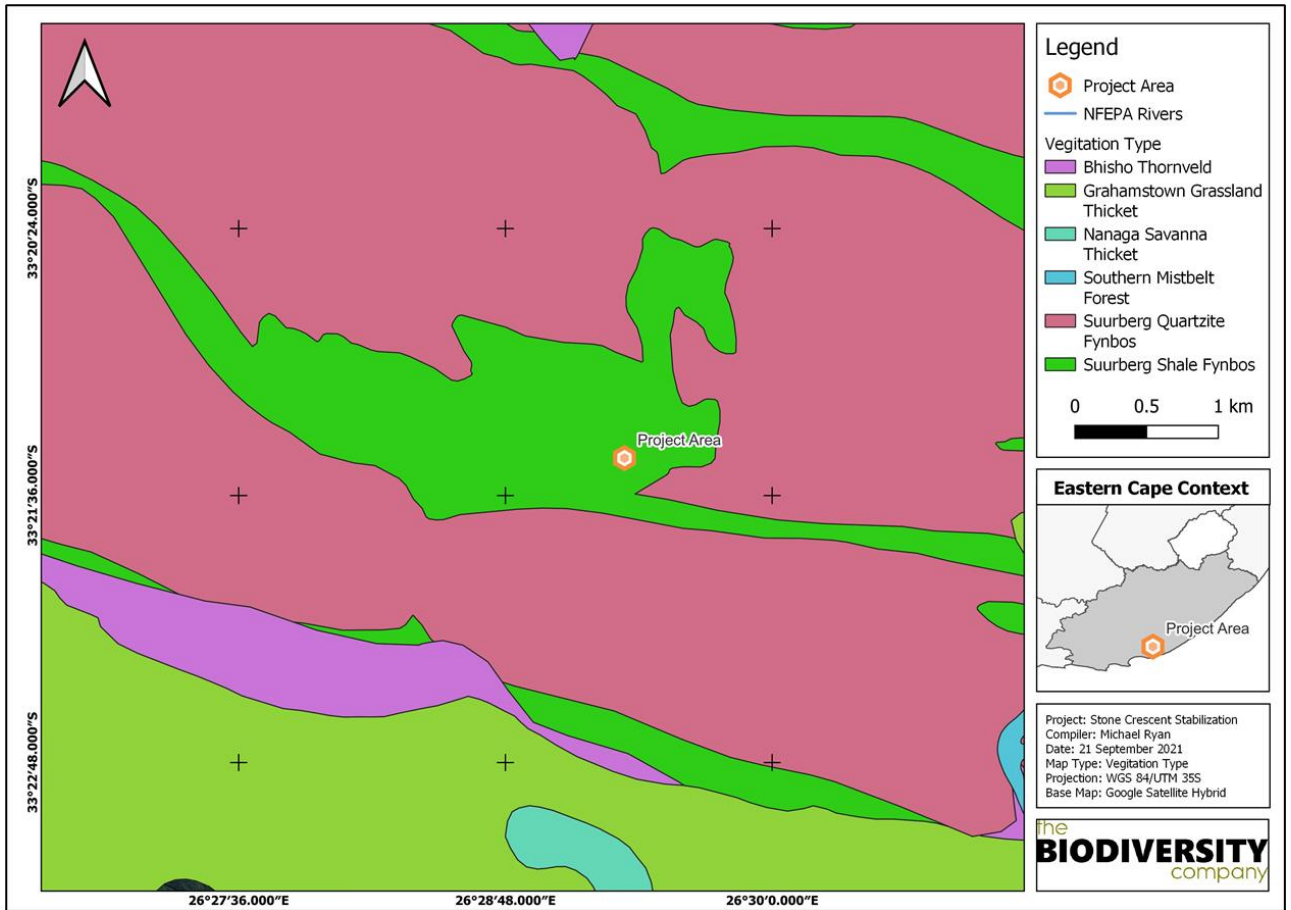


Figure 9: Vegetation Types associated with the project area.

SANRAL Stone Crescent Embankment Stabilisation Works Project

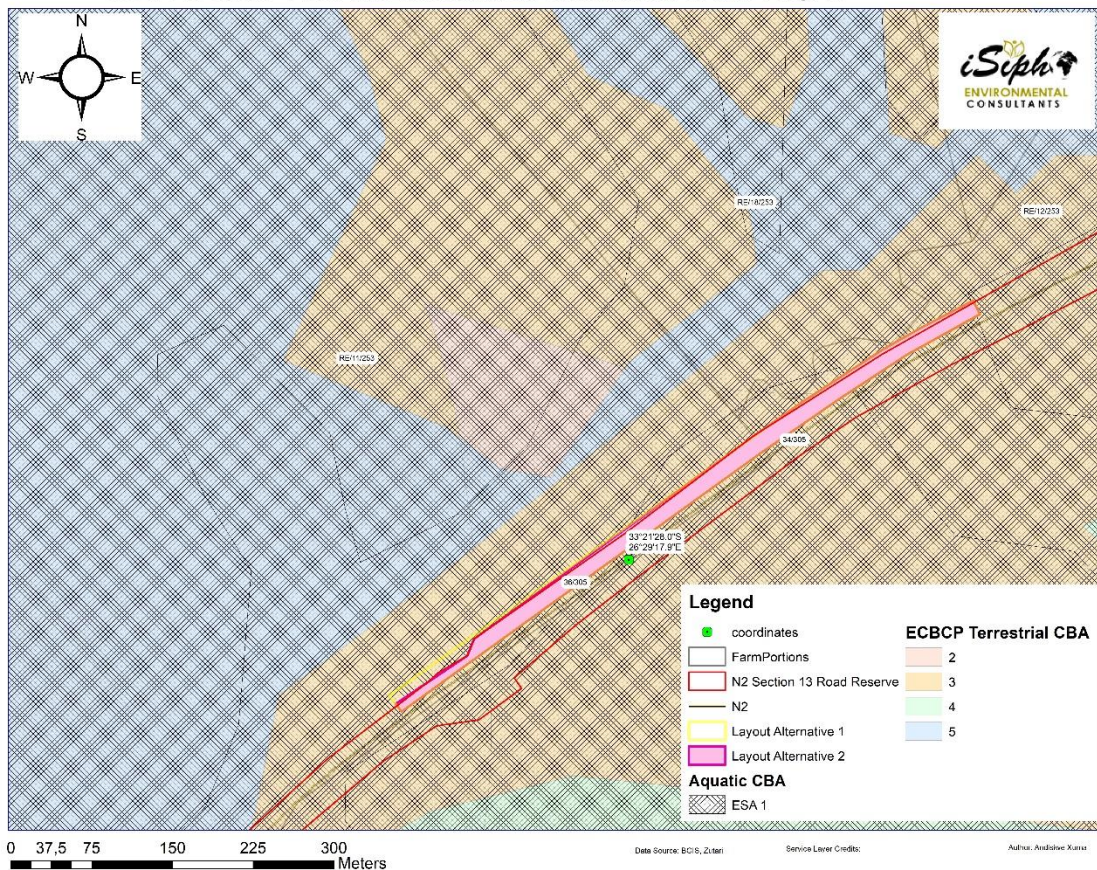


Figure 10: Eastern Cape Biodiversity Conservation Plan Map - CBAs

8.6. CRITICAL BIODIVERSITY AREAS

The key output of a systematic biodiversity plan is a map of biodiversity priority areas. The CBA map delineates Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs), Other Natural Areas (ONAs), Protected Areas (PAs), and areas that have been irreversibly modified from their natural state (ECBCP, 2019). The Eastern Cape Biodiversity Conservation Plan (ECBCP) uses the following terms to categorise the various land used types according to their biodiversity and environmental importance:

- CBA – 1;
- CBA –2;
- CBA –3;
- ONA; and
- PA.

CBAs are terrestrial and aquatic areas of the landscape that need to be maintained in a natural or near-natural state to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services. CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species. Thus, if these areas are not maintained in a natural or near natural state then biodiversity targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (ECBCP, 2019).

CBAs are areas of high biodiversity value and need to be kept in a natural state, with no further loss of habitat or species.

The ECBCP specifies two different CBA areas, Irreplaceable CBA's and Optimal CBA's. Irreplaceable CBA's include: (1) areas required to meet targets and with irreplaceability biodiversity values of more than 80%; (2) critical linkages or pinch-points in the landscape that must remain natural; or (3) critically Endangered ecosystems.

ESAs are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic (ECBCP, 2019).

ONAs consist of all those areas in good or fair ecological condition that fall outside the protected area network and have not been identified as CBAs or ESAs. A biodiversity sector plan or bioregional plan must not specify the desired state/management objectives for ONAs or provide land-use guidelines for ONAs (ECBCP, 2019).

Figure 10 shows the proposed project area superimposed on the Terrestrial and Aquatic CBA map. Based on this, the proposed embankment stabilization area will overlap with:

- Aquatic CBA: ESA 1
- Terrestrial CBA: CBA 3

8.7. PROTECTED AREAS

There are no protected areas within the project area, however, the site is located within 5km of the Thomas Baines Nature Reserve.

8.8. PALAEOLOGICAL RESOURCES

According to the SAHRIS Palaeomap, the project site is located in an area of moderate palaeontological sensitivity and a desktop Palaeontological assessment is required (**Figure 11**). The palaeontological desktop study is attached as Appendix D3 of this report.

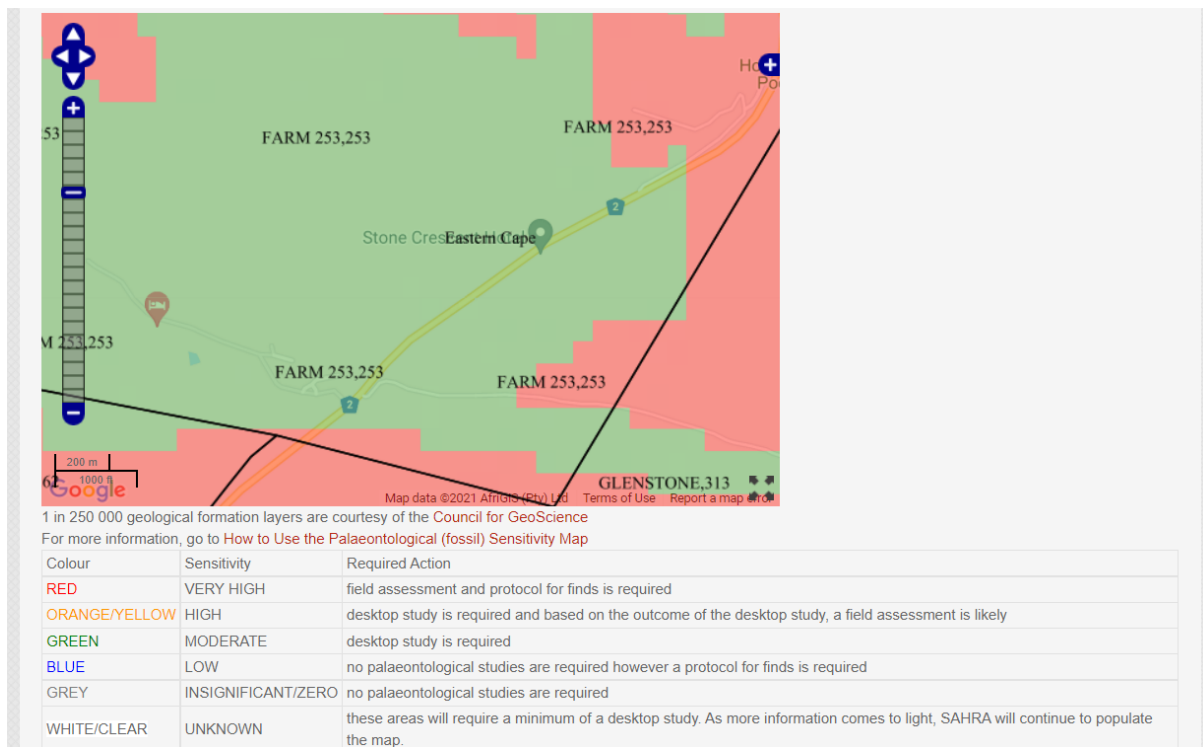


Figure 11: Palaeontological sensitivity of the project area

8.9. LAND-USE /LAND COVER

The application area measures approximately 8 000 m² in size and includes a terrestrial and aquatic ecosystem within an agricultural landscape, adjacent to the N2 Highway and road Reserve. It is divided by a wire fence along its length into a western and eastern portion. At about a third from its northern edge, another wire fence runs perpendicular to the first one, separating the two adjacent farms from each other. The western portion is low lying farmland with scattered rocks in places that includes the aquatic ecosystem (Berg River). Towards the northern end, the river has several smaller drainage channels flowing into it. The eastern portion of the site is a steep road embankment that is separated from the N2 road by a steel barrier. Storm water channels that run from the road verge towards the river as well as a retaining wall are also present on the site. In the north and south the site is connected to vacant farmland. The Eastern Cape landcover raster dataset indicates that the project area is covered with natural vegetation with some waterbodies and agricultural land (**Figure 12**).

Past and ongoing disturbances such as grazing, alien tree infestations and road construction have transformed the natural vegetation which is mapped as Suurburg Shale Fynbos into its current unrecognizable condition. (KC Phyto, 2021).

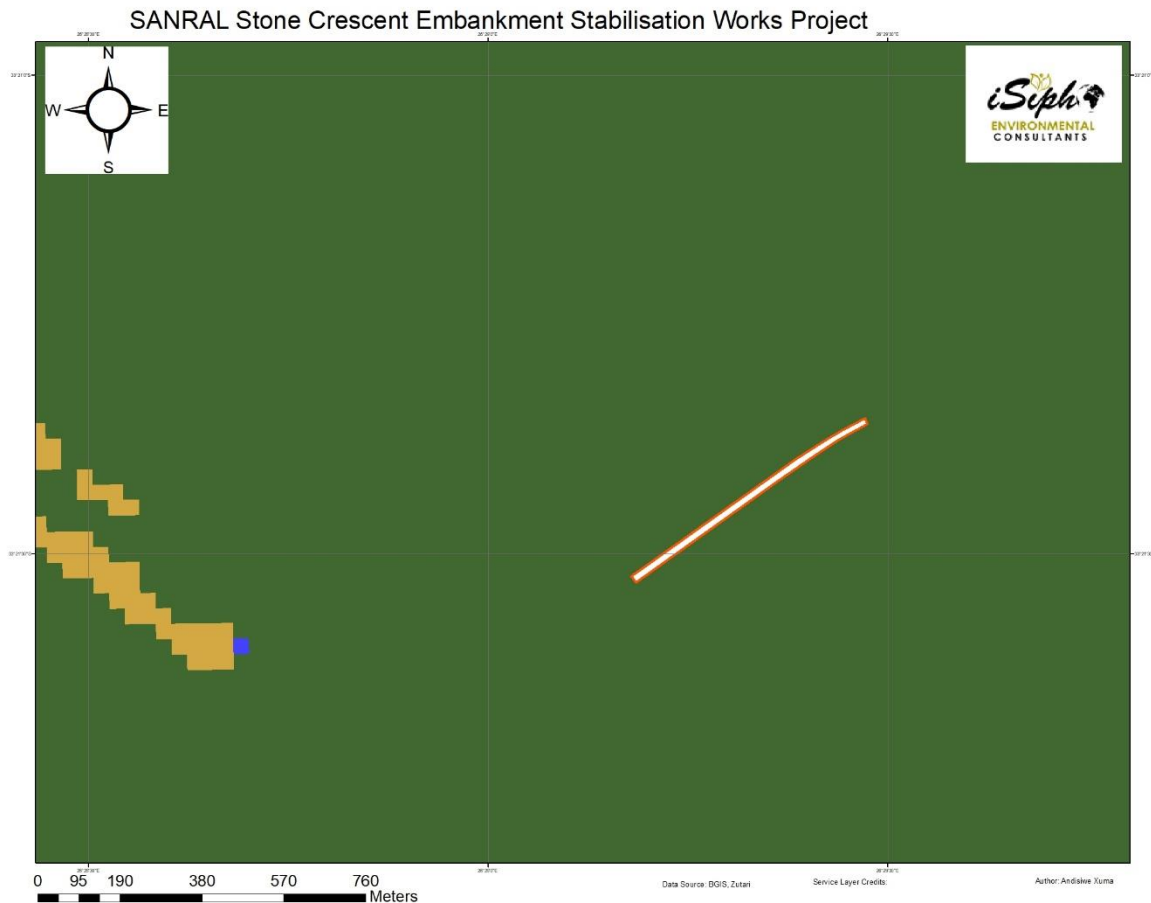


Figure 12: Land Cover- dark green represents natural vegetation in the project area surroundings

8.10. LAND CAPABILITY

There is no high potential agricultural land within Makana (**Figure 13**). Most of the land (68.71%) in Makana is classified under Class 6 – and is only for grazing of animals and is non-arable. The shallow and weakly developed soils limit the types of crops that may be planted. Some rich alluvial and colluvial soils exist close to rivers, which present opportunities for intensive agricultural cultivation if water is available (Makana Local Municipality draft SDF, 2013).

Taking into consideration the climate change risks is necessary when assessing developments that may affect water resources. It is anticipated that climate change in the Eastern Cape will result in the following:

- High temperature increases towards the northwest interior with lowest increases along the coast.
- A drying trend towards the south and south west.
- Increased precipitation more likely towards the east of the Province.
- Sea level rise scenario’s ranging from 2m to 6,5m depending on exposure.

The dry conditions over Makanda thus mandate that all surface and ground water sources are protected and disturbance to those resources is minimized.

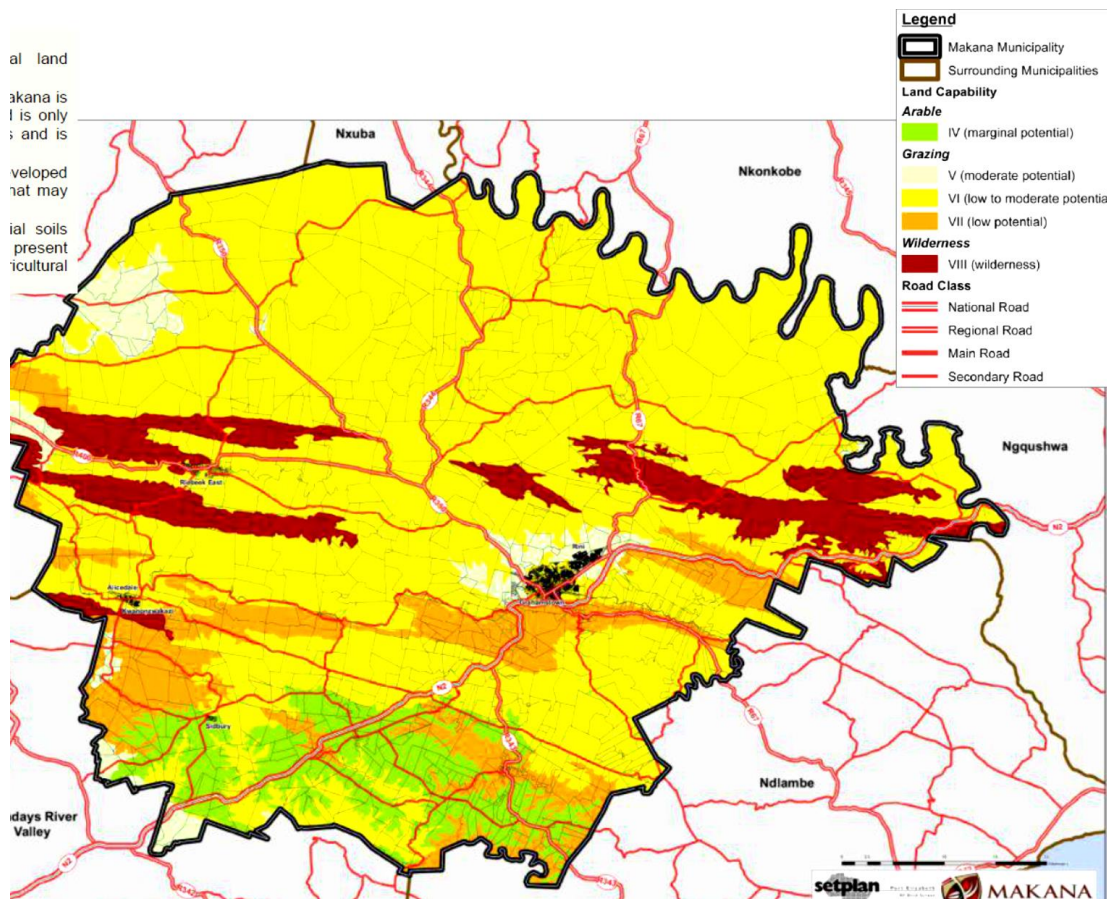


Figure 13: Land capability of Makana (MLM SDF, 2013)

8.11. SOCIOECONOMIC PROFILE

The Stone Crescent Stabilisation works project which entails geotechnical stabilisation of Section 13 of the N2 Road embankment near Makhanda (Makhanda) falls within ward 14 of Makana Local Municipality. The municipality covers an area of 1690 square kilometres with a population of 82060 as per the Census 2011 data. Ninety percent of the population lives in Makhanda, which is the economic hub of the region. According to Quantec Standardized Regional data (2018), there are 23 918 households in Makana with an average household size of 3.82. The gender profile of the municipality is predominantly female, with females being 52.2% and males being 47.8%. In terms of ethnicity, 80.7% of the population are Black Africans, 10.7% Coloured, 8.0% White and 0.6% Indian or Asian.

Makana has a young population, with 39% of the population categorised as Youth (15-34), 24% as Adult (35-64), 9% Elderly (65+) and 27% are children (0-14). Makana has the highest proportion of people who have a matric or higher in the Sarah Baartman District at 22.7%. The Municipality's high proportion of people who have a matric or higher could be related to the fact that many university students and highly qualified lecturers reside in Makhanda. It also has the lowest proportion of people without schooling, at 8.2%. The average household income in Makana is R 11 572. In terms of its employment profile, unemployment remains high at 45.5% in Makana.

The Gross Domestic Product (GDP) of Makana Municipality was measured at 19.3% in 2017. Despite difficult economic climate, the GDP for the Makana Municipality grew at 1.7% between 2007 and 2017. (Makana Local Municipality IDP, 2019/2020). The dominant economic activities in Makana are tourism, community services, trade and agriculture. Makhanda's settlement function includes Education (Rhodes University), more than 80% of the employed people are in the formal sector. Makhanda makes the highest contribution to the economy (Mainly through educational services and tourism related activities). The government sector is the largest contributor, followed by trade, finance and business. Rhodes University employs approximately 10% of the employed persons in the Municipality. It is estimated that approximately 23% of the households in Makana live below the poverty line (Makana Local Municipality draft SDF, 2013).

9. SENSITIVITY SENSITIVITIES IDENTIFIED BY THE NATIONAL WEB-BASED SCREENING TOOL

The sensitivity of the project area was assessed using the National Screening Tool sensitivity themes. Findings of the Specialists after on-site analysis is taken into account in determining the overall sensitivity of the site. Please refer to **Table 12** for a summary of how the EAP has responded to the incentives, restrictions and specialist assessments identified in the screening tool report.

9.1. AGRICULTURAL SENSITIVITY

According to the National Web Based Environmental Screening Tool, the agricultural sensitivity of the application area is rated as medium due to the low to moderate land capability of the application area (**Figure 14**). From what has been observed on site, it is confirmed that most of the application area has low potential for cultivation of plants due to existing development that would hinder that land use but the site is used for animal grazing.

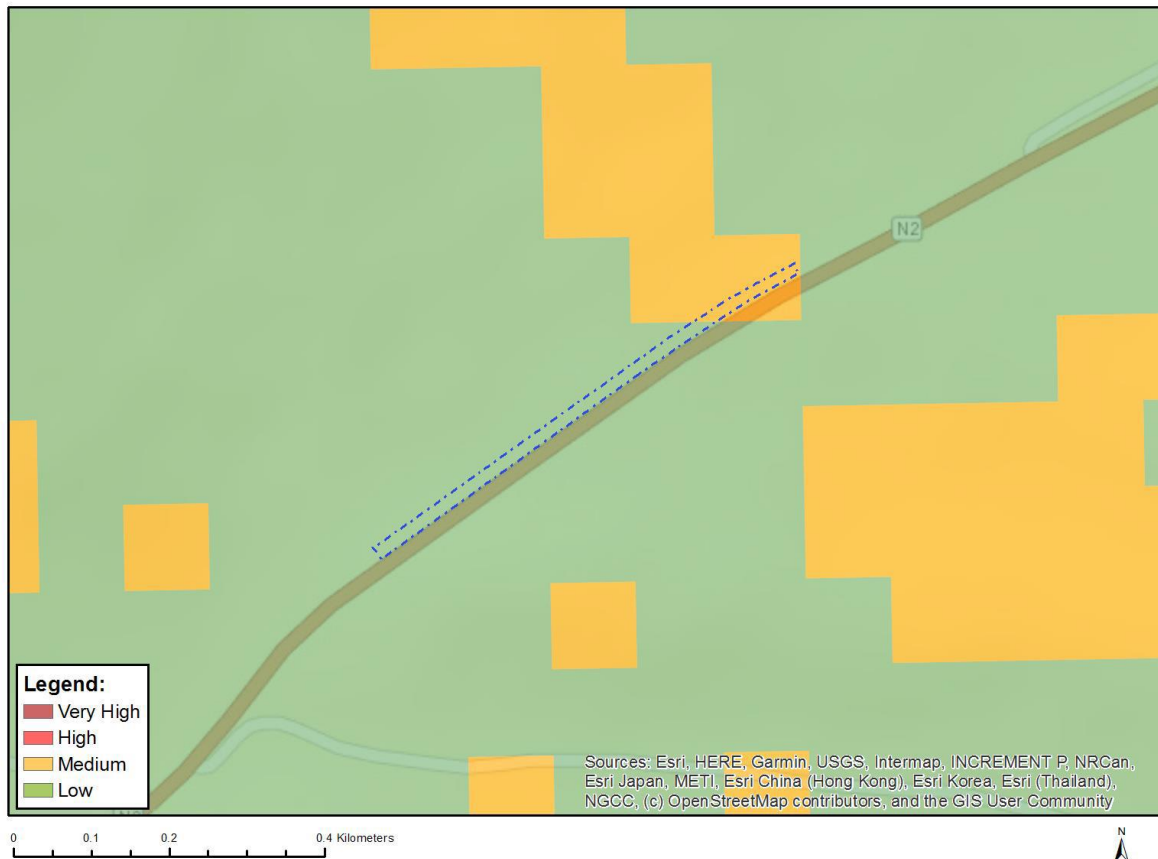


Figure 14: Agricultural sensitivity

9.2. ANIMAL SPECIES

According to the National Web Based Environmental Screening Tool (NWBEST), the animal species sensitivity of the application area is rated as medium (**Figure 15**). This is because a number of sensitive animal species are expected to occur in the vicinity of the application area. This includes the following species:

- Aves-Circus maurus
- Invertebrate-Aneuryphymus montanus
- Mammalia-Ourebia ourebi ourebi
- Sensitive species 7

Although no animal species were recorded on site during the assessments, it is likely that these species are present in the surrounding environment as the adjacent landowners did confirm that game hunting is one of the activities conducted in the area.

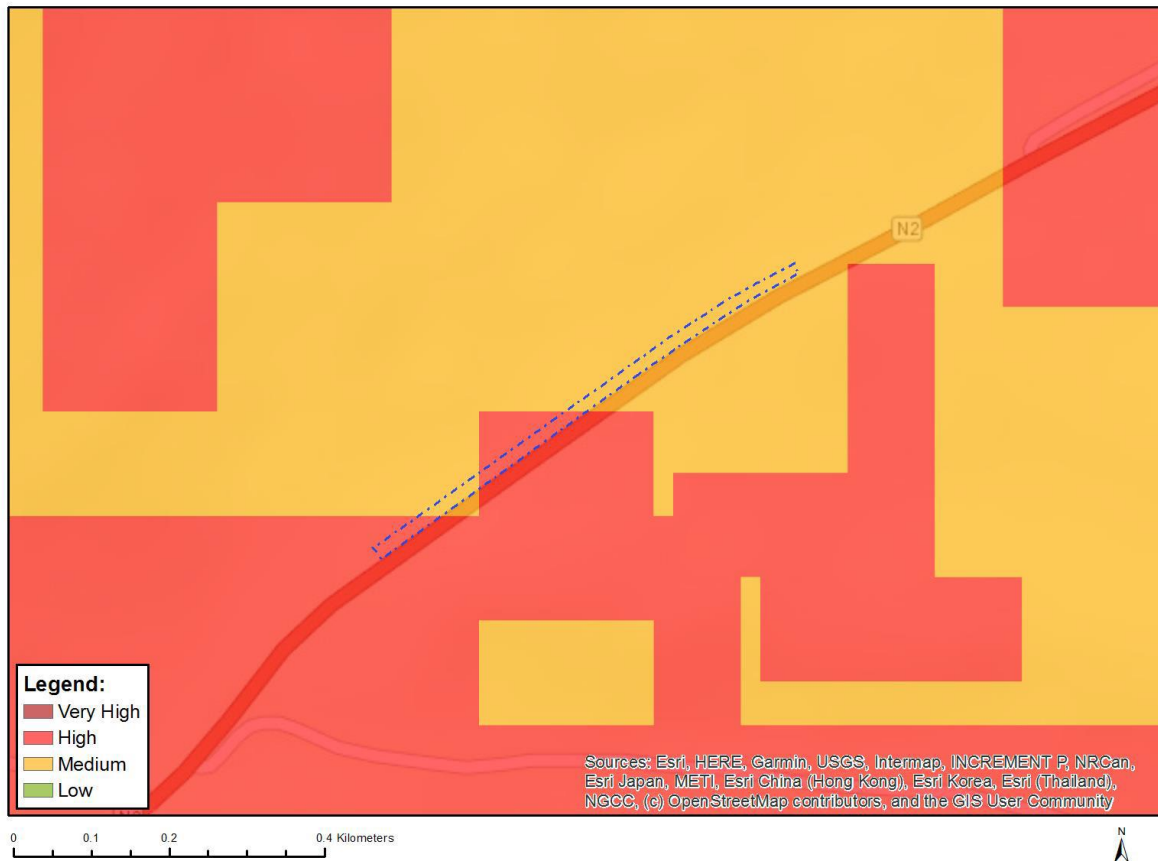


Figure 15: Animal species sensitivity

9.3. AQUATIC BIODIVERSITY

The NWBEST has characterised the aquatic sensitivity of the project area as “very high” (**Figure 16**). This will include all watercourses within the project area which are considered sensitive due to their relatively small spatial scale when compared to terrestrial habitat with a large demand for the ecosystem services which they provide. This sensitivity was confirmed by the specialist who conducted the Freshwater Impact Assessment.

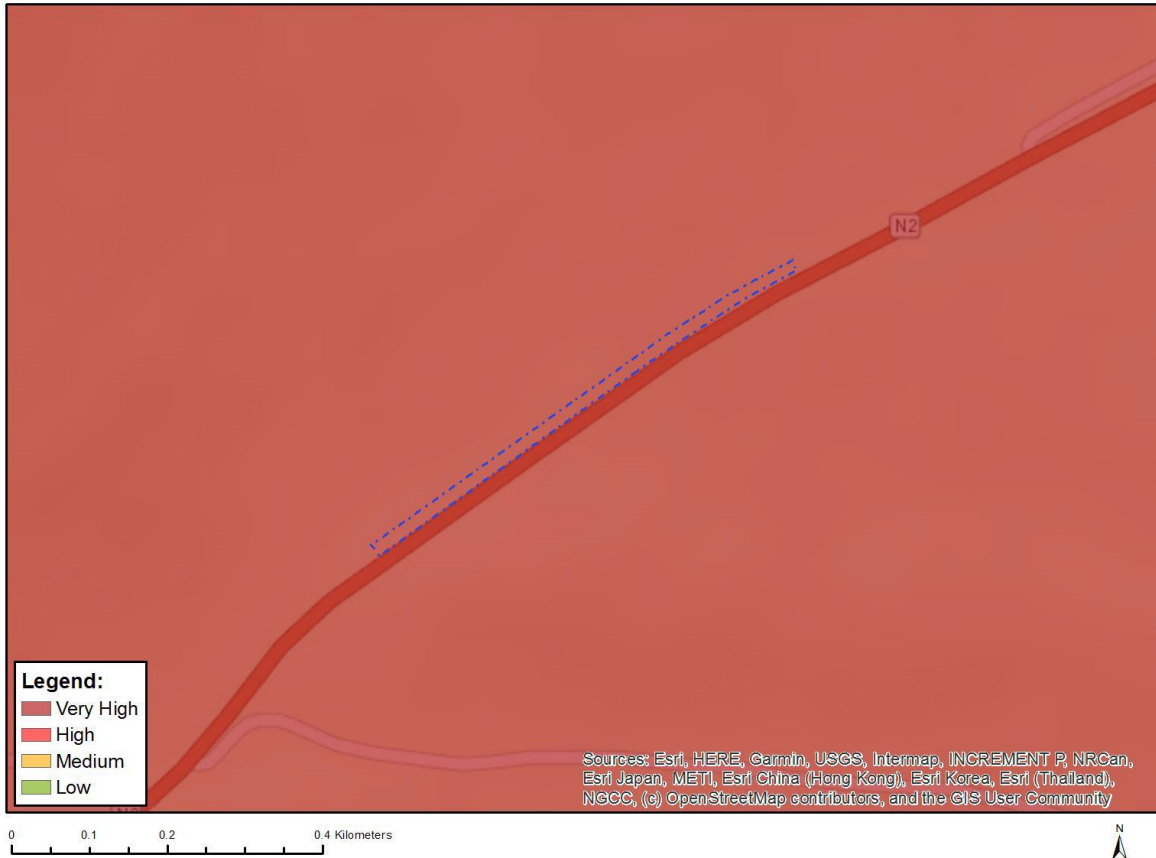


Figure 16: Aquatic Biodiversity

9.4. ARCHAEOLOGY AND CULTURAL HERITAGE

The NWBEST has characterised the archaeology and cultural heritage sensitivity of the site as “low” (**Figure 17**). Due to the presence of other developments within the application area such as a road, gabions and retaining walls and a water impoundment feature, it is highly unlikely that any archaeological structures would be present. EAP thus confirms this sensitivity rating.



Figure 17: Archaeology and cultural heritage sensitivity

9.5. PALAEOLOGY SENSITIVITY

The NWBEST characterised the palaeontological sensitivity of the site and surrounding environment as Medium (**Figure 18**). This rating is consistent with the finding from the South African Heritage Resources Agency Palaeontology map for the area (**Figure 11**). The specialist study conducted concluded that significance of the impact of the proposed project on palaeontological resources is low and that no further mitigation is required. Please refer to appendix D3 for further details.



Figure 18: Palaeontological sensitivity

9.6. PLANT SPECIES SENSITIVITY

According to the NWBEST, the plant species sensitivity of the application area is described as medium. (**Figure 19**). Several sensitive plant species are expected to occur in the project area. The Botanical specialist has reassigned the sensitivity of the project area to low-medium based on the onsite conditions as illustrated in **Figure 20**. A list of plant species sampled in the project area is provided in the Botanical Impact Assessment Report attached as Appendix D2.

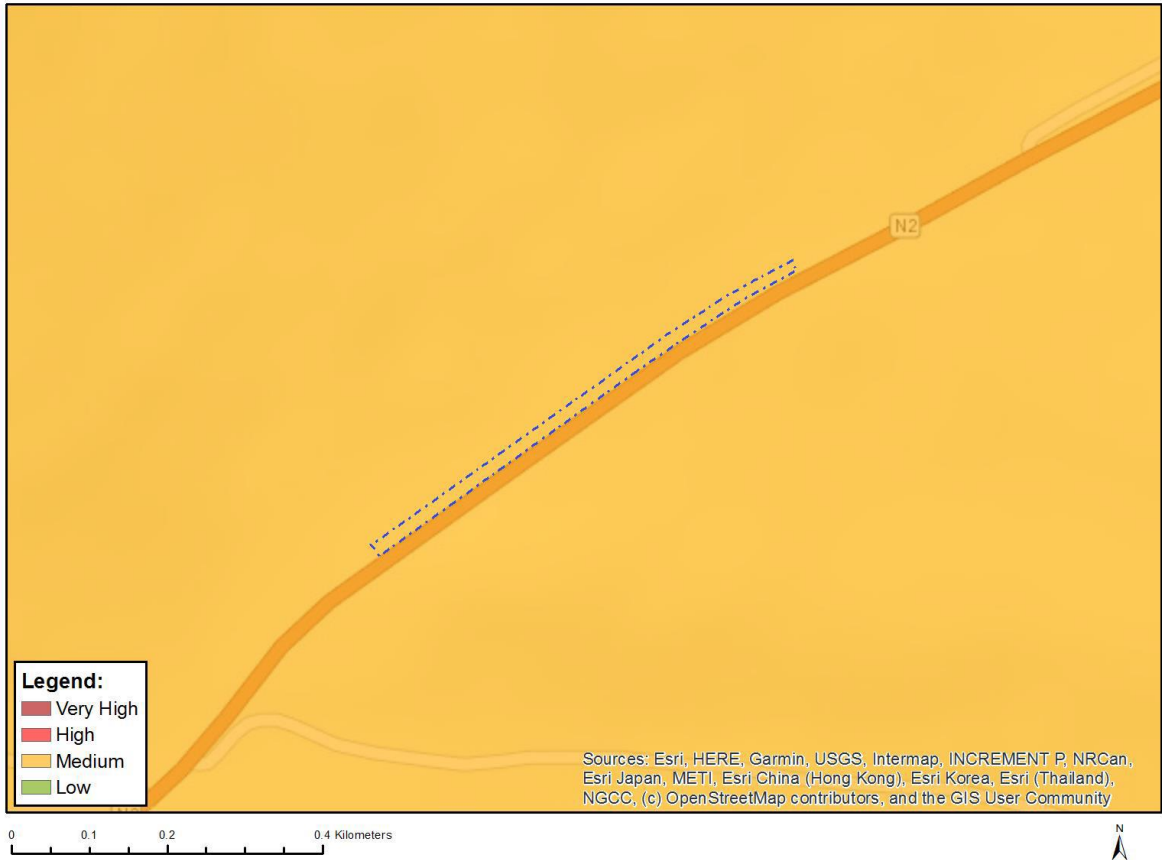


Figure 19: Plant species sensitivity



Figure 20: Updated Plant species sensitivity by botanical specialist

9.1. TERRESTRIAL BIODIVERSITY THEME SENSITIVITY

The Terrestrial Biodiversity sensitivity of the project area is described as “Very High” in the NWBEST report. This high sensitivity can be ascribed to the Freshwater ecosystem priority area quinary catchments found in the project surroundings (**Figure 21**). The Fresh water Impact study confirmed that the project area falls within the 8534 Quaternary catchment. The 8534 quaternary catchment contains four freshwater priority areas as it is considered a River FEPA as well as a Fish Sanctuary.



Figure 21: *Terrestrial Biodiversity Theme Sensitivity*

9.2. RESPONSE TO INCENTIVES, RESTRICTIONS AND SPECIALIST ASSESSMENTS IDENTIFIED IN THE SCREENING TOOL REPORT

Table 12: EAP response to incentives, restrictions and specialist assessments identified in the screening tool report

Incentive, restriction, or prohibition	Detail of incentive, restriction, or prohibition	Implications for the environmental authorisation process and motivation for not including an identified specialist study
Strategic Gas Pipeline Corridors	The site falls within the Strategic Gas Pipeline Corridors-Phase 7: Coega to Richards Bay. The aim of Strategic Gas Pipeline Corridor is to facilitate faster than normal environmental authorisation applications for gas transmission pipeline infrastructure where the infrastructure triggers Activity 60(i) and (ii) of Listing Notice 1 or Activity 7(i) and (ii) of Listing Notice 2.	This does not apply to the proposed development since the development is for the stabilization of a road embankment along and within the N2 reserve near Grahamstown and not a gas pipeline project.
Renewable energy development zones	The site falls within Zone 3- Cookhouse of the Renewable energy development zones. The purpose of the Renewable energy development zones is to facilitate faster than normal environmental authorisation applications for large scale wind and solar photovoltaic development activities when such activities trigger Listing Notice 2 - activity 1 of the EIA Regulations and any other listed activity specified as necessary for implementation of such a development.	This does not apply to the proposed development, since the development is for the stabilization of a road embankment along and within the N2 reserve near Grahamstown and not a renewable energy development project.
Agriculture		
<u>Agricultural theme:</u> Medium sensitivity	According to the National Web Based Environmental Screening Tool, the	From what has been observed on site, it is confirmed that most of the application area has low potential

Incentive, restriction, or prohibition	Detail of incentive, restriction, or prohibition	Implications for the environmental authorisation process and motivation for not including an identified specialist study
	<p>agricultural sensitivity of the application area is rated as medium.</p>	<p>for cultivation of plants due to existing development that would hinder that land use. The site is currently used for animal grazing. It is also stated in the Makana Local Municipality SDF that there is no high potential agricultural land within Makana and most of the land is non-arable.</p> <p>It is recommended that no agricultural assessment is required.</p>
Biodiversity		
<p><u>Animal species theme:</u> High sensitivity</p>	<p>According to the National Web Based Environmental Screening Tool (NWBEST), the animal species sensitivity of the application area is rated as medium. An animal species assessment is listed as one of the identified specialist assessments.</p>	<p>Although no animal species were recorded on site during the verification, it is likely that these species are present in the surrounding environment as the adjacent landowners did confirm that game hunting is one of the activities conducted in the area. Mitigation measures will be put in place to minimize impact on faunal species during construction and impact on the surrounding habitat will be kept minimal, it is not foreseen that the low impact on faunal species will continue post construction phase. Most of the application area is transformed, please refer to the visual assessment in Appendix E for photographic record of the current site conditions. Therefore,</p>

Incentive, restriction, or prohibition	Detail of incentive, restriction, or prohibition	Implications for the environmental authorisation process and motivation for not including an identified specialist study
		recommended that <u>no</u> faunal impact is required.
<u>Aquatic Biodiversity theme:</u> Very High	The NWBEST has characterised the aquatic sensitivity of the project area as “very high”	During the site visit, it was confirmed that there is a watercourse that flows through the application area. The site falls within an Aquatic CBA: ESA1. A Freshwater Impact Assessment Study has been included as Appendix D1 of this report.
<u>Plant species theme:</u> Medium sensitivity	According to the Screening Tool, the sites have a medium sensitivity for plant species.	The site falls within a Terrestrial CBA 3. The vegetation type of the site is the Suurberg Shale Fynbos, conservation status of vegetation type and terrestrial ecosystem are rated as least threatened. Several sensitive plant species are expected to occur in the project area. The Botanical specialist has reassigned the sensitivity of the project area to low-medium based on the onsite conditions. A list of plant species sampled in the project area is provided in the Botanical Impact Assessment Report attached as Appendix D2.
<u>Terrestrial biodiversity theme:</u> Very High sensitivity	The Terrestrial Biodiversity sensitivity of the project area is described as “Very High” in the NWBEST report.	An assessment of the site terrestrial biodiversity is included in the Botanical and Freshwater specialist assessments undertaken for this project.
Heritage		

Incentive, restriction, or prohibition	Detail of incentive, restriction, or prohibition	Implications for the environmental authorisation process and motivation for not including an identified specialist study
<u>Archaeological and Cultural Heritage Theme: Low sensitivity.</u>	The NWBEST has characterised the archaeology and cultural heritage sensitivity of the site as “low”	Due to the presence of other developments within the application area such as a road, gabions and retaining walls and a water impoundment feature, it is highly unlikely that any archaeological structures would be present. It is recommended that no heritage impact assessment is required.
<u>Palaeontology theme: Very High sensitivity</u>	The NWBEST characterised the palaeontological sensitivity of the site and surrounding environment as Medium	This rating is consistent with the finding from the South African Heritage Resources Agency Palaeontology map for the area. The desktop palaeontology study conducted concluded that significance of the impact of the proposed project on palaeontological resources is low and that no further mitigation is required. Please refer to appendix D3 for further details.
Other		
<u>Civil aviation theme:</u> Medium sensitivity	According to the DFFE Screening Tool, the site has a medium sensitivity to civil aviation.	The proposed site falls between 8 and 15 km of other civil aviation aerodrome. However, it is not envisaged that the proposed works would extend beyond a 1km radius of the application area in terms of physical disturbance. No high-flying equipment such as drones will be operated during construction and

Incentive, restriction, or prohibition	Detail of incentive, restriction, or prohibition	Implications for the environmental authorisation process and motivation for not including an identified specialist study
		therefore no specialist assessment for civil aviation is recommended.
Defence theme: Low sensitivity	According to the NWBEST, the site has a low sensitivity for defence.	It is recommended that no assessment for defence is required for this application due to the low sensitivity.
Noise Impact assessment	According to the NWBEST, these assessments are required.	An assessment of these impacts has been included in this report. Suitable mitigation measures will be included in the EMPr
Air Quality		
Traffic Impact Assessment		
Socio-economic		
Geotechnical Assessment	According to the NWBEST, a geotechnical assessment is required.	Given the fact that the purpose of the proposed project is to stabilize sections of the road embankment that have eroded and are showing signs of instability, it is critical to ensure that the final design takes into account the geotechnical conditions of the site. Thus it is recommended that if this information is currently not available, a geotechnical assessment must be conducted prior to construction.

9.3. OVERALL SITE SENSITIVITY

Based on the above sensitivities, and the findings of the specialist studies undertaken, an overall MEDIUM (MODERATE) Sensitivity is assigned to the site. The assigned sensitivity also takes into consideration comments from adjacent landowners and the surrounding environment.

10. IMPACT ASSESSMENT

10.1. IMPACT ASSESSMENT METHODOLOGY

In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. Each impact is assessed according to the following project phases:

- Planning
- Construction
- Operation
- Decommissioning
- Rehabilitation

The methodology to identify, determine and assess the potential impacts is set out below. It aims to minimise subjectivity as far as possible by using standard rating scales for the assessment and quantification of identified impacts.

The impact assessment methodology utilised for the project consists of two phases namely impact identification and impact significance rating. Impacts and risks have been identified based on a description of the activities to be undertaken. Once impacts have been identified, a numerical environmental significance rating process is undertaken that utilises the probability of an event occurring and the severity of the impact as factors to determine the significance of a particular environmental impact.

The severity of an impact is determined by taking the spatial extent, the duration and the severity of the impacts into consideration. The probability of an impact is then determined by the frequency at which the activity takes place or is likely to take place and by how often the type of impact in question has taken place in similar circumstances. The significance rating process follows the established impact/risk assessment formula:

$$\text{Significance} = \text{Consequence} \times \text{Probability}$$

where

$$\text{Consequence} = \text{Nature (Severity + Spatial Scale + Duration)}$$

and

$$\text{Probability} = \text{Likelihood of an impact occurring}$$

The nature of an impact is either negative or positive (+1 or -1) based on whether it is likely to result in a beneficial or detrimental impact. The matrix calculates the rating out of 147, whereby intensity, extent, duration and probability are each rated out of seven as indicated in **Table 13**.

Impacts are rated prior to mitigation and again after consideration of the mitigation has been applied; post-mitigation is referred to as the residual impact. The significance of an impact is determined and categorised into one of seven categories (The descriptions of the significance ratings are presented in **Table 14**). Descriptions of the various levels of the significance rating is provided in **Table 15**.

Table 13: Evaluation Criteria for Rating Impacts

Rating	Severity	Spatial scale	Duration	Probability
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or ecosystem. Persistent severe damage.	<u>International</u> The effect will occur cross international borders	<u>Permanent: No Mitigation</u> No mitigation measures of natural process will reduce the impact after implementation.	<u>Certain/ Definite.</u> The impact will occur regardless of the implementation of any preventative or corrective actions.
6	Significant impact on highly valued species, habitat or ecosystem.	<u>National</u> Will affect the entire country	<u>Permanent: Mitigation</u> Mitigation measures of natural process will reduce the impact.	<u>Almost certain/Highly probable</u> It is most likely that the impact will occur.
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate	<u>Province/ Region</u> Will affect the entire province or region	<u>Project Life</u> The impact will cease after the operational life span of the project.	<u>Likely</u> The impact may occur.
4	Serious medium-term environmental effects. Environmental damage can be reversed in less than a year	<u>Municipal Area</u> Will affect the whole municipal area	<u>Long term</u> 6-15 years	<u>Probable</u> Has occurred here or elsewhere and could therefore occur.
3	Moderate, short-term effects but not affecting ecosystem functions. Rehabilitation requires intervention of external specialists and can be done in less than a month.	<u>Local</u> Local extending only as far as the development site area	<u>Medium term</u> 1-5 years	<u>Unlikely</u> Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur.

Rating	Severity	Spatial scale	Duration	Probability
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants.	<u>Limited</u> Limited to the site and its immediate surroundings	<u>Short term</u> Less than 1 year	<u>Rare/ improbable</u> Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures
1	Limited damage to minimal area of low significance. Will have no impact on the environment.	<u>Very limited</u> Limited to specific isolated parts of the site.	<u>Immediate</u> Less than 1 month	<u>Highly unlikely/None</u> Expected never to happen.

Table 14: Significance ranking matrix

Significance										
Consequence= Nature (severity + scale + duration)										
		1	3	5	7	9	11	15	18	21
Probability / Likelihood	1	1	3	5	7	9	11	15	18	21
	2	2	6	10	14	18	22	30	36	42
	3	3	9	15	21	27	33	45	54	63
	4	4	12	20	28	36	44	60	72	84
	5	5	15	25	35	45	55	75	90	105
	6	6	18	30	42	54	66	90	108	126
	7	7	21	35	49	63	77	105	126	147
Significance										
High (Major)						108- 147				
Medium-High (Moderate)						73 – 107				
Medium-Low (Minor)						36 – 72				
Low (Negligible)						0 – 35				

Table 15: Description Significance Ratings

SIGNIFICANCE RATING	DESCRIPTION
Low (Negligible)	<p>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.</p> <p>Impacts on this particular issue will result in either positive or negative medium to short term effects on the social and/or natural environment.</p>
Medium-Low (Minor)	<p>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, cause restrictive approval of the proposed project. Impacts on this issue will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.</p>
Medium-High (Moderate)	<p>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.</p>
High (Major)	<p>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.</p>

Steps to determine the significance of an impact

S1. Determine whether the nature of the impact is negative (-1) or or positive (+1)

Using Table 13, determine the following by assigning a rating number:

S2. Severity of the Impact;

S3. Extent of the impact (spatial scale);

S4. The duration of the impact;

S5. Calculate the Consequence = Nature (Severity+ Spatial Scale+ Duration);

S6. Then determine the Probability;

S7. The significance of the impact will be determined using Table 14;

S8. Calculate the Significance = Consequence x Probability

10.2. IMPACT IDENTIFICATION

The table below details impacts that have been identified by the EAP as well as the appointed specialists.

Table 16: Potential impacts identified during all phases of the proposed Stone Crescent Stabilisation Works

ASPECT	IMPACT	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTION
			Planning	Construction	Operation	Decommissioning	
Policy and Legislative Context	Non-compliance	SANRAL/CONTRACTOR	X	X	X		Obtain permits and Authorization from relevant Competent Authorities
Land Ownership/Access	Stakeholder Engagement	SANRAL/CONTRACTOR	X	X			Ensure that landowner consent is obtained where required
Scheduling of Construction	Delays in Programme Scheduling during rainy season	Aquatic environments	X	X			Assessed in the Impact Assessment Section 10 and the Freshwater Impact Assessment
Slumped embankment and concrete walls	Drainage patterns change due	Aquatic environments		X			
Excavation	Excavated streambed and soil nailing	Aquatic environments		X			

ASPECT	IMPACT	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTION
			Planning	Construction	Operation	Decommissioning	
Clearing of Vegetation	Removal of embankment vegetation areas	Aquatic and Terrestrial environments		X			
Stabilisation	Cutting/reshaping of embankments	Aquatic environments		X			
Construction of retaining walls	Operation of equipment and machinery in watercourse	Aquatic environments		X			
Construction of retaining walls	Infilling/backfilling and building material stockpile management	Aquatic and Terrestrial Environments		X			
Construction of erosion protection/retaining walls	Waste management	Aquatic and Terrestrial environments		X			
Construction of erosion protection/retaining walls	Contamination due to improper storage of chemicals,	Aquatic and Terrestrial environments		X			

ASPECT	IMPACT	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTION
			Planning	Construction	Operation	Decommissioning	
	construction materials, fuel and machinery leaks						
Landscaping and Rehabilitation	Final landscaping and post-construction rehabilitation	Terrestrial environment		X			
Stabilisation and vegetation establishment	Altered surface drainage and runoff	Aquatic and Terrestrial environments			X		
Stormwater runoff	Storm water management	Aquatic and Terrestrial environments			X		
Biodiversity Impacts	Establishment of alien plants on disturbed areas	Terrestrial environment			X		
Post Construction monitoring	Conducting maintenance	Terrestrial environment			X		
Damage of site vegetation by equipment for site	Loss of Biodiversity	Terrestrial environment		X	X		Assessed in the Impact Assessment

ASPECT	IMPACT	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTION
			Planning	Construction	Operation	Decommissioning	
preparation and during construction							Section 10 and the Botanical Impact Assessment
Damage to topsoil by excavation activities	Loss of Habitat	Terrestrial environment		X	X		
Construction activities	Alteration and loss of ecological processes including ecosystem services	Aquatic and Terrestrial environments		X	X		
Construction of erosion protection/retaining walls	Ecosystem services impairment	Aquatic and Terrestrial environments		X	X		
Post-Construction	Impacts after mitigation	Aquatic and Terrestrial environments		X	X		
Ongoing grazing/farming activity	Cumulative Impacts	Aquatic and Terrestrial environments		X	X		
Heritage and Archaeological Environment	Potential damage to heritage structures	Landscape		X			Assessed in Section 10 of this report

ASPECT	IMPACT	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTION
			Planning	Construction	Operation	Decommissioning	
Palaeontological Environment	Potential damage to fossils	Underground excavations		X			
Air Quality	Dust	Animal species and adjacent land owners/occupants		X			
Land Use	Disturbance of existing land uses	Adjacent land owners/occupants		X			
Noise Impact	Disturbance of animal species	Animal species and adjacent land owners/occupants		X			
Socio-Economic	Job Creation	Individuals and businesses in Makana	X	X	X		
Climate Change	Water Availability	Individuals and businesses in Makana	X	X			
Visual	Landscape disturbances	adjacent land owners/occupants		X			
Traffic	Delays during construction Improved road stability and safety	Road users		X	X		

ASPECT	IMPACT	POTENTIAL RECEPTORS	PHASE				ASSESSMENT ACTION
			Planning	Construction	Operation	Decommissioning	
Health and Safety	Injuries and fatalities during construction	Construction workers		X	X		

10.3. SUMMARY OF SPECIALST FINDINGS

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

Appendix	Specialist Study
D1	Freshwater Impact and Risk Assessment
D2	Botanical Impact Assessment
D3	Palaeontology Desktop Assessment

10.3.1 FRESHWATER IMPACT ASSESSMENT

10.3.1.1 DESKTOP ASSESSMENT RESULTS

The hydrological setting of the project area is within the Mzimvubu - Tsitsikamma Water Management Area (WMA 7) and the Southern Folded Mountains – Upper Aquatic Ecoregion. At a more localised scale the project area is located within the P30A quaternary catchment, along a tributary of the P30A – 08534 Sub Quaternary Reach (SQR) which forms a reach of the Palmiet River. The tributary has been identified as the Berg River. The sampling points for the study were selected to adequately assess the current state of all watercourses within the 500 m regulated area of Stone Crescent Stabilisation Works, to identify all potential risks that may result from the bank stabilisation works. This was done to gain a holistic image of the system as well as which habitat may be affected. To achieve this, sites were selected along the Berg River which include Site 2 as an upstream site and Site 6 as a downstream site, as well as sites along the relevant drainage lines which flow into the tributaries - which includes Site 1, Site 3, Site 4, Site 5 and Site 7 (**Figure 22**). The upstream and downstream sites were surveyed for the aquatic ecology status of the Berg River.

According to Nel et al. (2011), the project area falls within the 8534 Quaternary catchment. The 8534 quaternary catchment contains four freshwater priority areas as it is considered a River FEPA as well as a Fish Sanctuary. The Palmiet River flows into the Kariega River which forms a Phase 2 FEPA at the coast. The ephemeral rivers which form part of the Southern Folded Mountains - Mountain streams and Upper foothill geomorphological zones within the catchment are considered as FEPAs and should therefore be conserved. The Berg River does not form one of these systems as it is perennial in nature. The considered catchment is a Fish Sanctuary for *Enteromius anoplus* and *Enteromius pallidus* and therefore consideration should be given to prevent deterioration of the system (Nel et al, 2011).

Desktop information for SQR's was obtained from DWS (2021). The Berg River forms a tributary of the P30A - 08534 SQR. The P30A - 08534 SQR forms a 10.40 km reach which constitutes the entire Palmiet River from its source in the north to its confluence with the Kariega River in the south. The Present Ecological State (PES) category of the reach is classed as moderately modified (class C). The moderately modified state of the reach

was due to moderate impacts to instream habitat, wetland and riparian zone modification and continuity, flow modifications, and moderate impacts on physico-chemical conditions (water quality) and potential instream habitat modifications.

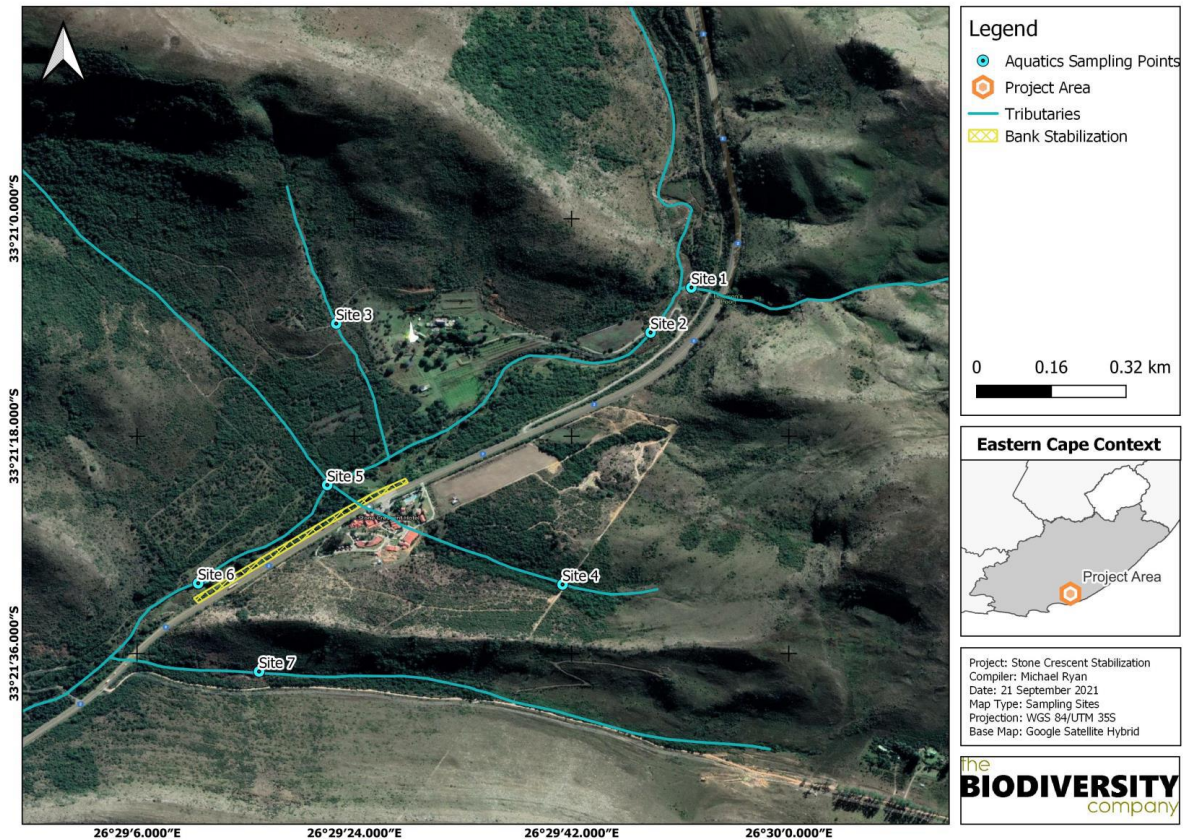


Figure 22: Sampling sites within 500m regulated area of the project

A total of five fish species were expected to occur in the Palmiet River which are presented in **Table 17**. The Palmiet River reach does however have wide diversity of habitat and therefore the full range of fish species are expected within the river. The associated tributaries are smaller in scale with a lower diversity of flow conditions and thus less diversity of habitat to support less diversity of fish species than the Palmiet River. The distance from the coast makes the presence of *Glossogobius callidus* unlikely within the Berg River. All fish species expected within the project area are of least concern according to the IUCN red list (2021).

Table 17: Expected fish species

Scientific name	Abbreviation	Common name	IUCN Status (IUCN, 2021)
<i>Anguilla bengalensis ssp. labiata</i>	ALAB	Indian Mottled Eel	LC
<i>Anguilla mossambica</i>	AMOS	African Longfin Eel	LC

<i>Enteromius anoplus</i>	BANO	Cubbyhead Barb	LC
<i>Enteromius pallidus</i>	BPAL	Goldie Barb	LC
<i>Glossogobius callidus</i>	GCAL	River Goby	LC
Total Species Count			5

*IUCN: International Union for the Conservation of Nature

LC: Least Concern

According to the SAIIE, the Ecosystem Threat Status (ETS) of aquatic ecosystem types is based on the extent to which each aquatic ecosystem type had been altered from its natural condition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Concern (LC), with CR, EN and VU ecosystem types collectively referred to as ‘threatened’ (Van Deventer et al., 2019; Skowno et al., 2019). According to the SAIIE and NFEPA datasets, no wetlands were identified within 500 m regulated area. Owing to this fact no further ecological assessment of the wetland has been completed for this project, with emphasis rather afforded to the aquatic assessment of the Berg River potentially at risk as a result of the proposed project. **Figure 23** shows that CV and EN wetlands can be found outside the project area and associated 500m regulated area.

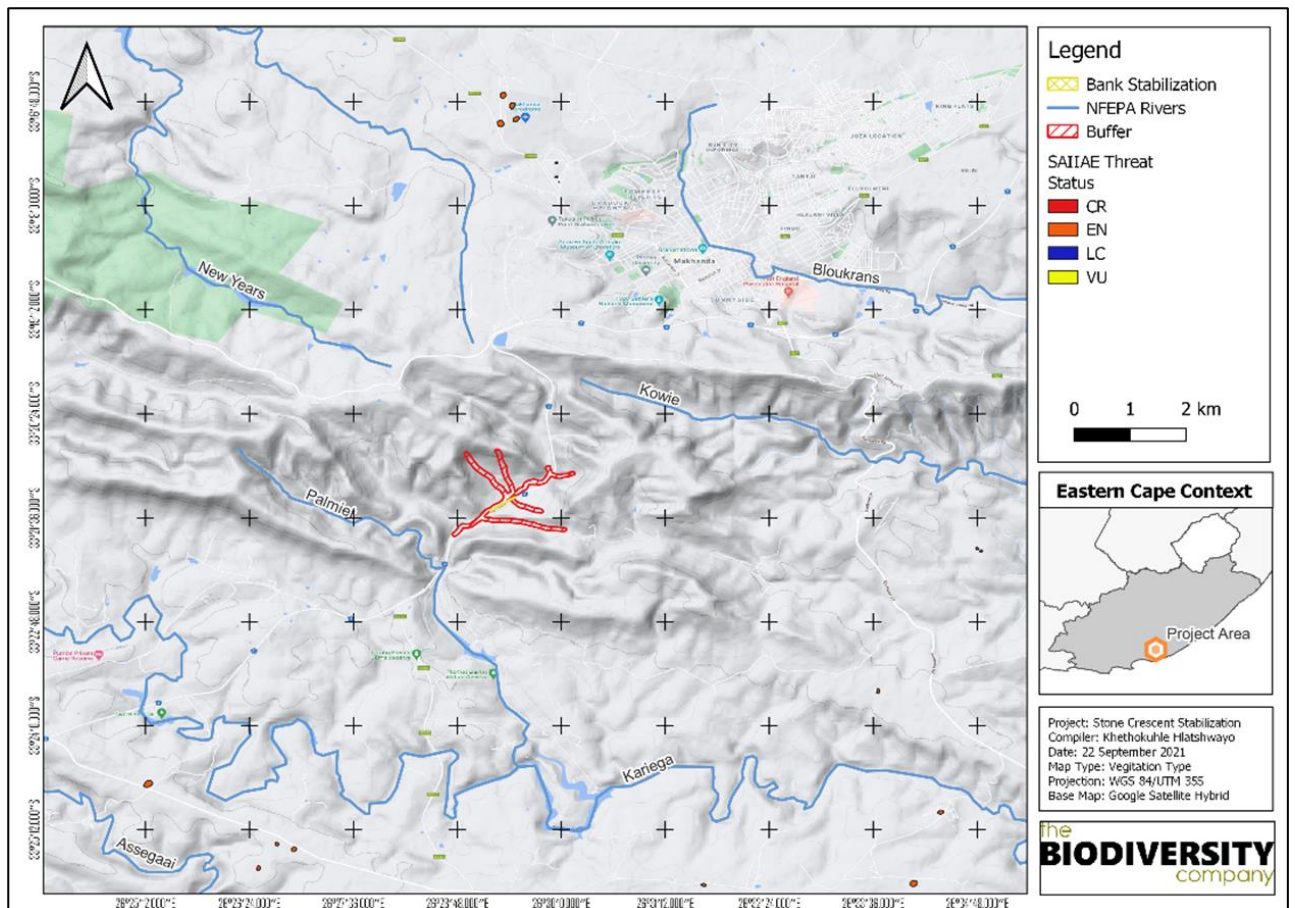


Figure 23: Map illustrating SAIIE wetland Ecosystem Threat Status within the project area

10.3.1.2 FIELD ASSESSMENT RESULTS

In situ water quality for the Berg River indicated natural conditions. The dissolved oxygen and water temperature were within the TWQR for aquatic life. The pH at Site 1 (pH 6.00) fell below the TWQR, and this can be attributed to low water levels and reduced dilution capacity (no rainfall) as expected of low flow seasons within the sampled reach. The pH levels for the rest of the sites accessed fell within the TWQR for aquatic biota. Despite no allocated TWQR for dissolved solid concentrations [measured in Conductivity ($\mu\text{S}/\text{cm}$)] by the department, it is the specialist opinion that measured values within the project area would not negatively affect the local aquatic biota. Therefore, the water quality within the assessed reach was considered not limiting factor to local aquatic biota.

The results of both instream and riparian habitat assessment in the associated with proposed project indicated moderate modification (class C) within the 5 km downstream and upstream of the project area, indicating a loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged. The largest contributing factors to the moderately modified state were attributed to, exotic vegetation encroachment within the catchment, bank erosion, bed and channel modification.

The riparian area of the Berg River is represented in Figure 6-4, indicating the well-established vegetation on both banks. The riparian areas consist of a poor diversity of vegetation which are dominated by graminoids species along with the marginal and wetland sedges. The northern banks are more established with larger vegetation types which include ferns, shrub species such as *Helichrysum panduratum* and *Helichrysum kraussii*. These areas are also composed of alien invasive plant species which include shrubs such as *Rubus fruticosus* and tree species such as *Eucalyptus sp.* and *Solanum mauritianum*.



Figure 24: Depiction of the overall composition of the riparian area at Site 2 (left) and Site 6 (right)

Largely modified to poor instream habitat diversity and subsequent availability was observed in the Berg River at Site 2 (upstream) and Site 6 (downstream), respectively. The largely modified instream habitat at Site 2 was due to the limited diversity and presence of stones out of current, limited aquatic vegetation and mud substrate. The poor habitat abundance and availability at Site 6 was attributed to limited stones, and vegetation in current and aquatic vegetation within the sampled Berg River reach. The largely modified to poor habitat diversity within the reach would be a limiting factor for the macroinvertebrate communities, particularly at Site 6 compared to Site 2.

The SASS5 assessment results generated SASS5 scores that are categorised as a class B (Dallas, 2007) which indicates largely natural conditions at Site 2 upstream and moderately modified at Site 6 downstream within the assessed Berg River reach associated with the proposed project. The average score per taxon (ASPT) indicated that not only the intolerant macroinvertebrate species were collected but also the tolerant species such as Oligochaeta (Earthworms), Chironomidae (Midges), Culicidae (Mosquitoes) were collected during this survey. Moderately intolerant macroinvertebrate species such as Leptophlebiidae (Prongills), Philopotamidae (Caddisflies), and three species of Baetidae (Mayflies). This was in line with the biotope assessment, with the poor habitat abundance and availability at Site 6 would be a limiting factor compared to Site 2.

The sampled fish results indicated that 20% of the expected fish species were recorded during the survey as only *Enteromius anoplus* were sampled within the Berg River. The low diversity of fish within the Berg River is

suspected to result from the source nature of the system with small fast flowing channels. This compounded with dams along the Palmet River would hinder migration of many species into the reach.

10.3.1.3 IMPACT IDENTIFICATION AND ASSESSMENT

Four (4) moderate risks were defined in the risk assessment. The construction phase is anticipated to have the most significant impacts. During the construction phase drainage patterns change are anticipated to change due to embankment excavation and soil nailing and removal of embankment vegetation areas causing erosion and sedimentation downstream of the river. During the active workings it is anticipated that the instream sedimentation will result in altered instream flow paths and sediment movement, limiting the instream habitat for aquatic biota. These alterations will have a direct impact to local riverine conditions and associated biota if not managed effectively.

Following the completion of the construction phase, changes to flow patterns, alteration of surface drainage and runoff are anticipated. Anticipating the constructed walls (by concrete walls or reno mattresses) to collapse during flood events, routine maintenance of the structures will be required. Maintenance should be adaptive based on the efficacy of the structures for the life of the structures. Overall, it is determined that the moderate impacts could be mitigated via appropriate embankment stabilisation design which will limit the impacts caused by the construction phase.

The following freshwater impacts were identified:

Table 18: Freshwater Impacts identified

IMPACT	IMPACT RATINGS	
	PRE-MITIGATION	POST-MITIGATION
CONSTRUCTION PHASE		
Drainage patterns change due to slumped embankment and concrete walls	Moderate Negative	Low Negative
Excavated streambed and soil nailing	Moderate* Negative	Low Negative
Removal of embankment vegetation areas	Moderate* Negative	Low Negative
Cutting/reshaping of embankments	Low Negative	Low Negative

IMPACT	IMPACT RATINGS	
	PRE-MITIGATION	POST-MITIGATION
Operation of equipment and machinery in watercourse	Low Negative	Low Negative
Infilling/backfilling and building material stockpile management	Low Negative	Low Negative
Waste management	Low Negative	Low Negative
Contamination due to improper storage of chemicals, construction materials, fuel and machinery leaks	Low Negative	Low Negative
Final landscaping and post-construction rehabilitation	Low Negative	Low Negative
OPERATIONAL PHASE		
Altered surface drainage and runoff	Moderate Negative	Low
Storm water management	Low Negative	Low
Establishment of alien plants on disturbed areas	Low Negative	Low
Conducting maintenance	Low	Low

(*) denotes - In accordance with General Notice 509 "Risk is determined after considering all listed control / mitigation measures. Borderline Low / Moderate risk scores can be manually adapted downwards up to a maximum of 25 points (from a score of 80) subject to listing of additional mitigation measures detailed below."

10.3.1.4 CONCLUSIONS AND RECOMMENDATIONS

GENERAL MITIGATION

- The prescribed buffer zone of 32 m from the riparian or 1:100 year floodline edge must be kept clear of all non-essential project aspects such as site offices, laydown yards and stockpiles;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping";

- The contractors used for the construction should have spill kits available prior to construction to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly;
- Action plans must be present on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems;
- The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access;
- Prevent uncontrolled access of vehicles through the watercourses that can cause a significant adverse impact on the hydrology and soil structure of these areas;
- During construction activities, all rubble generated must be removed from the site and not dumped in the active water channel;
- Contamination of the watercourse with unset cement or cement powder should be negated as it is detrimental to aquatic biota. It is preferable that on-site mixing is avoided and that prefabricated materials be prioritised (where feasible);
- Erosion and sedimentation into the channel must be minimised and the re-vegetation of any disturbed banks;
- All removed materials must not be stockpiled within the system. Stockpiling should take place outside of the watercourse;
- All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- Any exposed earth should be rehabilitated promptly by planting suitable (endemic) vegetation (vigorous indigenous grasses) to protect the exposed soil;
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; and
- Adequate sanitary facilities and ablutions must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation).

BANK STABILISATION MITIGATION MEASURES

- This report provides the correct mitigation measures to limit the anticipated impacts for the proposed activities. It is imperative that these mitigation measures are correctly implemented and not altered. Some important mitigations are as follows:

- Each extended wall (wall 1 and wall 2) must sufficient depth to avoid failing of the structure during daily expected scouring and during flood events;
- Each scour protection structure (gabions and reno-mattresses) should be deeply imbedded within the embankment to a sufficient depth to avoid failing of the structure (notably the end points of the structures) during rainfall and flood events;
- The footprint area of the bank stabilisation (slumping of embankments, installation of reno mattresses, reinforced concrete wall constructions or gabion structures) must be kept to a minimum. The designated area should be demarcated to avoid unnecessary disturbances and encroachment into adjacent areas; and
- Encourage indigenous vegetation growth within the disturbed area to assist in bank stability and minimise erosion.

RECOMMENDATIONS

- The following recommendations are proposed for the bank stabilisation and responsibly managing for biodiversity:
- During final landscaping of the bank stabilisation, an alien vegetation control and eradication plan must be compiled and implemented;
- A recommended buffer zone of 32 m surrounding the river should be strictly adhered to during the construction phase of the project. However, it is noted that the proposed activities are within the buffer zone surrounding the watercourse. Any supporting aspects and activities not required to be within the buffer area should adhere to the buffer zone;
- No trapping, killing, or poisoning of any wildlife is to be allowed;
- The drilling holes and trenches created during the construction phase must not entrap local wildlife when left unattended (overnight);
- Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals;
- Waste management must be a priority and all waste (includes building material) must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to minimize waste ending up in the local environment and infestation of pests on site;
- The duration of the construction phase should be kept to a minimum, to reduce the period of disturbance on fauna; and

- Dust-suppression mitigation must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated to avoid impacts to local vegetation and sensitive instream habitat (cobbles, gravel which serves as fish spawning beds);
- Disturbed instream and riparian habitat must be returned to preconstruction condition;
- Ultimately, it is critical that a qualified Environmental Control Officer (ECO) be on site at all times, to oversee the project activities and ensure strict environmental practices and compliance is carried out to minimise environmental degradation; and
- A post construction aquatic and riparian monitoring inspection must be done to assess the impact of the project, and implement appropriate mitigation and rehabilitation in key areas.
- The bank stabilisation is along or adjacent to the road (a two-way road). Therefore, some of the SANRAL (South African National Roads Agency Limited) road guidelines for construction of road embankments should be considered as follows:
 - It is possible that failure may occur due to a slope being steeper than was allowed for in the design and if the slopes are not trimmed to the correct lines and dimensions. Therefore, protection against erosion and ease of maintenance, slopes no steeper than 1:2 are preferable;
 - For gabions (as per Stone Crescent Bank Stabilisation project description) should be filled with clean, not easily weathered, hard and rocks larger than the gabion mesh size, and to pack the cage to the maximum volume;
 - To restore natural ground-surface after the clearance of embankment vegetation (roots/stumps), all resultant cavities should be carefully filled and compacted to the same density as the surrounding surface ground;
 - In the event of a steep slope without topsoil, hydroseeding is recommended for slope protection, where cutting of chases in the slope surface to prevent the seed from being washed down the slope during rain. Chases also act as water traps which encourage the establishment of the grass;
 - Immediate monitoring of post-construction of the embankment is recommended to ensure the behaviour is as anticipated and to control the work programme and take corrective actions when required;
 - The scheduled monitoring can be stopped, presumably after two years (two rainy seasons), provided the new established embankment is performing successfully as designed.

10.3.2 BOTANICAL IMPACT ASSESSMENT

10.3.2.1 DESKTOP ASSESSMENT RESULTS

The Makana Local Municipality covers an area of approximately 437 561 hectares and includes 12 vegetation types of which one is endangered. It is estimated that 5.71% of the municipal land area has been transformed and 3.8% of the remaining 94.29% natural habitat is formally conserved.

In the Vegetation Map of South Africa, Lesotho and Swaziland (Mucina & Rutherford 2006 & updated e-versions), the natural vegetation on the site **Figure 9** is mapped as Suurberg Shale Fynbos (FFh10). It is characterised as a low to medium high, closed, ericoid and proteoid shrubland or grassland, with closed restioid and or grass understorey, occurring on low mountains or hills in acidic, moist clay-loam soils in the Eastern Cape Province. Suurberg Shale Fynbos is found from the Klein Winterberg at Baroe in the west, Suurberg, and highly fragmented distributions around Riebeek East and Makhanda at altitudes between 400 and 900 m (Rebelo et al. 2006).

The important taxa within the vegetation type include tall shrubs of: *Aspalathus setacea*, *Metalasia densa*, *Montinia caryophyllacea*, *Phylica paniculata*, *Protea lorifolia*, *Rhus lucida*. And the low shrubs of: *Selago corymbosa*, *Agathosma ovata*, *Diospyros dichrophylla*, *Elytropappus rhinocerotis*, *Erica thamnoides*, *Felicia filifolia* subsp. *filifolia*, *Leucadendron salignum*, *Leucospermum cuneiforme*, *Metalasia pungens*, *Protea cynaroides*, *P. foliosa*. Succulent as well as *Cotyledon orbiculata* var. *oblonga*. Geophytic The herb species include: *Bobartia orientalis* subsp. *Orientalis* and *Oxalis punctata* while the graminoids species include: *Themeda triandra*, *Diheteropogon filifolius*, *Ehrharta ramosa* subsp. *ramosa*, *Harpochloa falx*, *Hypodiscus striatus*, *Restio triticeus*, *Tetraria cuspidata*, *T. exilis* and *Tristachya leucothrix* (Mucina & Rutherford., 2006) (TBC, 2021).

The conservation status of vegetation type and terrestrial ecosystem are rated as least threatened with 46 % conserved (Mucina & Rutherford., 2006).

In the 2019 Eastern Cape Biodiversity Conservation Plan the study site falls within an Ecological Support Area (ESA1) (**Figure 10**). ESA's are considered important in order to support the functioning of a Critical Biodiversity Area (CBA). CBA's are defined as features critical for the conservation of biodiversity and maintenance of ecosystem functioning and must be maintained in a natural state as far as possible. More specifically to the site, ESA 1 refers to an ecosystem which is not essential for meeting biodiversity targets, but that plays an important role in supporting the functioning of Protected Areas or CBAs, and are often vital for delivering ecosystem services.

10.3.2.2 FIELD ASSESSMENT RESULTS

The assessment area measures approximately 8 000 m² in size and includes a terrestrial and aquatic ecosystem within an open space agricultural landscape, adjacent to a motorway. It is divided by a wire fence along its length into a western and eastern portion. At about a third from its northern edge another wire fence which runs perpendicular to the first one, separating the two adjacent farms from each other. The western portion is low lying farmland with scattered rocks in places that includes the aquatic ecosystem (Berg River). Towards the

northern end the river is controlled by numerous water channels. The eastern portion of the site is a steep road embankment that is separated from the motorway by a steel barrier. Storm water channels that run from the road verge towards the river as well as a retaining wall are also present on the site. In the north and south the site is connected to vacant farmland.

Past and ongoing disturbances such as grazing (**Figure 25**), alien tree infestations and road construction have transformed the natural vegetation, Suurberg Shale Fynbos, into its current unrecognizable condition. Most of the site, approximately 99 % is covered in vegetation while litter in the form of dead trees, old car tyres and plastic containers are present at some place adjacent to the motorway.

The underlying natural vegetation that is mapped as Suurberg Shale Fynbos is no longer evident on the site. Typical fynbos elements from the families Proteaceae, Ericaceae and Restionaceae are absent. Instead, they and many associated fynbos species were replaced by a plant cover that is dominated by indigenous and alien woody elements with a grass understorey of annual and perennial species. Perhaps the vegetation can best be described as degraded Makhanda Grassland Thicket.

Overall, the terrestrial ecosystem plant diversity presents as two distinct communities that correlates with the underlying habitat and disturbance regime. The first is found on the flat farmland area west of the fence, inside the farm boundary, and it is subjected to ongoing grazing and varying seasonal water levels. Here the plant composition is dominated by graminoids of which *Cynodon dactylon* (quick grass) is common in drier areas while the rush, *Juncus* sp. and the sedge, *Cyperus* sp. occupy the aquatic (river) ecosystem. A large population of *Cliffortia linearifolia* and the fern *Pteridium aquilinum* are associated with the aquatic ecosystem. Indigenous trees and shrubs such as *Vachellia karroo*, *Diospyros dichrophylla*, *Gymnosporia buxifolia*, *Zanthoxylum capense*, *Carissa bispinosa*, *Helichrysum* sp. and *Pelargonium graveolens* are scattered amongst the grass. Entangles on some of these woody elements are climbers that include *Senecio deltoides*, *Cynanchum obtusifolium* and *Rhoicissus tridentata*.



Figure 25: Impact of grazing on the vegetation

The second plant community is located east of the farm fence on the steep embankment between it and the N2 road verge. This community of mature trees and shrubs with a grassy understorey and lawn might have settled here after the road construction and though it is not subjected to ongoing grazing pressures, grass cutting does occur on the area closest to the road verge. From about the middle of this area towards the northern edge the tree component becomes denser and more species rich. Some of the trees and shrubs found here include *Pittosporum viridiflorum*, *Erythrina caffra*, *Brachylaena elliptica*, *Hippobromus pauciflorus*, *Plumbago auriculata*, *Searsia chirindensis*, *Hermannia velutina*, *Asparagus racemosus*, *Osteospermum moniliferum*, *Tecomaria capensis* and *Cussonia spicata*. Herbaceous species such as *Leonotis leonurus*, *Diets iriodioides*, *Sansevieria sp.*, *Crassula multicava* and *Isoglossa ciliata* are only found in this portion of the site.

Throughout the site alien invasive and garden plants such as *Acacia longifolia*, *Lantana camara*, *Ricinus communis*, *Solanum mauritanum*, *Jacaranda mimosifolia*, *Schinus mole*, *Bidens pilosa*, *Rubus rigidus*, *Optunia ficus-indica* and *Melia azedarach* are well established on the site. Sampled plants are listed in

Table 19: List of sampled plant species

SPECIES NAME	
<i>Acacia longifolia</i> *	<i>Opuntia ficus-indica</i>
<i>A. mearnsii</i> *	<i>Osteospermum moniliferum</i>
<i>Aizoon rigidum</i>	<i>Pavonia praemorsa</i>
<i>Asparagus racemosus</i>	<i>Pelargonium graveolens</i>
<i>Bidens pilosa</i> *	<i>Pelargonium sp.</i>
<i>Brachylaena elliptica</i>	<i>Pennisetum clandestinum</i> *
<i>Carissa bispinosa</i>	<i>Pittosporum viridiflorum</i>
<i>Cliffortia linearifolia</i>	<i>Plumbago auriculata</i>
<i>Coddia rudis</i>	<i>Pteridium aquilinum</i>
<i>Crassula multicava</i>	<i>Rhoisicissus tridentata</i>
<i>Cussonia spicata</i>	<i>Ricinus communis</i> *
<i>Cynanchum obtusifolium</i>	<i>Rubus rigidus</i> *
<i>Cynodon dactylon</i>	<i>Sansevieria sp.</i>
<i>Cyperus sp.</i>	<i>Schinus mole</i> *
<i>Dietes iridioides</i>	<i>Searsia chirindensis</i>
<i>Diospyros dichrophylla</i>	<i>Searsia guenzii</i>
<i>Erythrina caffra</i>	<i>Searsia lucida</i>
<i>Eucalyptus sp.</i> *	<i>Senecio deltoides</i>
<i>Grewia occidentalis</i>	<i>Senecio pterophorus</i>
<i>Gymnosporia buxifolia</i>	<i>Senecio sp.</i>
<i>Halleria lucida</i>	<i>Senna sp. (*)</i>
<i>Haplocarpa lyrata</i>	<i>Solanum linnaeanum</i>
<i>Helichrysum sp.</i>	<i>Solanum mauritianum</i> *
<i>Hermannia velutina</i>	<i>Stenotaphrum secundatum</i>
<i>Hippobromus pauciflorus</i>	<i>Tecomaria capensis</i>
<i>Isoglossa ciliata</i>	<i>Tradescantia zebrina</i> *
<i>Jacaranda mimosifolia</i> *	<i>Vachellia karroo</i>
<i>Juncus sp.</i>	<i>Zanthoxylum capense</i>
<i>Lantana camara</i> *	<i>Ziziphus mucronate</i>
<i>Leonotis leonurus</i>	
<i>Melia azedarach</i> *	
<i>Microglossa mespilifolia</i>	

*= naturalised exotics/cultivated species /garden escape

10.3.2.3 IMPACT IDENTIFICATION AND ASSESSMENT

The terrestrial ecosystem, Suurberg Shale Fynbos, is not of conservation concern however the site falls within a biodiversity priority area (ESA1) in the Eastern Cape Province and consequently the integrity of its supporting function has to be maintained.

Pristine Suurberg Shale Fynbos vegetation as evident on some the surrounding hills, no longer exists on this site because it has been transformed by past physical and biological disturbances into a plant cover that lacks fynbos indicator species but with a significant alien species diversity. The indigenous species that are growing on site are widespread in the surrounding areas and none of them are species of conservation concern. However, the intended activity could result in the loss of or damage to mature indigenous trees and the temporary alteration of ecological process. Based on the abovementioned factors the conservation value of the vegetation on the site is rated as low-medium (**Figure 20**).

From a botanical perspective, the medium condition of site makes it suitable for the intended development, but the final design plan and subsequent construction will have to safeguard the aquatic ecosystem and also implement stormwater control measures.

The following major biodiversity related impact groupings applies to the proposed development.

Table 20: Biodiversity Impacts identified

IMPACT	IMPACT RATINGS	
	PRE-MITIGATION	POST-MITIGATION
CONSTRUCTION & OPERATIONAL PHASE		
Biodiversity impairment – damage of site vegetation by equipment for site preparation and during construction	Low Negative	Low Negative
Habitat impairment – damage to top soil by excavation activities	Low Negative	Low Negative
Alteration and loss of ecological processes – associate with the development	Low Negative	Low Negative
Ecosystem services impairment – related to regulating, cultural and supporting services	Low Negative	Low Negative

IMPACT	IMPACT RATINGS	
	PRE-MITIGATION	POST-MITIGATION
CONSTRUCTION & OPERATIONAL PHASE		
Residual affects - after mitigation has been applied	Low Negative	Low Negative
Cumulative impairment loss – full estimated development impact	Low Negative	Low Negative

10.3.2.4 CONCLUSIONS AND RECOMMENDATIONS

The following considerations should be included in the design and construction of the embankment stabilisation:

- Restrict the development to the existing footprint
- Safeguard the aquatic ecosystem from pollution and physical damage
- Minimise or avoid the loss of mature indigenous trees and shrubs
- Remove all alien and dead trees, and solid waste material (plastic containers, car tyres, etc.) from the site
- Use environmentally friendly building material where possible
- Use existing roads for the transport of material and machinery
- Where possible prepare construction structures off site
- Implement erosion control measures pre and post construction
- Ensure that all surplus building material is removed from the site after construction

The following site specific mitigation measures should be implemented:

- The working areas must be clearly demarcated and no activities must be beyond the approved layouts;
- No protected plants may be removed or harvested without the appropriate permits in place’;
- A suitably qualified environmental officer must be in site to implement recommendations and mitigation measures contained in the specialist reports. The EO will be responsible for relocation of fauna/flora that is found during construction (this includes all species of flora and fauna);
- All personnel and contractors must undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of Red / Orange List species,

their identification, conservation status and importance, biology, habitat requirements and management requirements the Environmental Authorisation and within the EMPr;

- If any faunal species are recorded during construction, activities should temporarily cease, and an appropriate specialist should be consulted to identify the correct course of action. This is applicable to all species, even smaller species such as rodents, reptiles and amphibians;
- Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited;
- No trapping, killing or poisoning of any wildlife is to be allowed on site, including snakes, birds, lizards, frogs, insects or mammals;
- Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals;
- Speed limits must still be enforced to ensure that road killings and erosion is limited;
- All laydown, storage areas etc should be restricted to within the project area;
- Waste management must be a priority and all waste must be collected and stored effectively.

10.3.3 PALAEOLOGY DESKTOP ASSESSMENT

10.3.2.1 DESKTOP ASSESSMENT RESULTS

In compliance with the National Heritage Resources Act (No 25 of 1999, section 38) (NHRA), this PDA is necessary to confirm if fossil material could potentially be present in the planned development area and to evaluate the potential impact of the proposed development on the Palaeontological Heritage.

The proposed development is underlain by the Weltevrede Supergroup (**Dw** - green, **Figure 26**) (Witteberg Group of the Cape Supergroup). The Cape Supergroup represents about 170 million years of earth history [Early Ordovician (~500 Ma) to the Early Carboniferous (~330 Ma)]. The sediments of the Cape Supergroup were deposited along the northern edge of the semi-enclosed Agulhas Sea. The latter opened in reaction to early rifting between Africa, South America, and Antarctica. Today, this Supergroup forms the southern mountain ranges of the Western and Eastern Provinces. The Cape Supergroup is subdivided into the Table Mountain Group (lowermost and oldest group), the Bokkeveld Group (in the middle) and the Witteberg Group (uppermost and youngest). The Msikaba Formation also forms part of the Cape Supergroup but is located north of Port St Johns. Of these 3 groups only the Witteberg Groups outcrops in the area (Thamm and Johnson, 2006).

The Witteberg Group comprise of the (lower) Weltevrede Subgroup and the (upper) Lake Menz Subgroup. Strata of the Weltevrede Subgroup are exposed at the proposed development site along the N2. The Lake Menz Subgroup consists of Witpoort-, Kweekvlei-, Floriskraal and Waaipoot Formations while the Weltevrede Subgroup comprises of three subunits namely the Swartruggens, Blinkberg and Wagendrift Formations. The Witteberg Group was terminated by a gap in the geological record (an unconformity) of approximately 30 million

years, massive diamictites of the Dwyka Formation overlies this unconformity, suggesting the end of the ice age. This corresponds with palaeomagnetic interpretations which suggests that, at the time of deposition the Witteberg Group (now South Africa), was within the Antarctic Circle. The Witteberg Group comprises of sandstone and mudrock deposited in deltaic, shallow marine and paralic environments

The thickness of the Witteberg Group decreases from approximately 1700 m in the east to 1200 in the southwestern portion of the basin becoming thinner northwards along the western margin. In the Eastern Cape, the Weltevrede Subgroup is not as thick as in the west and is mostly exposed along the coastal plain, making it difficult to map as it is deeply weathered. The Weltevrede Subgroup is characterised by shallow marine sandstone and mudrocks. In the west, the lowermost basal Wagen Drift Formation (Weltevrede Subgroup) comprises of bioturbated siltstone and shale as well as thin interbedded quartzitic sandstones. Marine invertebrates (including brachiopods, molluscs, and trilobites), trace fossils of *Zoophycos*, *Skolithos* and *Spirophyton* and plant fragments, comprising of psilophyte and lycopod stems are present (Boucot *et al.*, 1983; Looek and Visser, 1985; Theron and Thamm, 1990).

The superimposing Blinkberg Formation, that becomes the Blinkberg Member of the Weltevrede Formation east of 21°45'E, contains various prominent, white quartz arenites divided by subordinate siltstones. Fossil Heritage present in this Formation is Lycopod stems and trace fossils. The Swartruggens Formation covers the Weltevrede Subgroup and is distinguished by interbedded thin silty/sandy mudrock and sandstone layers, rhythmites and mostly two or more thick quartzitic sandstone units. Trace fossils (as well as *Zoophycos*) are common (De Beer, 1990). The Weltevrede Subgroup/Formation grades upwards into the quartzitic sandstones and minor mudrocks of the Witpoort Formation.

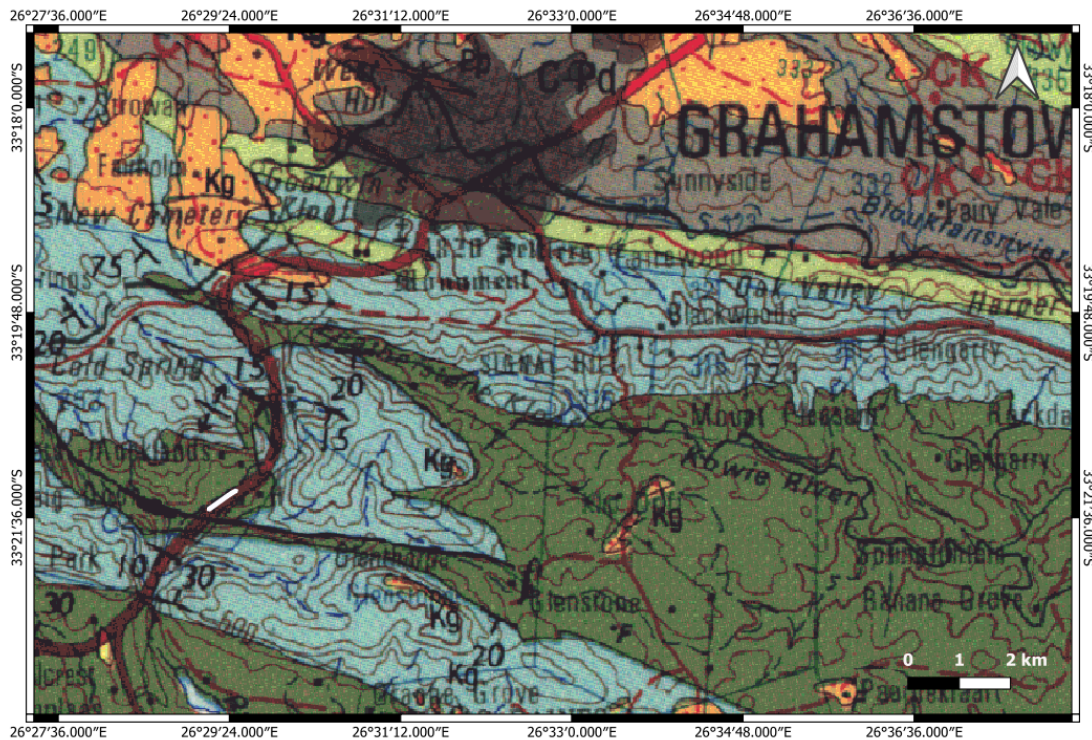


Figure 26: Extract of the 1:250 000 3326 Makhanda Geological Map (1976) (Council of Geoscience, Pretoria) indicating the geology of the proposed SANRAL Stone Crescent Embankment Stabilisation Works along the National Route N2 near Makhanda in the Eastern Cape. Development is indicated in white.

Table 21: Legend of the 1:250 000 3326 Makhanda Geological Map (1976) (Council of Geoscience, Pretoria)

CAPE SUPERGROUP SUPERGROEP KAAP	WITTEBERG	KOMMADAGGA	Dirkskraal (Cd)	Sandstone / Sandsteen	
		LAKE MENTZ		Shale, quartzite, sandstone, diamictite	
		MENTZMEER (Ci)	Witpoort	Skalie, kwartsiet, sandsteen, diamiktiet	
	BOKKEVELD	Weltevrede	Quartzite Kwartsiet		
TABLE MOUNTAIN TAFELBERG			Shale, quartzite Skalie, kwartsiet		
				Quartzite Kwartsiet	O/S

Various trace fossil assemblages are found in the lower Table Mountain Group, while invertebrate fossils are found in the shales of the Table Mountain and Bokkeveld Groups. Fish and plant fossils are present in the Witteberg Group. In the Cederberg Formation (Soom Member) fossil assemblage of arthropod, brachiopod, chitinozoan, nautiloid, and, most importantly conodont fauna (Aldridge et al., 1994; Gabbott et al., 1995) have been recovered. The Bokkeveld Group is known for the well-documented Malvinokaffric faunas (Reed, 1925; Hiller and Theron, 1988).

10.3.2.2 IMPACT IDENTIFICATION AND ASSESSMENT

The extent of the impact of the development is localised therefore only the site will be affected. The expected duration of the impact is assessed as potentially permanent to long term. In the absence of mitigation procedures (should fossil material be present within the affected area) the damage or destruction of any palaeontological materials will be permanent. Impacts on palaeontological heritage during the construction phase could potentially occur. The significance of the impact occurring will be low.

IMPACT	IMPACT RATINGS	
	PRE-MITIGATION	POSTMITIGATION
CONSTRUCTION & OPERATIONAL PHASE		
Impacts on palaeontological heritage	Low Negative	Low Negative

10.3.2.3 CONCLUSIONS AND RECOMMENDATIONS

The proposed development is underlain by the Weltevrede Subgroup (Witteberg Group of the Cape Supergroup). According to the PalaeoMap of the South African Heritage Resources Information System (SAHRIS) database, the Palaeontological Sensitivity of the Weltevrede Subgroup is Moderate. (Almond and Pether, 2009; Almond et al., 2013). A low Palaeontological Significance has also been allocated to the development and it is therefore considered that the construction of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area. The construction of the development may be authorised and no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

If fossil remains are discovered during any phase of construction, either on the surface or uncovered by excavations the ECO/site manager in charge of these developments must be notified immediately. These discoveries ought to be protected (if possible, in situ) and the ECO must report to SAHRA (Contact details: ECPHRA, Corner Scholl and Amalinda Drive, East London Tel: 0437450888/0434921942; Fax: +27 (0)43 7450889. Web: www.ecprha.org.za) so that correct mitigation (recording and collection) can be carry out by a palaeontologist.

The specialist would need a collection permit from SAHRA. Fossil material must be curated in an approved collection (museum or university) and all fieldwork and reports should meet the minimum standards for palaeontological impact studies developed by SAHRA.

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 the results are detailed in **Table 22** below.

Table 22: Significance rating of impacts identified

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Loss of Biodiversity	Construction	Alt 1	-1	2	2	3	4	-28	-1	2	2	3	4	-28
Loss of Biodiversity	Operation	Alt 1	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Loss of Biodiversity	Construction	Alt 2	-1	2	2	3	3	-21	-1	2	2	3	3	-21
Loss of Biodiversity	Operation	Alt 2	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Loss of Habitat	Construction	Alt 1	-1	2	2	3	4	-28	-1	2	2	3	4	-28
Loss of Habitat	Operation	Alt 1	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Loss of Habitat	Construction	Alt 2	-1	1	2	3	4	-24	-1	1	2	3	4	-24
Loss of Habitat	Operation	Alt 2	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Alteration and loss of ecological processes	Construction	Alt 1	-1	2	2	3	4	-28	-1	2	2	3	4	-28

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
including ecosystem services														
Alteration and loss of ecological processes including ecosystem services	Construction	Alt 2	-1	2	2	3	4	-28	below	2	2	3	4	-28
Alteration and loss of ecological processes including ecosystem services	Operation	Alt 1	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Alteration and loss of ecological processes including ecosystem services	Operation	Alt 2	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Residual Biodiversity Impact	Construction	Alt 1	-1	2	2	3	4	-28	-1	2	2	3	4	-28

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Residual Biodiversity Impact	Construction	Alt 2	-1	2	2	3	4	-28	-1	2	2	3	4	-28
Residual Biodiversity Impact	Operation	Alt 1	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Residual Biodiversity Impact	Operation	Alt 2	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Cumulative Impact	Construction	Alt 1	-1	2	2	3	4	-28	-1	2	2	3	4	-28
Cumulative Impact	Construction	Alt 2	-1	2	2	3	4	-28	-1	2	2	3	4	-28
Cumulative Impact	Operation	Alt 1	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Cumulative Impact	Operation	Alt 2	-1	2	2	3	1	-7	-1	2	2	3	1	-7
Drainage patterns change due to slumped embankment and concrete walls	Construction	Alt 1	-1	4	3	5	7	-84	-1	2	2	3	4	-28
Drainage patterns change due to slumped	Construction	Alt 2	-1	4	3	5	7	-84	-1	2	2	3	4	-28

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
embankment and concrete walls														
Excavated streambed and soil nailing	Construction	Alt 1	-1	3	3	5	7	-77	-1	2	2	3	4	-28
Excavated streambed and soil nailing	Construction	Alt 2	-1	2	3	5	7	-70	-1	2	2	3	4	-28
Removal of embankment vegetation areas	Construction	Alt 1	-1	3	3	5	7	-77	-1	2	2	3	4	-28
Removal of embankment vegetation areas	Construction	Alt 2	-1	2	3	5	7	-70	-1	2	2	3	4	-28
Cutting/reshaping of embankments	Construction	Alt 1	-1	3	2	3	4	-32	-1	2	2	3	3	-21

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Cutting/reshaping of embankments	Construction	Alt 2	-1	3	2	3	4	-32	-1	2	2	3	3	-21
Operation of equipment and machinery in watercourse	Construction	Alt 1	-1	3	2	3	4	-32	-1	2	3	3	3	-24
Operation of equipment and machinery in watercourse	Construction	Alt 2	-1	3	2	3	4	-32	-1	2	3	3	3	-24
Infilling/backfilling and building material stockpile management	Construction	Alt 1	-1	2	2	3	3	-21	-1	2	2	3	3	-21
Infilling/backfilling and building material stockpile management	Construction	Alt 2	-1	2	2	3	3	-21	-1	2	2	3	3	-21
Waste management	Construction	Alt 1	-1	2	2	4	4	-32	-1	2	2	3	3	-21

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Waste management	Construction	Alt 2	-1	2	2	4	4	-32	-1	2	2	3	3	-21
Contamination due to improper storage of chemicals, construction materials, fuel and machinery leaks	Construction	Alt 1	-1	2	2	4	4	-32	-1	2	2	4	4	-32
Contamination due to improper storage of chemicals, construction materials, fuel and machinery leaks	Construction	Alt 2	-1	2	2	4	4	-32	-1	2	2	4	4	-32
Final landscaping and post-construction rehabilitation	Construction	Alt 1	-1	3	2	3	3	-24	-1	2	2	3	3	-21
Final landscaping and post-construction rehabilitation	Construction	Alt 2	-1	3	2	3	3	-24	-1	2	2	3	3	-21

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Altered surface drainage and runoff	Operation	Alt 1	-1	3	3	5	7	-77	-1	2	2	2	3	-18
Altered surface drainage and runoff	Operation	Alt 2	-1	4	3	5	7	-84	-1	3	2	3	3	-24
Storm water management	Operation	Alt 1	-1	2	2	5	3	-27	-1	2	2	5	2	-18
Storm water management	Operation	Alt 2	-1	2	2	6	3	-30	-1	2	2	6	2	-20
Establishment of alien plants on disturbed areas	Operation	Alt 1	-1	2	2	4	4	-32	-1	2	2	3	4	-28
Establishment of alien plants on disturbed areas	Operation	Alt 2	-1	2	2	4	4	-32	-1	2	2	3	4	-28
Conducting maintenance	Operation	Alt 1	-1	2	3	3	4	-32	-1	2	2	3	3	-21

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Conducting maintenance	Operation	Alt 2	-1	2	3	3	4	-32	-1	2	2	3	3	-21
Inadequate stakeholder engagement	Planning	Alt 1	-1	3	1	2	5	-30	-1	2	1	2	5	-25
Inadequate stakeholder engagement	Planning	Alt 2	-1	3	1	2	4	-24	-1	2	1	2	4	-20
Inadequate stakeholder engagement	Construction	Alt 1	-1	3	1	2	5	-30	-1	2	1	2	5	-25
Inadequate stakeholder engagement	Construction	Alt 2	-1	3	1	2	4	-24	-1	2	1	2	4	-20
Scheduling of Construction	Planning	Alt 1	-1	1	2	3	4	-24	-1	1	2	3	3	-18
Scheduling of Construction	Planning	Alt 2	-1	1	2	3	4	-24	-1	1	2	3	3	-18
Potential damage to heritage structures	Construction	Alt 1	-1	1	1	2	1	-4	-1	1	1	2	1	-4

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Potential damage to heritage structures	Construction	Alt 2	-1	1	1	2	1	-4	-1	1	1	2	1	-4
Potential damage to fossils	Construction	Alt 1	-1	1	2	5	2	-16	-1	1	2	5	2	-16
Potential damage to fossils	Construction	Alt 2	-1	1	2	5	2	-16	-1	1	2	5	2	-16
Dust	Construction	Alt 1	-1	2	2	2	3	-18	-1	2	1	2	3	-15
Dust	Construction	Alt 2	-1	2	2	2	3	-18	-1	2	1	2	3	-15
Disturbance of existing land uses	Construction	Alt 1	-1	2	2	2	4	-24	-1	2	2	2	3	-18
Disturbance of existing land uses	Construction	Alt 2	-1	1	2	2	4	-20	-1	1	2	2	3	-15
Job Creation	Planning	Alt 1	1	2	2	3	7	49	1	2	2	3	7	49
Job Creation	Planning	Alt 2	1	2	2	3	7	49	1	2	2	3	7	49
Job Creation	Construction	Alt 1	1	2	2	3	7	49	1	2	2	3	7	49

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Job Creation	Construction	Alt 2	1	2	2	3	7	49	1	2	2	3	7	49
Climate Change-Water Availability	Construction	Alt 1	-1	3	2	5	3	-30	-1	3	2	5	3	-30
Climate Change-Water Availability	Construction	Alt 2	-1	3	2	5	3	-30	-1	3	2	5	3	-30
Landscape disturbances	Construction	Alt 1	-1	2	2	5	3	-27	-1	2	2	5	3	-27
Landscape disturbances	Construction	Alt 2	-1	2	1	5	3	-24	-1	2	1	5	3	-24
Improved road stability and safety	Construction	Alt 1	1	5	3	6	6	84	1	5	3	6	6	84
Improved road stability and safety	Construction	Alt 2	1	4	3	5	5	60	1	4	3	5	5	60
Injuries and fatalities during construction	Construction	Alt 1	-1	5	3	2	5	-50	-1	4	3	2	4	-36
Injuries and fatalities during construction	Construction	Alt 2	-1	5	3	2	5	-50	-1	4	3	2	4	-36

Impact	Phase	Alternatives	Nature	Severity	Spatial scale	Duration	Probability	Pre-mitigation	Nature	Severity	Spatial scale	Duration	Probability	Post-mitigation
Policy and Legislative Context	Planning	Alt 1	-1	5	3	3	3	-33	-1	2	3	3	2	-16
Policy and Legislative Context	Planning	Alt 2	-1	5	3	3	3	-33	-1	2	3	3	2	-16

An assessment of each potentially significant impact is summarised in **Table 23**.

Table 23: Impact Assessment of Each Identified Potentially Significant Impact and Risk

Issue	POTENTIAL IMPACT	PHASE	SIGNIFICANCE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE	SIGNIFICANCE
		In which impact is anticipated	if mitigated (ALT 1)	if not mitigated (ALT 2)		if mitigated (ALT 1)	if mitigated (ALT 2)
Policy and Legislative Context	There is a risk of noncompliance with the environmental laws and policies of South Africa which could lead to damage to the	Planning and Design Construction	Low (-)	Low (-)	Application for required environmental authorisations and licences. Appointment of an ECO to monitor compliance. Copies of all applicable licenses, permits and	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
	aquatic and terrestrial environment, unnecessary delays in construction activities, and potentially criminal cases, based on the severity of the noncompliance, being brought against the Applicant and the appointed contractors.				managements plans (EA, EMPr, Water Use Licenses, Permits, etc.) must be available on-site at all times. • Environmental Awareness Training must be provided by the ECO at the start of the construction phase all personnel involved in the project.		
Land Ownership	The project footprint goes beyond the N2 reserve and affects privately owned properties that are adjacent to the road reserve. Some land owners may object to	Planning Construction	Low (-)	Low (-)	Obtain landowner consent and set up agreements with landowners	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
	the project and refuse to allow access to the contractor.						
Scheduling of Construction	Inappropriate construction scheduling that does not take into account the seasonal requirements of the aquatic environment.	Construction	Low (-)	Low (-)	<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. • When not possible, sediment traps must be used to ensure the watercourses are not negatively impacted by construction activity 	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
Slumped embankment and concrete walls	During the construction phase drainage patterns change are anticipated to change due to embankment excavation and soil nailing and removal of embankment vegetation areas causing erosion and sedimentation downstream of the river.	Construction	Moderate (-)	Moderate (-)	Refer to mitigation measures in Section 10.3.1.4 for full details.	Low (-)	Low (-)
Excavation	Excavated streambed and soil nailing	Construction	Moderate (-)	Minor (-)		Low (-)	Low (-)
Clearing of Vegetation	Removal of embankment vegetation areas	Construction	Moderate (-)	Minor (-)		Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
Stabilisation	Cutting/reshaping of embankments	Construction	Low (-)	Low (-)		Low (-)	Low (-)
Construction of retaining walls/Erosion Protection	Operation of equipment and machinery in watercourse	Construction	Low (-)	Low (-)		Low (-)	Low (-)
	Infilling/backfilling and building material stockpile management	Construction	Low (-)	Low (-)		Low (-)	Low (-)
	Waste management	Construction	Low (-)	Low (-)		<ul style="list-style-type: none"> All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported; and Adequate sanitary facilities and ablutions must be provided for all personnel 	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation).		
	Contamination due to improper storage of chemicals, construction materials, fuel and machinery leaks	Construction	Low (-)	Low (-)	<ul style="list-style-type: none"> The contractors used for the construction should have spill kits available prior to construction to ensure that any fuel, oil or hazardous substance spills are cleaned-up and discarded correctly; Action plans must be present on site, and training for contractors and employees in the event of 	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					spills, leaks and other impacts to the aquatic systems; <ul style="list-style-type: none"> The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access; Prevent uncontrolled access of vehicles through the watercourses that can cause a significant adverse impact on the hydrology and soil structure of these areas; During construction activities, all rubble generated must be removed 		

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					<p>from the site and not dumped in the active water channel;</p> <ul style="list-style-type: none"> Contamination of the watercourse with unset cement or cement powder should be negated as it is detrimental to aquatic biota. It is preferable that on-site mixing is avoided and that prefabricated materials be prioritised (where feasible); 		
Landscaping and Rehabilitation	Final landscaping and post-construction rehabilitation	Construction	Low (-)	Low (-)	<ul style="list-style-type: none"> During final landscaping of the bank stabilisation, an alien vegetation control and eradication plan must be compiled and implemented; 	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
Stabilisation and vegetation establishment	Altered surface drainage and runoff	Operation	Moderate (-)	Moderate (-)	<ul style="list-style-type: none"> The duration of the construction phase should be kept to a minimum, to reduce the period of disturbance on fauna; and 	Low (-)	Low (-)
Stormwater runoff	Storm water management	Operation	Low (-)	Low (-)	<ul style="list-style-type: none"> Dust-suppression mitigation must be put in place and must be strictly adhered to, for all roads and dumps especially. This includes wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust being generated to avoid impacts to local vegetation and sensitive instream habitat (cobbles, 	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					gravel which serves as fish spawning beds); <ul style="list-style-type: none"> • Disturbed instream and riparian habitat must be returned to preconstruction condition; • Ultimately, it is critical that a qualified Environmental Control Officer (ECO) be on site at all times, to oversee the project activities and ensure strict environmental practices and compliance is carried out to minimise environmental degradation; and • A post construction aquatic and riparian monitoring inspection must 		

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					<p>be done to assess the impact of the project, and implement appropriate mitigation and rehabilitation in key areas.</p> <ul style="list-style-type: none"> The bank stabilisation is along or adjacent to the road (a two-way road). Therefore, some of the SANRAL (South African National Roads Agency Limited) road guidelines for construction of road embankments should be considered as follows: It is possible that failure may occur due to a slope being steeper than was allowed for in the design and 		

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					if the slopes are not trimmed to the correct lines and dimensions. Therefore, protection against erosion and ease of maintenance, slopes no steeper than 1:2 are preferable.		
Biodiversity Impacts	Establishment of alien plants on disturbed areas	Operation	Low (-)	Low (-)	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated back to their original condition. 	Low (-)	Low (-)
Post Construction monitoring	Conducting maintenance	Operation	Low (-)	Low (-)	<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 	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE	SIGNIFICANCE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE	SIGNIFICANCE
		In which impact is anticipated	if mitigated (ALT 1)	if not mitigated (ALT 2)		if mitigated (ALT 1)	if mitigated (ALT 2)
					Rehabilitation and Alien Vegetation Management Plan.		
Damage of site vegetation by equipment for site preparation and during construction	Loss of Biodiversity	Construction and Operation	Low (-)	Low (-)	Refer to mitigation measures in Section 10.3.2.4	Low (-)	Low (-)
Damage to top soil by excavation activities	Loss of Habitat	Construction and Operation	Low (-)	Low (-)		Low (-)	Low (-)
Construction activities	Alteration and loss of ecological processes including ecosystem services	Construction and Operation	Low (-)	Low (-)		Low (-)	Low (-)
Construction of erosion protection/retaining walls	Ecosystem services impairment	Construction and Operation	Low (-)	Low (-)		Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE		MITIGATION TYPE	SIGNIFICANCE	
			if not mitigated (ALT 1)	if not mitigated (ALT 2)		if mitigated (ALT 1)	if mitigated (ALT 2)
Post-Construction	Impacts after mitigation	Construction and Operation	Low (-)	Low (-)		Low (-)	Low (-)
Ongoing grazing/farming activity	Cumulative Impacts	Construction and Operation	Low (-)	Low (-)	Adequate management of grazing activities by landowners	Low (-)	Low (-)
Heritage and Archaeological Environment	Potential damage to heritage structures	Construction	Low (-)	Low (-)	No mitigation required pending the discovery of newly discovered fossils or archaeological structures.	Low (-)	Low (-)
Palaeontological Environment	Potential impact on Palaeontological resources	Construction	Low (-)	Low (-)	If fossil remains/heritage structures are discovered during any phase of construction, either on the surface or uncovered by excavations the ECO/site manager in charge of these developments must be notified immediately. These	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					discoveries ought to be protected (if possible, in situ) and the ECO must report to SAHRA (Contact details: ECPHRA, Corner Scholl and Amalinda Drive, East London Tel: 0437450888/0434921942; Fax: +27 (0)43 7450889. Web: www.ecprha.org.za) so that correct mitigation (recording and collection) can be carry out by a palaeontologist /archaeologist.		
Air Quality	Dust generation	Construction	Low (-)	Low (-)	• Cleared surfaces must be dampened whenever possible, especially during dry and windy conditions,	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					<p>to avoid excessive dust generation.</p> <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. 		
Land Use	Disturbance of existing land uses	Construction	Low (-)	Low (-)	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 stabilisation footprint.	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE		MITIGATION TYPE	SIGNIFICANCE	
			if not mitigated (ALT 1)	if not mitigated (ALT 2)		if mitigated (ALT 1)	if mitigated (ALT 2)
Noise Impact	Disturbance of animal species	Construction	Low (-)	Low (-)	<ul style="list-style-type: none"> No trapping, killing, or poisoning of any wildlife is to be allowed; The drilling holes and trenches created during the construction phase must not entrap local wildlife when left unattended (overnight); Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to amphibian species and nocturnal mammals; 	Low (-)	Low (-)
Socio-Economic	Job Creation	Construction	Minor (+)	Minor (+)	Use of local labour and SME is recommended whenever it is possible.	Minor (+)	Minor (+)

Issue	POTENTIAL IMPACT	PHASE	SIGNIFICANCE	SIGNIFICANCE	MITIGATION TYPE	SIGNIFICANCE	SIGNIFICANCE
		In which impact is anticipated	if mitigated (ALT 1)	if not mitigated (ALT 2)		if mitigated (ALT 1)	if mitigated (ALT 2)
Climate Change	Water Availability	Construction	Low (-)	Low (-)	Conserve water, reuse water from excavated trenches. Contamination of water resources to be avoided	Low (-)	Low (-)
Visual	Landscape disturbances	Construction	Low (-)	Low (-)	<ul style="list-style-type: none"> • Minimize disturbance of new areas. • 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 (-)	Low (-)
Traffic	Delays during construction	Construction	Low (-)	Low (-)	A Traffic Management Plan	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					must be compiled by the contractor prior to the commencement of the construction phase detailing appropriate mitigation measures		
Improved road stability and safety	Prevent further erosion of embankment	Operational	Moderate (+)	Minor (+)	No mitigation required	Moderate (+)	Minor (+)
Health and Safety	Injuries and fatalities during construction	Construction	Low (-)	Low (-)	<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. 	Low (-)	Low (-)

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					<ul style="list-style-type: none"> • 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 		

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					<p>typical risk assessment process.</p> <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 times. Regular training/talks must be given to all workers on site regarding safe working procedures. Appropriate warning signs must be in place to notify the public regarding construction activities. 		

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					<ul style="list-style-type: none"> • The construction site and camp must have access control and be demarcated, where possible. • 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 		

Issue	POTENTIAL IMPACT	PHASE In which impact is anticipated	SIGNIFICANCE if not mitigated (ALT 1)	SIGNIFICANCE if not mitigated (ALT 2)	MITIGATION TYPE	SIGNIFICANCE if mitigated (ALT 1)	SIGNIFICANCE if mitigated (ALT 2)
					so. <ul style="list-style-type: none"> All hazardous chemicals must be stored properly in a secure, banded and contained area. 		

11. IMPACT STATEMENT

A summary of positive and negative impacts identified is included in **Table 24**. As indicated in **Table 22**, most of the impacts identified pre-mitigation are Moderate or low Negative, with majority becoming Low Negative post-mitigation. No high negative impacts were identified.

11.1. PREFERRED ALTERNATIVE

Two layout alternatives have been considered for this project (**Figure 5**). The first alternative is based on preliminary designs that detail where site assessment conducted indicated slope stability issues. This layout alternative has stabilisation measures that go beyond the current N2 road reserve and some erosion protection measures reach the riverbanks, thus affects other properties that are privately owned. The second layout alternative considered is similar to Alternative 1 however it stays within the N2 Reserve and does not extend to the adjacent private properties. This alternative was considered due to comments received from IAPs that the project should avoid the riverbanks as well as Farm 253 Portion 11RE.

As indicated in **Table 24**, the combined pre-mitigation significance of Layout Alternative 1 (-858) is higher than that of Alternative 2 (-848). This is due to the fact that the footprint of alternative 1 is greater and this has slightly higher impact on the terrestrial and aquatic ecosystem without mitigation. The mitigation measures proposed by the appointed specialists are applicable to both alternatives. However, due to the positive impact of improved road stability and safety and the fact that implementation of Alternative 1 will lead to better stormwater management and reduced erosion of the embankment, the resultant post-mitigation significance of Layout Alternative 1 (-532) becomes slightly lower than Alternative 2 (-537).

Alternative 1 is therefore the preferred alternative which entails the stabilisation of Section 13 of the N2 Road embankment on the properties listed in **Table 7** but taking a sensitivity approach and implementing the recommendations of the Freshwater and Botanical Specialist and where it is necessary for the project to encroach on Portion 11 of the farm Zyferfontein 253, ensure that consent is obtained prior to construction.

Table 24: Comparison of impact significance of each alternative considered

Impacts assessed for each alternative	Combined pre-mitigation Significance	Combined post-mitigation Significance
Alt 1	-858	-532
Improved road stability and safety	84	84

Impacts assessed for each alternative	Combined pre-mitigation Significance	Combined post-mitigation Significance
Alteration and loss of ecological processes including ecosystem services	-35	-35
Altered surface drainage and runoff	-77	-18
Climate Change-Water Availability	-30	-30
Conducting maintenance	-32	-21
Contamination due to improper storage of chemicals, construction materials, fuel and machinery leaks	-32	-32
Cumulative Impact	-35	-35
Cutting/reshaping of embankments	-32	-21
Disturbance of existing land uses	-24	-18
Drainage patterns change due to slumped embankment and concrete walls	-84	-28
Dust	-18	-15
Establishment of alien plants on disturbed areas	-32	-28
Excavated streambed and soil nailing	-77	-28
Final landscaping and post-construction rehabilitation	-24	-21
Infilling/backfilling and building material stockpile management	-21	-21
Injuries and fatalities during construction	-50	-36
Job Creation	98	98
Landscape disturbances	-27	-27
Loss of Biodiversity	-35	-35
Loss of Habitat	-35	-35
Inadequate stakeholder engagement	-60	-50
Operation of equipment and machinery in watercourse	-32	-24

Impacts assessed for each alternative	Combined pre-mitigation Significance	Combined post-mitigation Significance
Potential damage to heritage structures	-4	-4
Potential damage to fossils	-16	-16
Removal of embankment vegetation areas	-77	-28
Residual Biodiversity Impact	-35	-35
Scheduling of Construction	-24	-18
Storm water management	-27	-18
Waste management	-32	-21
Policy and Legislative Context	-33	-16
Alt 2	-848	-537
Improved road stability and safety	60	60
Alteration and loss of ecological processes including ecosystem services	-35	-35
Altered surface drainage and runoff	-84	-24
Climate Change-Water Availability	-30	-30
Conducting maintenance	-32	-21
Contamination due to improper storage of chemicals, construction materials, fuel and machinery leaks	-32	-32
Cumulative Impact	-35	-35
Cutting/reshaping of embankments	-32	-21
Disturbance of existing land uses	-20	-15

Impacts assessed for each alternative	Combined pre-mitigation Significance	Combined post-mitigation Significance
Drainage patterns change due to slumped embankment and concrete walls	-84	-28
Dust	-18	-15
Establishment of alien plants on disturbed areas	-32	-28
Excavated streambed and soil nailing	-70	-28
Final landscaping and post-construction rehabilitation	-24	-21
Infilling/backfilling and building material stockpile management	-21	-21
Injuries and fatalities during construction	-50	-36
Job Creation	98	98
Landscape disturbances	-24	-24
Loss of Biodiversity	-28	-28
Loss of Habitat	-31	-31
Inadequate stakeholder engagement	-48	-40
Operation of equipment and machinery in watercourse	-32	-24
Potential damage to heritage structures	-4	-4
Potential damage to fossils	-16	-16
Removal of embankment vegetation areas	-70	-28
Residual Biodiversity Impact	-35	-35
Scheduling of Construction	-24	-18
Storm water management	-30	-20
Waste management	-32	-21

Impacts assessed for each alternative	Combined pre-mitigation Significance	Combined post-mitigation Significance
Policy and Legislative Context	-33	-16

11.2. 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 stability etc.). The environment will remain relatively undisturbed and there would be no contribution to road stability at the N2 Section 13 near Makhanda. The no-go alternative will allow the status quo to continue, which means persistence of the degraded and transformed terrestrial ecosystem with the likely increase in the number of. problem and weedy plant species. The no-go alternative is thus not considered the preferred alternative in terms of this development.

11.3. CUMULATIVE IMPACTS

The proposed stabilisation of Section 13 of the N2 Road embankment may lead to potential cumulative impacts such as:

- The clearing of natural vegetation leading to the loss of the natural vegetation, 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;

11.4. FATAL FLAWS

There are no fatal flaws are identified for this project.

12. RECOMMENDATIONS AND CONCLUSIONS

The following recommendations must be included into the final EMPr:

- The applicant must obtain landowner consent for all private properties outside the road reserve prior to commencement of construction.
- An application for registration of National Water Act Section 21 c and l water uses must be submitted to the Department of Water and Sanitation (DWS).
- Water for construction purposes should be obtained from existing licences water sources, where this is not available, then a registration for Section 21 a water use must be submitted to the DWS.
- 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 and the ECO shall conduct compliance audits on a monthly basis.
- All mitigation measures detailed in Section 10.3.1 to 10.3.3 as well as **Table 23** must be included into the EMPr.
- The following Management Plans must be developed by the contractor prior to clearing and implemented during construction and operations of the proposed development. These management plans must be approved by the ECO and project engineer:
 - Traffic Management Plan;
 - Storm Water Management Plan;
 - Waste Management Plan;
 - Erosion and Sedimentation Management Plan; and
 - Alien Vegetation Rehabilitation Management Plan.

It is the recommendation of the EAP that the preferred alternative for this project may be authorised on condition that the applicant will ensure compliance with all mitigation measures and recommendations contained in this report and associated EMPr.

13. REFERENCES

Aurecon South Africa (Pty) Ltd (2020). Report on N2 Stone Crescent Flood Study

Banzai Environmental (2021). Palaeontological Desktop Assessment for The Proposed SANRAL Stone Crescent Embankment Stabilisation Works Along The N2 Near Grahamstown In The Eastern Cape

BGIS (Biodiversity GIS). (2018). <http://bgis.sanbi.org/> (Accessed: June 2020).'

DEA. (2015). National land cover data for SA. https://egis.environment.gov.za/national_land_cover_data_sa (Accessed: September 2021).

ECBCP (Eastern Cape Biodiversity Conservation Plan). (2006). <http://bgis.sanbi.org/Projects/Detail/50> (Accessed: September 2021).

Makana Local Municipality (MLM) Spatial Development Framework (2013)

Makana Local Municipality Integrated Development Plan (2019/2020)

Makana Local Municipality LED Strategic Development-Framework

KC Phyto Enterprises (2021). Botanical Assessment Report for the Proposed N2 Road-Stone Crescent Embankment Stabilisation Works, Makhanda, Eastern Cape Province

TBC (The Biodiversity Company) (2021). Freshwater Study and Impacts Assessment for the Proposed Stone Crescent Stabilization Works

14. 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 DWS Pre-Application Enquiry submission proof

Appendix C: Environmental Management Programme (EMPr)

Appendix D: Specialist Reports

D1: Freshwater Impact and Risk Assessment Report

D2: Botanical Impact Assessment Report

D3: Palaeontological Impact Assessment Report

Appendix E: Additional Information:

E1: Final Composite Map

E2: Flood-line Study of section of the N2 at S13 km43 near Makhanda