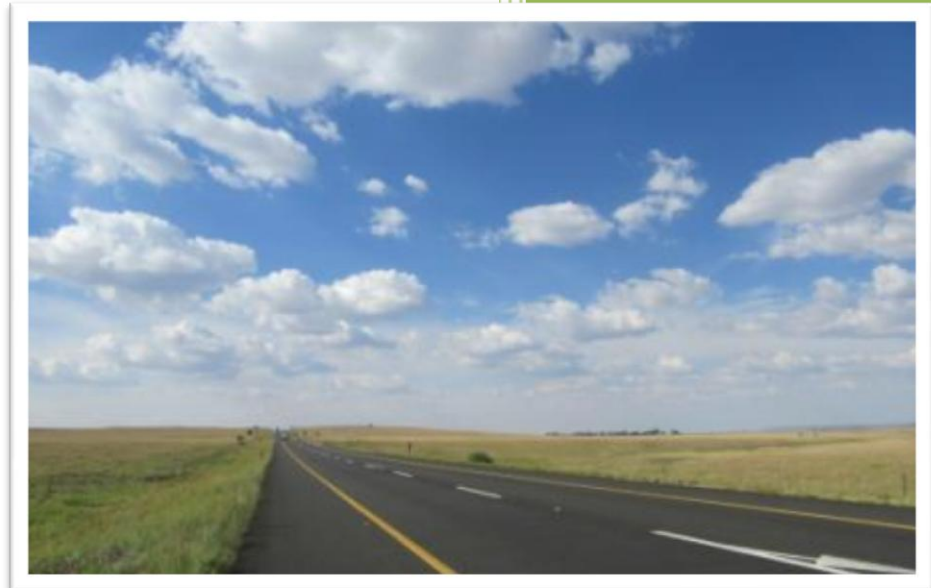


# 2019

## FINAL BASIC ASSESSMENT REPORT

DEA Ref No: 14/12/16/3/3/1/2092



**UPGRADE OF  
NATIONAL ROUTE 1  
SECTION 16 (N1-16)  
BETWEEN WINBURG  
STATION (km 89.8) AND  
VENTERSBURG (km  
133.53)**

**ENVIROMATRIX**

## PROJECT DETAILS

**PROJECT TITLE:** BASIC ASSESSMENT REPORT FOR THE UPGRADING OF NATIONAL ROUTE 1 SECTION 16 BETWEEN WINBURG STATION (km 89,8) AND VENTERSBURG (km 133,53)

**REFERENCE NO:** CONTRACT NRA N001-160-2018/2F-ENV

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## EXECUTIVE SUMMARY

The South African National Roads Agency SOC Limited (SANRAL), as the applicant, initiated during 2018 the environmental authorisation process for the upgrading of the National Route 1 Section 16 (N1-16) between Winburg Station (km 89.8) and Ventersburg (km 133.53). The new road will be parallel to the existing road and has an approximate length of 44 km. An access management plan will also be implemented to reduce the number of locations with direct access to the N1-16 through the construction of new service roads approximately 46 Km in length. The construction and/or upgrading of four (4) bridges over the Erasmusspruit, Koolspruit, Sand River and Venterspruit is envisaged as well as seventeen (17) major culverts plus ±160 smaller culverts and storm water pipes are also planned along the road. The N1-16 road upgrading project is located within the Free State Province, within the Lejweleputswa and Thabo Mofutsanyana District Municipalities, and the Masilonyana Local Municipality, Matjhabeng Local Municipality and Setsoto Local Municipalities.

The proposed upgrading of N1-16 is of strategic importance to South Africa. The proposed additional lanes will provide for future capacity, address pertinent road safety, hazards, and improve intersections. The upgrading of the N1-16 is aimed at accelerating economic growth and development in the designated regions of the country, through an increase in the safety of the flow and ease of transportation on the route. This is critical since the N1 is one of the major roads in South Africa with a high volume of traffic that flows along the route on a daily basis.

EnviroMatrix Pty Ltd (EnviroMatrix) has been appointed as the Independent Environmental Consultants by the South African National Roads Agency SOC Limited (SANRAL) as part of the Aurecon Engineering Consulting Team, for the Environmental Authorisation application processes in terms of the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA). The Aurecon Engineering Consulting Team consists of Aurecon SA (Pty) Ltd, MPA Consulting Engineers, V3 Consulting Engineers and Leporogo Specialist Engineers.

In compliance to the requirements of NEMA, EnviroMatrix conducted a Basic Assessment of the project and socio and environmental context in order to obtain Environmental Authorisation for the road works. Amended Environmental Impact Assessment Regulations, 2014 (GN R982 in GG 38382 of 4 December 2014: National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014 (GN 982)) that regulate the environmental authorisation process and list activities that may not commence without Environmental Authorisation from the Competent Authority in the following regulations:

- GN R983 in GG 38382 of 4 December 2014: Listing notice 1: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R983)
- GN R984 in GG 38382 of 4 December 2014: Listing notice 2: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R984)
- GN R985 in GG 38382 of 4 December 2014: Listing notice 3: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R985)

The planned upgrading of the N1-16 with service roads will trigger the following activities:

Listing Notice 1 activities in GN R983 is for the road works construction the following:

- Activity 12; Construction of bridges bigger than 100m<sup>2</sup> within or close to watercourses
- Activity 19; Construction activities within or close to a water course

- Activity 24; Development of new service roads
- Activity 31; The decommissioning of existing structures (i.e. bridges)
- Activity 48; Extension of culverts within or close to a watercourse
- Activity 56; Widening of the existing N1 and service roads

Listing Notice 3 activities in GN R985 is within the Free State the following:

- Activity 12; clearance of 300m<sup>2</sup> indigenous vegetation within or close to watercourses
- Activity 14; Reconstruction of bridge within 5Km from proclaimed nature reserve
- Activity 18; Widening of the N1 within 5Km from proclaimed nature reserve

The Basic Assessment conducted in accordance to the above regulations, included an assessment of the socio-economic and environmental context, the description of the project layout and design as well as the project alternatives considered. Several specialist studies were also conducted. These include the following studies:

- Ecological Study by Lefatse Environmental Planning Services (Pty) Ltd

The following general conclusions were drawn upon completion of the literature review and site assessment:

- According to the National List of Threatened Terrestrial Ecosystems (2011) the study area does not fall in a threatened terrestrial ecosystem
- The study area is not part of a formal or an informal protected area.
- According to Free State Biodiversity Plan (2016) the project site goes through mainly Ecological Support Areas (ESA1 & 2). There are also some degraded and transformed areas (crop fields). The N1 does also cross a number of drainage lines, seasonal and perennial streams classified as aquatic Critical Biodiversity areas. The project area does not cut through any terrestrial Critical Biodiversity Areas (CBA1 & 2);
- Protected plant species occur on the project site
- Species which are suitable transplant must be translocated during a search and rescue operation.
- Permits to collect these species must be obtained from DESTEA

Due to the agricultural activities extensive disturbance of the natural vegetation occurred. Several alien species and pioneer species were noted on these disturbed areas. Several indigenous and alien species were identified in and around the proposed road reserve. The identified protected species are given in the table below.

TREES / SCHRUBS	GRASSES / REEDS / BULRUSHES	BULBS / SUCCULENTS / FORBS
<i>Olea europaea sp africana</i>	None	<i>Aloe davyana</i>
<i>Cussonia paniculata</i>		<i>Avonia ustulata</i>
		<i>Crinum bulbispermum</i>
		<i>Euphorbia clavaroides</i>
		<i>Haemanthus humilis</i>
		<i>Stapelia grandiflora</i>

The potential diversity of mammals within the study area is low because it is a disturbed area and most natural habitats have been transformed. There are several factors which will reduce the actual number of species present within the project site. The presence of humans and roads, the destruction of natural vegetation, noise etc., has had a major impact on the natural animal populations in the project area.

During the site visit the following faunal species were confirmed within the project site:

- Single rodent burrows (most likely Four-striped Grass Mouse (*Rabdomys pumilo*)).
- Relative large burrows (likely to have been made and utilized by Aardwolf (*Proteles cristatus*), Porcupine (*Hystrix africae-australis*). and/or Aardvark – (*Orycteropus afer*). Smaller burrows were noted and were probably made by Ground squirrel (*Geosciurus inauris*), Yellow Mongoose (*Cunictis penicillata*) and Zorilla (*Ichonyx striatus*)

None of these species noted within the project site are listed and or protected species.

Fifteen amphibian species have been recorded within the region and of these 15 species eight species were recorded within close proximity of the project site. Of the more than 320 bird species that have been recorded in the region a few species occur on the study area. Birds such as Crowned Lapwing, Blacksmith Lapwing, Orange River Francolin, Helmeted Guineafowl, Thick-knee, Northern Black Korhaan, Cattle Egrets, Black-headed Heron, Turtle Doves, Rock Pigeons, and Hadedda and others could occur in the project site.

The most significant potential impacts on the ecosystem that are expected are mainly the reduction of a stable vegetation cover with associated below-ground biomass, loss of portions of potential sensitive habitats, invasion by alien plants during the project in disturbed areas and those in close proximity to the project site and lastly the impacts on the seasonal drainage lines, rivers and wetlands. Several mitigation measures were prescribed in the Environmental Management Plan to mitigate these impacts.

With the diligent implementation of mitigating measures by the developer, contractors, and operational staff, the severity of these impacts can be minimised and reduced to acceptable levels. The impact on fauna is expected to be small to negligent. Presence of indigenous terrestrial vertebrates within the study area is relatively low. Animals that may be permanently present can be relocated or will move away during construction, and may resettle after construction, depending on safety specifications necessitated by the development. No restricted or specific habitat of vertebrates exists on the project site that will be affected by the proposed development.

- Wetland Delineation Study by Lefatse Environmental Planning Services (Pty) Ltd

The Sand River, Erasmusspruit, Koolspruit, Venterspruit floodplains, stream riparian planes and wetlands have a low Ecological Importance and Sensitivity (EIS) score (Category D) according to the Wetland Assessment Reports. This is indicating that these systems are largely modified and are considered to be ecologically un-important and not sensitive on a provincial and local scale.

The overall Present Ecological State (PES) Category for the larger streams namely the Sand River, Erasmusspruit, Koolspruit and Venterspruit is a C which means that these systems are

moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.

The overall PES Category for the floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit is also an E which means that the change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural features are still recognizable.

The overall PES Category for the ephemeral drainage lines is a B which means that these systems are largely natural with few modifications. A slight change in ecosystem processes is notable and a small loss of natural habitats and biota may have taken place.

The pans in the 500m buffer around the project site scored an overall PES category of a B which means that these systems are largely natural with few modifications. A slight change in ecosystem processes is notable and a small loss of natural habitats and biota may have taken place.

The man-made dams in the 500m buffer around the project site scored an overall PES category of a C which means that these systems are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.

ECOSYSTEM	PRESENT ECOLOGICAL STATE (PES) CATEGORY	ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS) CATEGORY
Sand River, Erasmusspruit, Koolspruit and Venterspruit	C	C/D
Floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit	E	D
Ephemeral drainage lines	B	D
Pans	B	D
Man-made dams	C	D

The ecological functions and service provision for these hydro-geomorphic units and the hydro-geomorphic units as a whole was calculated. Biodiversity maintenance is low in the Sand River, Erasmusspruit, Koolspruit, Venterspruit floodplain wetlands, drainage lines, pans and man-made dams' riparian vegetation. The agricultural activities and the presence of exotic species have a limiting factor in this area in terms of biodiversity maintenance and support. The average ecological functions and service provision score for the Sand River, Erasmusspruit, Koolspruit, and Venterspruit floodplain wetlands, drainage lines, pans and man-made dams' riparian vegetation on the project site scores a Moderately – Low rating. These systems' riparian vegetation scored low values in terms of tourism, recreation, education and research and they also do not play any form of cultural importance to the surrounding communities.

The results of the impact assessment conducted indicate that although the impacts prior to mitigation may potentially be "Moderate", strict and effective implementation of mitigation measures will reduce the impact significance to "Low" levels. In view of the fact that large portions of the study area and the catchment of the watercourse have already been impacted due to human activities such as crop production, construction of roads, dams, farmsteads, etc. It



is the opinion of the specialist that should the mitigation measures, be adhered to, the proposed construction activities may have a lower risk to the wetland or riparian resources or natural vegetation within the project site than without the mitigation measures.

- Heritage Impact Assessment Study by eThembeni Cultural Heritage

Two archaeological sites were identified. The eastern edge of the Late Iron Age (LIA) stone-walled site (28° 15' 18.84" S 27° 04' 39.66" E) currently lies some 50m west of the current N1 median and 30 m from the edge of the road current reserve fence. In order to protect the integrity of this site this buffer distance should be maintained as far as possible. A second site lies to the east of the N1 on the same axis at 28°15'20.36"S 27° 4'49.63"E. The latter is however some 200m beyond the current median and should not be impacted by construction activities. Both these areas should be avoided entirely as a stock-pile area, plant park area, or the establishment of a construction camp.

Three grave sites were identified. Some 200m to the south of the rectangular stone structures a cluster of stone packed graves without headstones was observed at 28° 18' 20.65" S 27° 03' 55.35" E. A small graveyard was observed at 28°21'51.80"S 27° 3'16.79"E. It is well fenced and contains 3 visible headstones. Another graveyard was observed at the Eittel turn off, at road marker N1 -16X, 28°20'28.86"S 27° 3'57.84"E. These graves are less than 50m from the existing road reserve. The graveyard has High heritage significance and may not be altered or removed without a permit from SAHRA. Preferably the site should be buffered with a sturdy fence. However, construction activities in its vicinity may negatively impact on the graves and exhumation and relocation may have to be considered, following prescribed protocols by SAHRA. The relocation of these graves is currently being investigated.

Very little fossil material was found during the survey and very little Adelaide Subgroup rock was observed exposed at the surface immediately adjacent to the road. Most of the road cuttings were observed as being into dolerite. Consequently, no further palaeontological assessment is required. During the laying of the road bedding for the proposed project it is recommended that non- fossiliferous rocks are used (e.g. dolerite / berg-gruis etc.) as a foundation fill for tar/concrete mix, and that if local rocks are being sourced for this purpose then it is suggested that the quarrying of fossiliferous bedrock be avoided if possible. If sandstone, mudstone or shale is locally quarried for use in the new development, it is very likely to contain fossil material, and this will require monitoring by a professional palaeontologist.

Historical site of the Sand River Convention memorial site was identified. This monument commemorates the signing of a convention on the 17th January 1852 whereby the British Colonial Government in South Africa formally recognised the independence of the Boers north of the Vaal River.

Given the socio-economic and environmental context the Public was informed through the notification in the Volksblad on 4 October 2018 and the placement of notices, during October 2018, at various points along the route as well as at the Winburg Library, the Masilonyana Local Municipality offices, the Winburg OVK, the Matjhabeng Local Municipality office, the Ventersburg Library and the Ventersburg Spar. Basic Information Documents were also distributed to various stakeholders and individual interviews were conducted with the affected Landowners. Stakeholder

Engagement Meetings were also held, one on 6 February 2019 in Winburg and one on 7 February 2019 in Ventersburg.

Based on the socio-economic and environmental context, project description and comments from the stakeholders, the impacts were assessed of the project and all the identified project alternatives.

Findings from the environmental impact assessment are:

- The impacts before mitigation are “medium”;
- After mitigation the identified impacts significance were reduced to “low”;
- The Alternative 1, 2, 3 and 4 have the same impacts, risk rating and mitigation measures;
- The NO-GO alternative has two “high” risk rating for which the proposed project is the mitigation measure.

The findings conclude that provided that the recommended mitigation and management measures are implemented there are no environmental disqualifying factors that should prevent the proposed project from proceeding. In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the mitigation measures detailed in the specialist studies have been captured in the Environmental Management Plan (EMP). The EMP would be used to ensure compliance with environmental specifications and management measures.

The construction is currently planned for a six year period starting from January 2029 to December 2034. Therefore the environmental authorisation applied for is until December 2035 including a one year post construction monitoring period.

The information contained in this report and the documentation attached hereto is sufficient to make a decision in respect of the project. It is submitted that the proposed mitigation measures, if implemented, will reduce the significance of the identified impacts to “low”, and that the proposed project should therefore be authorised to proceed.

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APPENDIX – H.4 Landscape Management Plan

APPENDIX – H.5 Rehabilitation Plan

### **APPENDIX – I Public Participation**

APPENDIX – I.1 List of Key Stakeholders

APPENDIX – I.2 Interviews with and letter of consent from Landowners

APPENDIX – I.3 Advertisement

APPENDIX – I.4 Notice with proof of placement

APPENDIX – I.5 BID and proof of circulation of BID

APPENDIX – I.6 E-mails to I&AP

APPENDIX – I.7 Stakeholder meeting notification, presentation and meeting minutes

APPENDIX – I.8 Comments and Response Report

APPENDIX – I.9 Registration Forms

APPENDIX – I.10 Attendance Registers of meetings with State Departments

APPENDIX – I.11 E-mails to DEA: Biodiversity and Conservation

APPENDIX – I.12 Comments on Draft BAR

### **APPENDIX – J Impact Assessment**

### **APPENDIX – K Screening Report – Proposed Site Environmental Sensitivity**



## LIST OF ABBREVIATIONS

ABBREVIATION	DESCRIPTION
BAR	Basic Assessment Report
BPEO	Best practicable environmental option
CARA	Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
GN 982	GN R982 in GG 38382 of 4 December 2014: National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014
GN R983	GN R983 in GG 38382 of 4 December 2014: Listing notice 1: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D
GN R984	GN R984 in GG 38382 of 4 December 2014: Listing notice 2: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D
GN R985	GN R985 in GG 38382 of 4 December 2014: Listing notice 3: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D
I&AP	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated environmental management
IP	Impact Point
ITS	Intelligent Transport System
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002)
N1-16	National Route 1 Section 16 between Winburg Station (km 89.8) and Ventersburg (km 133.53)
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No 107 of 1998)
NEM:AQA	National Environmental Management: Air Quality Act (Act No 39 of 2004)
NEM:BA	National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)
NEM:WA	National Environmental Management: Waste Act, 2008 (Act No 59 of 2008)
NHRA	National Heritage Resources Act, 1999 (Act No 25 of 1999)
NWA	National Water Act, 1998 (Act No 36 of 1998)
PSDF	Provincial Spatial Development Framework
SDF	Spatial Development Framework
SANRAL	South African National Roads Agency SOC Limited
SAPS	South African Police Services
WMA	Water Management Area
WUL	Water Use Licence

## 1 INTRODUCTION

EnviroMatrix Pty Ltd has been appointed as the Independent Environmental Consultants by the South African National Roads Agency SOC Limited (SANRAL) as part of the Aurecon Engineering Consulting Team, for the Environmental Authorisation application processes in terms of the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA). The Aurecon Engineering Consulting Team consists of Aurecon SA (Pty) Ltd, MPA Consulting Engineers, V3 Consulting Engineers and Leporogo Specialist Engineers.

SANRAL, as applicant, is committed to conducting its planning and design, construction, operation and maintenance, in accordance with the guidance of the competent authority and the requirements of the NEMA. SANRAL's aim is also to facilitate a mutually beneficial relationship between themselves as proponent and their stakeholders. This they try to achieve, by seeking to identify and inform interested parties, by providing regular updates and communicating to participants how their input affected decisions taken.

The construction work is for the upgrading of National Route 1 Section 16 (N1-16) between Winburg Station (km 89.8) and Ventersburg (km 133.53). The N1-16 road upgrading project is located within the Free State Province, within the Lejweleputswa and Thabo Mofutsanyana District Municipalities, and the Masilonyana Local Municipality, Matjhabeng Local Municipality and Setsoto Local Municipalities.

The new road will be parallel to the existing road and has an approximate length of 44 km. An access management plan will also be implemented to reduce the number of locations with direct access to the N1-16 throughout the construction of new service roads approximately 46 Km in length. The reconstruction and/or upgrade of four (4) bridges over the Erasmus Spruit, Koolspruit, Sand River and Venterspruit is envisage as well as seventeen (17) major culverts plus ±160 smaller culverts and storm water pipes are also planned along the road.

The **Environmental Authorisation for the roadworks** is regulated by the National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA). Amended Environmental Impact Assessment Regulations, 2014 (GN R982 in GG 38382 of 4 December 2014: National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014 (GN 982)) that regulate the environmental authorisation process and list activities that may not commence without Environmental Authorisation from the Competent Authority in the following regulations:

- GN R983 in GG 38382 of 4 December 2014: Listing notice 1: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R983)
- GN R984 in GG 38382 of 4 December 2014: Listing notice 2: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R984)
- GN R985 in GG 38382 of 4 December 2014: Listing notice 3: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R985)

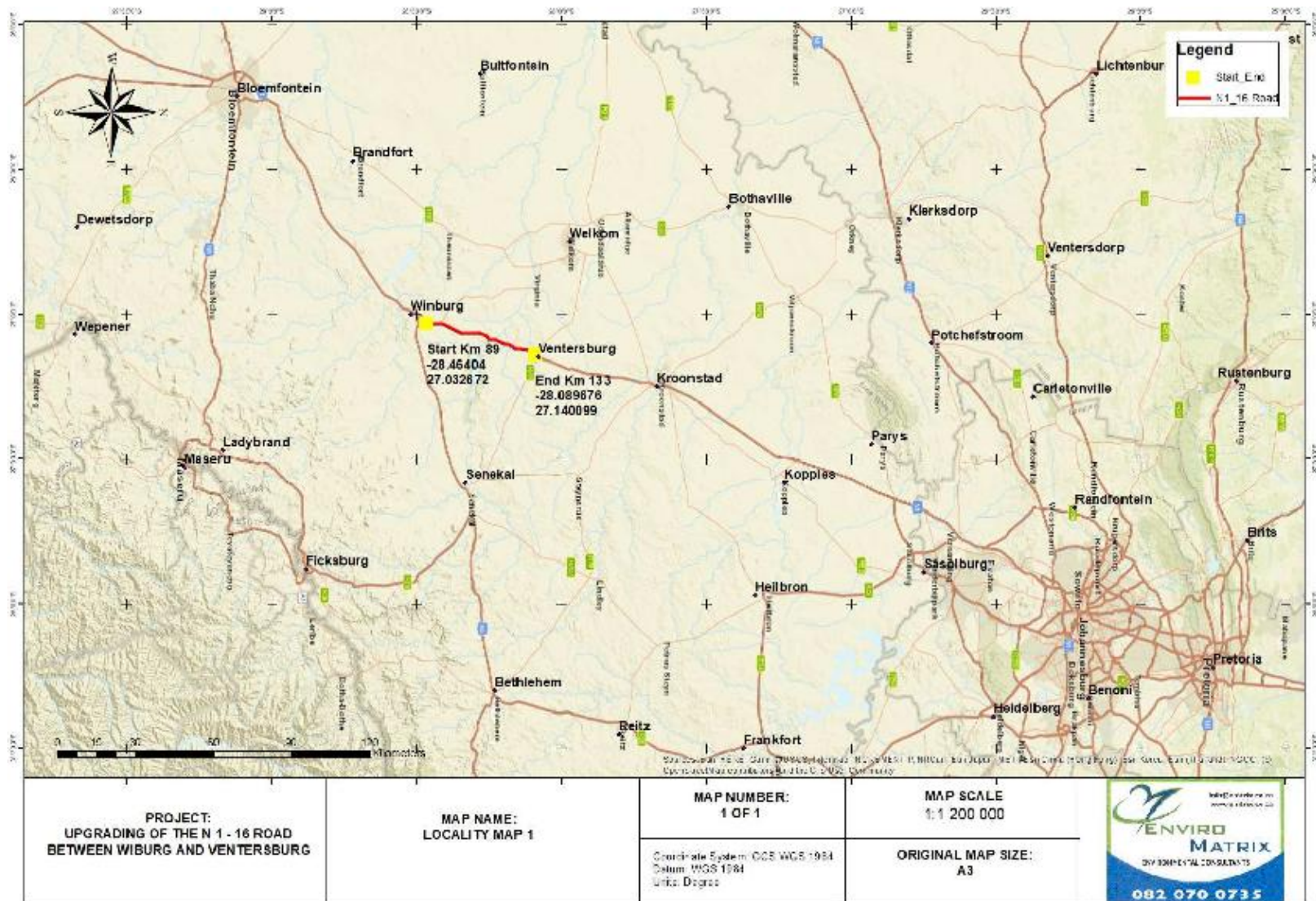


Figure 1: Project locality

It is anticipated that the planned upgrading of the N1-16 with service roads will trigger the following activities:

Listing Notice 1 activities in GN R983 is for the road works construction the following:

- Activity 12; Construction of bridges bigger than 100m<sup>2</sup> within or close to watercourses
- Activity 19; Construction activities within or close to a water course
- Activity 24; Development of new service roads
- Activity 31; The decommissioning of existing structures (i.e. bridges)
- Activity 48; Extension of culverts within or close to a watercourse
- Activity 56; Widening of the existing N1 and service roads

Listing Notice 3 activities in GN R985 is within the Free State the following:

- Activity 12; clearance of 300m<sup>2</sup> indigenous vegetation within or close to watercourses
- Activity 14; Reconstruction of bridge within 5Km from proclaimed nature reserve
- Activity 18; Widening of the N1 within 5Km from proclaimed nature reserve

A more detailed description of the applicable listed activities is given in Chapter 7.1 of this document.

## 2 BACKGROUND

### 2.1 Applicant

South African National Roads Agency SOC Limited (SANRAL), as the applicant, initiated during 2018 the environmental authorisation process for the upgrading of the National Route 1 Section 16 (N1-16) between Winburg Station (km 89.8) and Ventersburg (km 133.53).

CONTACT DETAILS: The South African National Roads Agency SOC LIMITED  
Postal address: P.O. Box 100410  
Scottsville, 3201

Physical Address: 58 Van Eck Place  
Mkondeni  
Pietermaritzburg

CONTACT PERSON: Ms. Stephné Wilmot  
Regional Manager: Eastern Region  
Tel: 033-392 8100  
Tel: 076 347 5744  
E-mail: wilmots@nra.co.za

The company registration letter is included in Appendix A.

SANRAL Letter of employment of Contact person (Project Manager) is included in Appendix A

### 2.2 Environmental Assessment Practitioner (EAP)

EnviroMatrix (Pty) Ltd. (EnviroMatrix) has been appointed as the Independent Environmental Consultants by the South African National Roads Agency SOC Limited (SANRAL) as part of the Aurecon Engineering Consulting Team. Enviromatrix has been in existence since 2013 and is operating from their office in Bethlehem, Free State.

CONTACT DETAILS: ENVIROMATRIX  
Postal address: P.O. Box 2580  
Bethlehem, 9700

Physical Address: Plot 34  
Eden  
Bethlehem, 9700

LEAD EAP: Tom Hugo  
Phone: 082 070 0735  
Fax: 086 619 2136  
Email: tom@emtrix.co.za

**Table 1: Assessment Team**

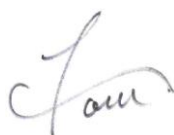
NAME	DESIGNATION	QUALIFICATION AND PROFESSIONAL REGISTRATION	YEARS OF EXPERIENCE
Tom Hugo	Director and Lead EAP	M. EM in Environmental Management Pri.Sci.Nat. (Reg. No. 400124/96)	13
Janette van der Walt	Environmental Consultant	B.Eng (Chemical Engineering), M.Sc (Environmental Studies)	10
Chris Kleynhans	Environmental Consultant	BA with specialization in Environmental Management	5

The appointment letter of EnviroMatrix by SANRAL is included in Appendix B as well as the CV of Mr Tom Hugo the EAP of the project.

### **DECLARATION OF INDEPENDENCE**

I, Thomas Arnoldus Hugo, ID 620720 5033 082, declare that I:

- am a Director of EnviroMatrix;
- act as an independent specialist consultant in the field of environmental management;
- am assigned as specialist consultant by Aurecon South Africa (Pty) Ltd for this project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- have or will not have any vested interest in the proposed activity proceeding;
- have no and will not engage in conflicting interests in the undertaking of the activity;
- undertake to disclose to the client and the competent authority any material, information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2014;
- will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.



TA Hugo MEM  
PriSciNat (No: 400124/96)

### 2.3 Objective of the report

In undertaking environmental assessments, SANRAL is committed to conduct its planning and design, construction, operation and maintenance, in accordance with the guidance of the competent authority and the requirements of NEMA. The Basic Assessment Report aims to provide information to the Department Environmental Affairs on all environmental impacts, mitigation and management aspects associated with the anticipated upgrading of the N1-16 Road.

The following objectives were considered in the technical assessment:

- The socio-economic and environmental context of the area in which the project is situated in order to provide the setting for the impacts as well as benefits of the project;
- The type of project, the project locations, the proposed method statement and technology is to be clearly described in order to ensure that a clear and thorough review process has been undertaken;
- Provide sufficient information to allow for an assessment to be made on the significant impacts that the project may have on the environment;
- The identification of feasible project alternatives, the identification of all positive and negative impacts on the environment and the identification of sustainable mitigation measures that can be adopted as part of the project; and
- To address all legislative requirements including proof of all public participation actions taken to notify all Stakeholders, Local and Provincial Governments, Landowners and Interested and Affected Parties (I&AP)

### 2.4 Structure of this report

The structure of the report is such that it addresses the aspects and requirements for a Basic Assessment Report. Below is a summary table of the main aspects and the referred chapter in this document that addresses the respective issues in line with the requirements of GN R982 in GG 38382 of 4 December 2014: National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014 (GN 982).

**Table 2: Report requirements**

GN R982 Appendix 1 Reg 3(1)	DESCRIPTION OF REQUIRED INFORMATION	WHERE SUPPLIED IN THIS BAR REPORT
(a)	Details of EAP, experience and CV	Chapter 2.2 and Appendix B
(b)	Location of activity	Chapter 4.1
	21 Digit Survey General code and farm name	Chapter 4.1.2
(c)	A plan which locates the proposed activity – in case of a linear activity, a description and coordinates of the corridor in which the proposed activity is to be undertaken	Chapter 4.1.1 and Appendix D
(d)	Description of the scope of proposed activity	Chapter 5
	All listed and specified activities triggered and being applied for	Chapter 7.1

GN R982 Appendix 1 Reg 3(1)	DESCRIPTION OF REQUIRED INFORMATION	WHERE SUPPLIED IN THIS BAR REPORT
(e)	Description of the policy and legislative context	Chapter 3
(f)	Motivation for the need and desirability for the proposed development	Chapter 2.5
(g)	Motivation for preferred site, activity and technology alternative	Chapter 5.3
(h)(i)	Details of alternatives considered	Chapter 5.3
(h)(ii)	Details of the Public Participation process	Chapter 6
(h)(iii)	Summary of issues raised by IAPs	Chapter 6.5 and Comment and Response Report in Appendix I.8
(h)(iv)	Environmental attribute	Chapter 4.3
(h)(v)	Impacts and risks including nature, significance, consequence, extent etc	Chapter 7.3 and Appendix J
(h)(vi)	Methodology used in determining and ranking	Chapter 7.2
(h)(vii)	Positive and negative impacts that the proposed will have on the environment and community	Chapter 7.3
(h)(viii)	Possible mitigation measures that could be applied and level of residual risk	Chapter 7.3
(h)(ix)	Site selection matrix	Not applicable. Site of upgrade to be next to existing road
(h)(xi)	Concluding statement	Chapter 7.5
(i)	Full description of the process undertaken to identify, assess and rank the impacts	Chapter 7.2, Appendix J
(j)	Assessment of each identified potentially significant impact and risk	Chapter 7.3 and Appendix J
(k)	Summary of the findings and impact management measures identified in any specialist reports	Chapter 4.4
(l)	Environmental Impact Statement	Chapter 7.5
(m)	Impact management measures from specialist reports for inclusion in the EMPr	EMP in Appendix H.1, Chapter 14 of EMP
(n)	Any aspects which were conditional to the findings of the assessment	Chapter 7.6
(o)	Description of any assumptions, uncertainties and gaps in knowledge	Chapter 9
(p)	Reasoned opinion as to whether the proposed activity should or should not be authorised	Chapter 10
(q)	Period for which the environmental authorisation is required, the date on which the activity will be concluded and the post construction monitoring finalised	Chapter 8.1
(r)	Undertaking under oath of affirmation by the EAP	Chapter 11
(s)	Financial provision for rehabilitation etc	Not applicable
(t)	Specific information required by Competent Authority	Chapter 6.6



GN R982 Appendix 1 Reg 3(1)	DESCRIPTION OF REQUIRED INFORMATION	WHERE SUPPLIED IN THIS BAR REPORT
(u)	Other matters required to section 24(4)(a) and (b) of NEMA <ul style="list-style-type: none"> <li>- Coordination and cooperation between organs of state</li> <li>- Environmental management as set out in Section 2 of NEMA</li> </ul>	As above and  Chapters 6.1.3 and 6.3  Chapter 2.5.11

## 2.5 Motivation for the project

The proposed upgrading of National Route 1 Section 16 (N1-16) between Winburg Station (km 89.8) and Ventersburg (km 133.53) is of strategic importance to South Africa. The proposed additional lanes will provide for future capacity, address pertinent road safety, hazards, and improve intersections. The upgrading of the N1-16 is aimed at accelerating economic growth and development in the designated regions of the country, through an increase in the safety of the flow and ease of transportation on the route. This is critical since the N1 is one of the major roads in South Africa with a high volume of traffic that flows along the route on a daily basis.

It was necessary for SANRAL to consider an upgrade of the road in order to satisfy traffic growth projections for at least the next 20 years. A high traffic growth rate for heavy vehicles of 3.7%.p.a is projected. This results in a likely traffic loading of 47 MESA. The road was constructed in 1970 and then again upgraded in 1996. Due to the increase in traffic, especially in heavy vehicles, the road is due for another upgrade to accommodate the increase in traffic and to ensure the safety of all road users.

### 2.5.1 Existing land-use rights

In terms of the property's existing land use rights - the rehabilitation of the existing N1-16 carriageway falls within the existing SANRAL owned N1 road reserve. The construction of a second lane carriageway falls within privately own land. The land uses surrounding the N1-16 are mainly defined as agricultural use with natural grazing dominant, alternated by cultivated fields. The existing N1-16 servitude belongs to SANRAL or the Ventersburg Municipality and was procured as part of the original N1-16 development. The new upgrading of the road will be passing, in some areas, through privately owned land. Some small portions of properties will have to be expropriated to expand the four link roads. Expropriation is governed by the Expropriation Act, 1975 (Act No. 63 of 1975) as amended, which requires compensation for the market value, actual financial loss and *solatium* (a consolation for loss). The expropriation process is separate from and will occur after the EIA process, as it can only be conducted once the project and preferred alternatives have been authorised and detailed design has been undertaken to identify exactly what additional land is needed for the intersections. Land-use rights is discussed in more detail in Chapter 4.1.2

### 2.5.2 National Development Plan

The National Development Plan (NDP) 2030 published in 2011 is a long term plan for South Africa for securing the future and to eliminate poverty, reduce inequality and should therefore accelerate economic growth. One of the core elements of the NDP 2030 is "*safe and reliable public transport*"<sup>1</sup> which includes the road network. In the section Economic Infrastructure (i.e. Chapter 4) the

<sup>1</sup> <https://nationalplanningcommission.wordpress.com/the-national-development-plan/>

envisaged goals for transport is also given to bridge the geographical divide, support economic development and promote a low-carbon economy. One of the key policy and planning priorities include the *“Strengthening and optimising freight corridors through expanding and improving the following corridors: North South Corridor”*<sup>2</sup> which is the N1 and stresses the importance of this national road in the road network.

According to the NDP for 2030 South Africa’s largest single public asset is its road network. National and provincial roads are the prime means of connecting people and moving cargo from small settlements and secondary towns to the centres of economic activity. In the short term, before expansions are considered, road maintenance campaigns in municipalities and rehabilitating provincial road networks are needed to prevent further deterioration.

In order to reach the strategic 2030 transportation goals *“a systematic approach to transport, which puts focus on the total transport network, will improve transport efficiency and accessibility while reducing the overall environmental, social and economic cost”*<sup>2</sup> is needed

### **2.5.3 Provincial Spatial Development Framework**

One of Governments development priorities also reflected in the Free State Provincial Spatial Development Framework (PSDF) of 7 March 2014<sup>3</sup> is to upgrade its road infrastructure and networks. Upgrading a National road running through the Free State is in line with Free States development priorities. In Table B26 p91 of the Free State PSDF the N1 corridor is listed as a development corridor for the Free state: *“The N1 Corridor runs from Cape Town to Johannesburg through the Free State. Bloemfontein is the most prominent node on this route. Other secondary nodes are Winburg, Ventersburg, and Kroonstad. The N1 highway is a primary corridor for the transport of freight goods and products between Cape Town and Johannesburg.”* Therefore the Chapter 8 (p178) key objective for the development of surface infrastructure – transport include: *“Provide and maintain an adequate road and railway transport system throughout the province and, in particular, along the defined transport routes, the main agricultural development nodes, and the primary settlement areas.”*

### **2.5.4 Integrated Development Plan (IDP) and Spatial Development Framework (SDF)**

The Masilonyana Local Municipality’s Draft Integrated Development Plan 2018 / 2019<sup>4</sup> and Matjhabeng Local Municipality’s Draft Integrated Development Plan 2017 / 2022<sup>5</sup> has as aim to align with national and provincial development plans. Most of the objectives for the municipalities are around social issues, service delivery and local economic development. The N1-16 project has the potential to create (temporarily during construction) some jobs and skills transfer which will with the social and economic objectives of the Municipality. Upgrading the N1-16 as proposed will also not influence the urban edge of the town Winburg or Ventersburg. The area is in dire need of this project and it is a societal priority as numerous accidents occur on the N1 in this area every year with associated loss of lives. Municipal services will not be applicable for this N1 upgrade, prior process water for road construction will be obtained from other legal sources, and approved by Department of Water and Sanitation.

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<sup>2</sup> <https://nationalplanningcommission.wordpress.com/economic-infrastructure/>

<sup>3</sup> <http://freestatepsdf.co.za/>

<sup>4</sup> <http://www.masilonyana.fs.gov.za/wp-content/uploads/2018/10/Masilonyana-IDP-draft-2018-2019.pdf>

<sup>5</sup> <http://www.matjhabeng.fs.gov.za/wp-content/uploads/2012/09/IDP-Process-Plan-2017-2022.pdf>

Upgrading activities associated with this N1 project, although close to Winburg and Ventersburg , will not enter either Winburg's or Ventersburg's SDF area. In other words the neither the SDF for Winburg nor for Ventersburg will be compromised. Construction activities will also remain within SANRAL's existing and proposed road reserve. The Ventersburg SDF is indicated in the figure below which indicates that the N1-16 project lies outside of the town's developmental area<sup>6</sup>.

Furthermore SANRAL is given the power to perform all strategic planning, as well as the planning, design, construction, operation, management, control, maintenance and rehabilitation of all national roads in South Africa in terms of the South African National Roads Agency Limited and National Roads Act, 1998 (Act No 7 of 1998). The N1-16 is a national road and falls within the jurisdiction of SANRAL and the development is not bound by the Municipality's approved plans in order to continue as it is not a residential development or municipal roads development.

### **2.5.5 Strategic Integrated Projects**

SIP 6: Integrated municipal infrastructure project aims to develop national capacity to assist the 23 least resourced districts (19 million people) to address all the maintenance backlogs and upgrades required in water, electricity and sanitation bulk infrastructure. The road maintenance program will enhance service delivery capacity thereby impacting positively on the population.<sup>7</sup> However, neither the Masilonyana Local Municipality nor the Matjhabeng Local Municipality have been identified as local municipalities in the 23 least resourced districts.

### **2.5.6 Environmental Management Framework**

The approval of this application will not compromise the integrity of any existing environmental management priorities for the area and it can be justified in terms of sustainability considerations. No significant long term impact is foreseen as a result of the upgrade of the road.

### **2.5.7 Person Rights**

It is not foreseen that any person's rights will be negatively affected by the proposed activity as no community displacement will take place. A public participation process were followed and the comments and concerns taken into account during the environmental process.

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<sup>6</sup> [http://www.matjhabeng.fs.gov.za/?page\\_id=5585](http://www.matjhabeng.fs.gov.za/?page_id=5585)

<sup>7</sup> <https://www.gov.za/issues/national-infrastructure-plan>

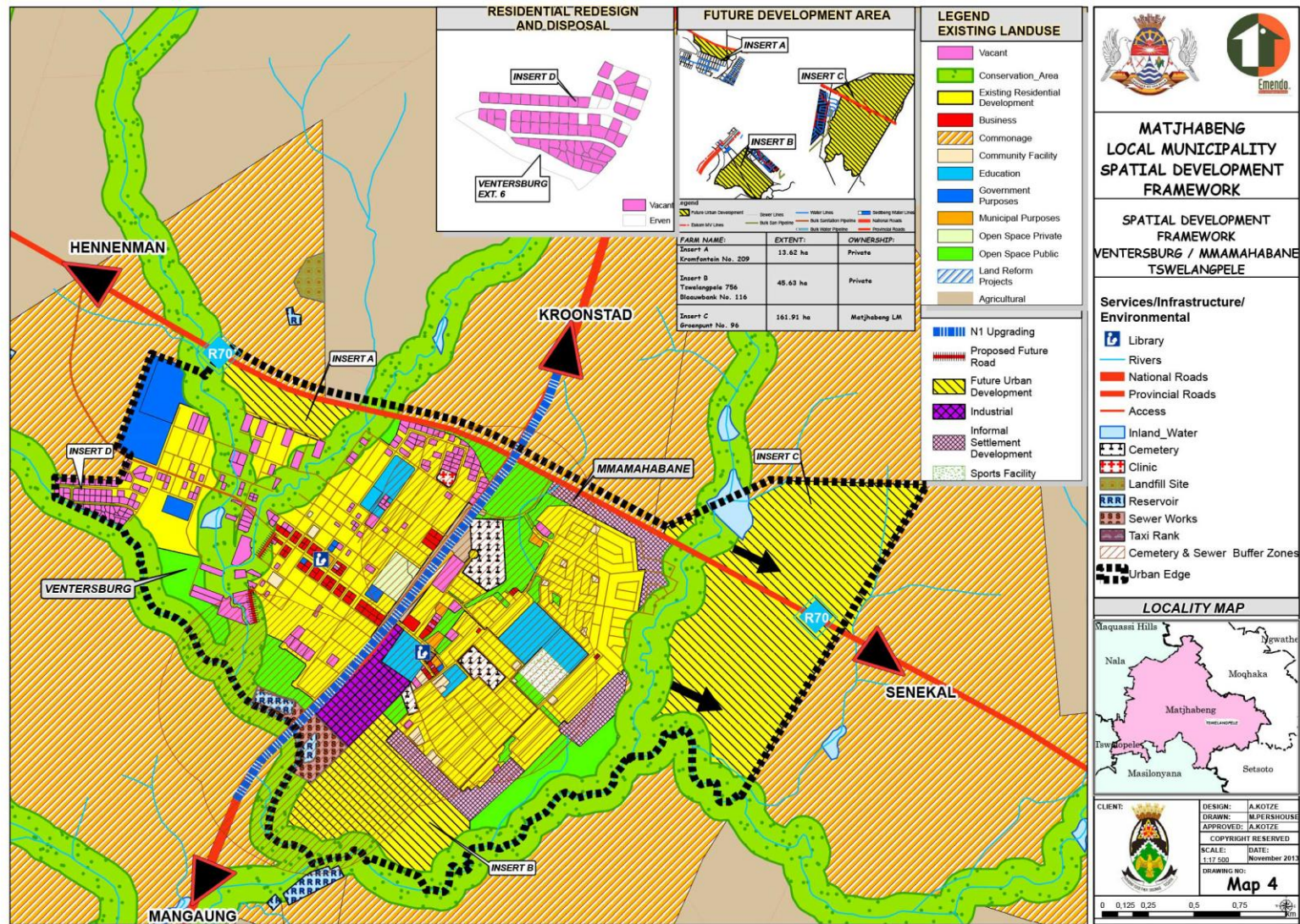


Figure 2: Ventersburg SDF

### 2.5.8 General benefits to society

The benefits of the proposed development will outweigh the negative impacts as the national road users are in dire need of this project as numerous accidents occur in this area every year with associated loss of lives. Crash data for road N1-16 between km 85.3 and km 133.15, was obtained from SANRAL (ITIS) for the years 2003 to 2016. It should be noted that the period between 2006 to end 2010 is missing, so the accident data is only for nine (9) years. The records show that over this time period (and section) 177 accidents occurred. The overall accident rate is therefore 19.67 accidents per annum. The data was also analysed according to the severity of the injuries incurred. A large percentage was found to be accidents resulting in no injuries at 45.2%. The fatal and serious injuries were found to be at 7.9% and 11.9% respectively. Thirteen (13) head on collisions occurred over the section (7.3%), eleven (11) of which occurred at night. Five (5) of these eleven (11) head on collisions at night resulted in fatalities and two (2) in serious injury. Furthermore as a safety element, the current one lane per direction on this section was noted as leading to unsafe behaviour due to driver frustration behind the high truck traffic on the corridor.

The road will, therefore, be widened with a low impact to the environmental but a high positive impact to the community at large.

The proposed road upgrade could offer several benefits to society in general, including:

- Decrease accidents due to additional double lane and at grade intersections there will be a safety enhancement;
- Safer driving conditions for the road users as the additional road lanes will provide opportunities to pass heavy vehicles;
- Turn movements and safety at the intersections will improve;
- With the upgrade of the road, less maintenance on vehicles are anticipated;
- Improved traffic flow of commuter traffic, particularly during peak periods;
- Reduced congestion;
- Improved drainage and other services. Existing drainage channels will also be improved.
- Employment opportunities for the local residents during construction.

There will likely be various disruptions on the use of the N1-16 road to motorists, during the proposed road upgrade and bridge expansion construction phases – including, but not limited to – delays caused by traffic control at the active construction areas. It is envisaged that no stop-go points will be used and that traffic can mostly be accommodated through the existing N1 lanes.

### 2.5.9 Integrated Environmental Management

Integrated environmental management (IEM) has evolved to be an underlying philosophy and set of principles, supported by a range of environmental assessment and management tools that are aimed at promoting sustainability. IEM has moved away from being defined in terms of particular processes. Rather, it provides a “*way of thinking*”<sup>8</sup> that can either be used to underpin a stand-alone process (e.g. EIA) or be integrated into existing complementary processes (e.g. integrated development planning). Some of the principles that underpin IEM are:

- Accountability and responsibility;

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<sup>8</sup> <https://www.environment.gov.za/sites/default/files/docs/series0%20overview.pdf>

- Alternative options
- Community empowerment
- Continual improvement
- Environmental Justice
- Holistic and informed decision making
- Institutional co-ordination
- Stakeholder engagement
- Sustainability
- Transparency

The objectives of IEM have been taken into account during the Basic Environmental Impact Assessment Process. Potential biophysical and socio-economic impacts on the environment have been identified and assessed. The significance of an identified impact was rated by taking into account its duration, scale, severity (magnitude) and the probability that the impact may occur. The findings of the specialist studies undertaken during this BAR provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. Mitigation measures have been proposed in order to minimise negative impacts and maximise positive benefits. A number of alternatives were evaluated by the environmental consultant as well as various specialist consultants in order to propose the most acceptable alternative from an environmental and risk perspective. The public consultation process has been undertaken to assist in the identification of significant issues, and every effort has been made to include representatives of all stakeholders within the process.

#### **2.5.10 Best Practicable Environmental Option**

NEMA defines in Section 1 the best practicable environmental option (BPEO) to mean *“the option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term.”* It is also seen as an integral part of Environmental Management and the philosophy used in the selection of alternatives.

#### **2.5.11 Section 2 of NEMA Principles**

In Section 2 of NEMA the Act makes provision for principles to respect, protect, promote and fulfil the social and economic rights. It further serves as a *“framework within which environmental management and implementation plans must be formulated.”* The following principles were incorporated in the environmental assessment and water use assessment for the project:

- The Environmental Management Plan puts people in the forefront and take into account their physical, psychological, developmental, cultural and social interests;
- As far as practicable the project was developed in a socially, environmental and economically sustainable manner;
- As far as possible the disturbance of ecosystems and loss of biological diversity will be avoided or where it cannot be altogether avoided, is minimised and remedied;
- As far as possible the disturbance of landscapes and sites that constitute the nation's cultural heritage will be avoided or where it cannot be altogether avoided, is minimised and remedied;
- As far as possible a risk-averse and cautious approach was applied in-line with the precautionary principle;

- The negative impacts on the environment and on people's environmental rights were assessed in the Environmental Impact Assessment and mitigated as well as managed through the Environmental Management Plan;
- Through the project's stakeholder engagement process the participation of all interested and affected parties in the project's environmental governance was promoted
- Special attention was given to sensitive and vulnerable ecosystems such as the wetlands near the project area in the specialist studies, assessment and management of the project.
- In the overall assessment of the project social, economic and environmental impacts of activities, including disadvantages and benefits were considered.

### 3 LEGAL FRAMEWORK

The Constitution of the Republic of South Africa, 1996 (Constitution) compels all of us to ensure the rights of South African citizens are protected. Section 24 of the Constitution provides everyone with the right:

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

The proposed upgrading of the N1-16 road has need of authorisation in terms of numerous legislative frameworks. A list of legislative requirements and/or authorisations is provided below and will form part of the pre-construction studies that have need of approval before the project can embark. The planned activities of the proposed road development need to be compliant with relevant environmental legislation and policies. The following legal requirements must be adhered to:

1. National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA); applications to the Department of Environmental Affairs' Pretoria Office, for the following planned construction activities:
  - a. widening of the original N1
  - b. widening or building of service roads
  - c. borrow pit establishment.
2. National Water Act, 1998 (Act No 36 of 1998) (NWA); applications to the Department of Water and Sanitation's Bloemfontein Office, for water use licences for each stream and river crossing as well as potential abstraction points.
3. Minerals, and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA); registering the mining activity and the closing thereof after the construction period ended at the Department of Mineral Resources' Welkom Office.
4. National Heritage Act, 1999 (Act No. 25 of 1999); obtain authorisation from the South African Heritage Resources Agency in Cape Town.

Each individual legislative authorisation has an essential share in the Integrated Water Use License Application and must not be perceived as isolated studies.

#### 3.1 National Environmental Management Act, 1998 (Act No 107 of 1998)

The National Environmental Management Act, 1998 (Act No 107 of 1998) (NEMA) can be regarded as a very important piece of overarching environmental legislation. It provides a framework for environmental law reform and covers three areas, namely:

- Land, planning and development;
- Natural and cultural resources, use and conservation; and
- Pollution control and waste management.



The law is based on the principles of sustainable development and duty of care. The objective of the NEMA is to provide for co-operative environmental governance through a series of principles relating to:

- The procedures for state decision-making on the environment; and
- The institutions of state which make those decisions.

The NEMA principles serve as:

- A general framework for environmental planning;
- Guidelines according to which the state must exercise its environmental functions; and
- A guide to the interpretation of NEMA itself and of any other law relating to the environment.

Some of the most important principles contained in NEMA are that:

- Environmental management must put people and their needs first;
- Development must be socially, environmentally and economically sustainable;
- There should be equal access to environmental resources, benefits and services to meet basic human needs;
- Government should promote public participation when making decisions about the environment;
- Communities must be given environmental education;
- Workers have the right to refuse to do work that is harmful to their health or to the environment;
- Decisions must be taken in an open and transparent manner and there must be access to information;
- The role of youth and women in environmental management must be recognised;
- The person or company who pollutes the environment must pay to clean it up;
- The environment is held in trust by the state for the benefit of all South Africans; and
- The utmost caution should be used when permission for new developments is granted.

NEMA also makes provision for the requirement of an Environmental Authorisation (Section 24) before a project may commence. This include *“the potential consequences for or impacts on the environment of listed activities or specified activities must be considered, investigated, assessed and reported on to the competent authority”*.

### **3.1.1 Environmental Impact Assessment (EIA) Regulations**

A Scoping and Environmental Impact Reporting (S&EIR) process is applicable to all projects likely to have significant environmental impacts due to their nature or extent, activities associated with potentially high levels of environmental degradation, or activities for which the impacts cannot be easily predicted. In comparison a Basic Assessment (BA) is required for projects with less significant impacts or impacts that can easily be mitigated. The difference between the processes relates to the nature of the proposed development in terms of its potential impact on the environment, and this is reflected in the level of detail that information is collected in as well as the level of interaction with Interested and Affected Parties (I&APs).

Amended Environmental Impact Assessment Regulations, 2014 (GN R982 in GG 38382 of 4 December 2014: National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014 (GN 982)) that regulate the environmental authorisation process and list activities that may not commence without Environmental Authorisation from the Competent Authority in the following regulations:

- GN R983 in GG 38382 of 4 December 2014: Listing notice 1: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R983)
- GN R984 in GG 38382 of 4 December 2014: Listing notice 2: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R984)
- GN R985 in GG 38382 of 4 December 2014: Listing notice 3: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R985)

It is anticipated that the planned upgrading of the N1-16 with service roads will trigger the following activities:

Listing Notice 1 activities in GN R983 is for the road works construction the following:

- Activity 12; Construction of bridges bigger than 100m<sup>2</sup> within or close to watercourses
- Activity 19; Construction activities within or close to a water course
- Activity 24; Development of new service roads
- Activity 31; The decommissioning of existing structures (i.e. bridges)
- Activity 48; Extension of culverts within or close to a watercourse
- Activity 56; Widening of the existing N1 and service roads

Listing Notice 3 activities in GN R985 is within the Free State the following:

- Activity 12; clearance of 300m<sup>2</sup> indigenous vegetation within or close to watercourses
- Activity 14; Reconstruction of bridge within 5Km from proclaimed nature reserve
- Activity 18; Widening of the N1 within 5Km from proclaimed nature reserve

### **3.2 National Water Act, 1998 (Act No 36 of 1998)**

The National Water Act, 1998 (Act No 36 of 1998) (NWA) guides the management of water in South Africa as a common resource. The Act aims to regulate the use of water and activities which may impact on water resources through the categorisation of 'listed water uses' encompassing water extraction, flow attenuation within catchments as well as the potential contamination of water resources, where the Department of Water and Sanitation (DWS) is the administering body in this regard. Should the proposed activities associated with the proposed project impact on water resources e.g. cross through rivers, the applicant would be responsible to obtain a Water Use Licence (WUL) from the DWS.

Section 21 of the NWA defines various water uses, while Section 22 requires that a person may only use water if licensed in terms of the NWA. The use of water does not necessarily mean the consumptive use thereof, but covers any aspects that have or could have an impact on a watercourse.

Water uses are defined in the NWA and include the following activities as described in Section 21 of the Act: “Section 21

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

In terms of Section 22(1) of NWA a person may only undertake the abovementioned water uses if it is appropriately authorised:

S22 (1) “A person may only use water (a) without a licence

- i. if that water use is permissible under Schedule 1;
  - ii. if that water use is permissible as a continuation of an existing lawful use; Or
  - iii. if that water use is permissible in terms of a general authorisation issued under Section 39;
- (b) if the water use is authorised by a licence under this Act; or
- (c) if the responsible authority has dispensed with a licence requirement under subsection (3).”

The Water Use Application is controlled by the NWA. The NWA provides the DWS with the mandate to protect, use, develop, conserve, manage and control the country’s water resources in an integrated manner. In terms of section 21 of the NWA there are approximately 40 water crossings that may require authorisation. The development relates to the following in section 21 of the NWA:

- Section 21 (c) Temporarily impeding the flow of water during the construction of the road
- Section 21 (i) Temporarily altering the bed, banks, courses or characteristics of watercourses during the construction of the road.

### **3.3 Minerals, and Petroleum Resources Development Act, 2002 (Act No 28 of 2002)**

The Mining Permit for the borrow pits excavation and closure is governed by the Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) (MPRDA). However, as an organ of state, the SANRAL has obtained exemption from the provisions of sections 16, 20, 22 and 27 (application process) of the MPRDA (as per GN 982 – GN 985) in respect of any activity to remove

any material for the construction and maintenance of dams, harbours, roads and railway lines and for the purposes incidental thereto, as allowed by the said act in section 106 (1).

As such the utilisation of resources is subject only to the preparation, submission and approval of a Basic Assessment Report and Environmental Management Plan, compiled in accordance with the requirements of NEMA and MPRDA. However, the exemption does not exempt SANRAL from the EIA Regulations in their entirety; for example, SANRAL still requires environmental authorisation for associated activities such as clearance of indigenous vegetation or removal or depositing of material from a watercourse. Pending the size and locality of the borrow pits the environmental authorisation application will be either a Basic Assessment process or an Environmental Impact Assessment in terms of the Amended Impact Assessment Regulations GN 982 – 985 of 14 December 2014.

### **3.4 National Heritage Resources Act, 1999 (Act No 25 of 1999)**

Legislation regarding Archaeology and Heritage is provided for in section 34, 35 and 36 of the National Heritage Resources Act, 1999 (Act No 25 of 1999) (NHRA). In terms of Section 38 of the NHRA the following developments require a Heritage Impact Assessment prior to proceeding with construction:

- Any development or other activity which will change the character of a site
- Exceeding 5 000 m<sup>2</sup> in extent; or
- Involving three or more existing erven or subdivisions thereof; or
- Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
- The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- The re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or
- Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

On the development of an area this legislation states that (section 38), “...any person who intends to undertake a development categorised as (d) exceeding 5000m<sup>2</sup> in extent”, must conduct a phase 1 heritage investigation to confirm the possibility of identified heritage or archaeological findings”. There are known areas of significance for heritage management and therefore it is recommended that at least a Phase 1 Heritage impact assessment be conducted and the necessary approvals be obtained from the authorities.

### **3.5 National Environmental Management: Waste Act, 2008 (Act No 59 of 2008)**

Improper waste management practices can lead to pollution of air, water and land resources and cause human health risks. The National Environmental Management: Waste Act, 2008 (Act No 59 of 2008) (NEM:WA) provides the national regulatory framework for waste management where one of the strategic goals is given as: “Pollution prevention, waste minimization, impact management and

*remediation” with the objective of: “Resource recovery, recycling and reuse mechanisms including the reduction in the waste stream by ensuring an economic environment which favours recycled materials”.*

Listed activities appear in Regulations published under NEM:WA. With respect to this proposed road development none of the listed activities will be triggered. Therefore none of the activities are applicable and no prior licensing in terms of these regulations is required.

### **3.6 National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)**

National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004) (NEM:BA) provides for the management and conservation of South Africa’s biodiversity. It provides the framework for:

- the protection of species and ecosystems that warrant national protection;
- the sustainable use of indigenous biological resources;
- the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; and
- the establishment and functions of a South African National Biodiversity Institute

### **3.7 National Environmental Management: Air Quality Act, 2004 (Act No 39 of 2004)**

The National Environmental Management: Air Quality Act (Act No 39 of 2004) (NEM:AQA) regulates the air quality in South Africa in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation.

Listed activities appear in Regulations published under NEM:AQA. With respect to this proposed road development none of the listed activities will be triggered. Therefore none of the activities are applicable and no prior licensing in terms of these regulations is required.

### **3.8 Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983)**

The Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983) (CARA) regulates the utilization and protection of wetlands, soil conservation and all matters relating thereto; control and prevention of veld fires, control of weeds and invader plants, the prevention of water pollution resulting from farming practices and losses in biodiversity.

### **3.9 South African National Roads Agency and National Roads Act, 1998 (Act No 7 of 1998)**

The Act makes provision for a national roads agency for the Republic to manage and control the Republic’s national roads system and take charge, amongst others, of the development, maintenance and rehabilitation of national roads within the framework of government policy. For that purpose it provides for the establishment of The South African National Roads Agency Limited (SANRAL). It also defines SANRAL’s powers and functions, its financial and operational accountability as well as to regulate its functioning in regards to national roads.

## 4 SOCIO-ECONOMIC AND ENVIRONMENTAL CONTEXT

### 4.1 Project Locality

The N1-16 road applicable to the project is located between the towns of Winburg and Ventersburg. The projects limits are; Start km 89.2 (new carriageway) as well as km 89.8 (rehabilitation of existing carriageway) to End km 133.0 in Ventersburg (south of the overpass bridges).

Start Point – Winburg Station	28°27'50.54"S	27° 1'57.62"E
Middle of route	28°16'10.77"S	27° 4'13.08"E
End Point - Ventersburg	28° 5'22.83"S	27° 8'24.36"E

The project locality is illustrated in the map on the next page.

#### 4.1.1 Layout/Route plan

The projects limits are; Start km 89.2 (new carriageway) as well as km 89.8 (rehabilitation of existing carriageway) to End km 133.0 in Ventersburg (south of the overpass bridges). The total length of road N1-16 under consideration is approximately 43.8km. An access management plan where the number of locations with direct access to the N1-16 is reduced, is planned. This means that approximately 46km of access/service roads will be constructed next to the proposed N1-16 and other secondary roads.

The proposed project layout is illustrated in Figures 4 and 5 and is also provided in Appendix D. Figures 4 and 5 and Appendix D.1 is the overview maps of the entire route with details per section given in Appendix D.3 as indicated in the blocks on Figures 4 and 5.

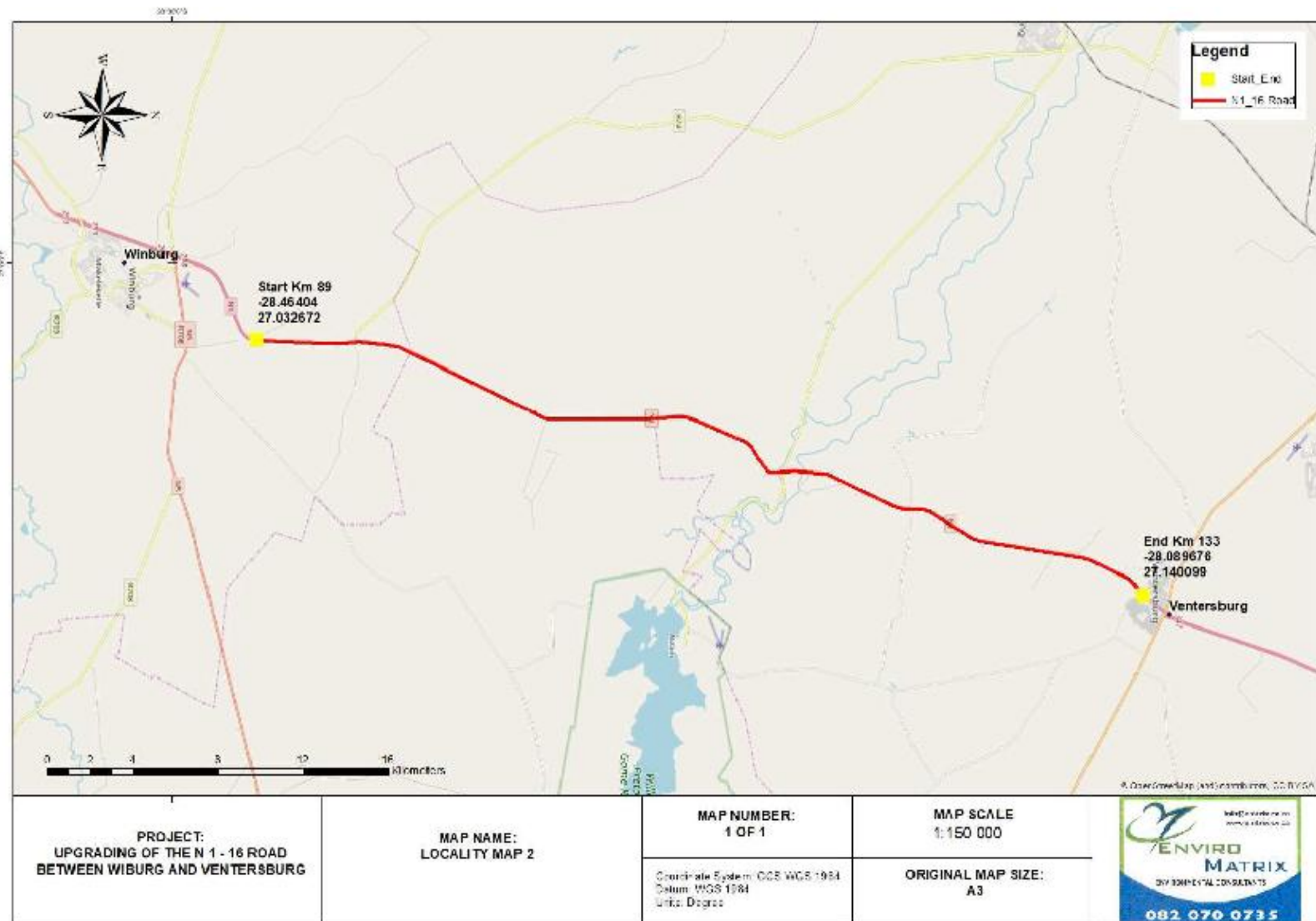


Figure 3: Project Locality

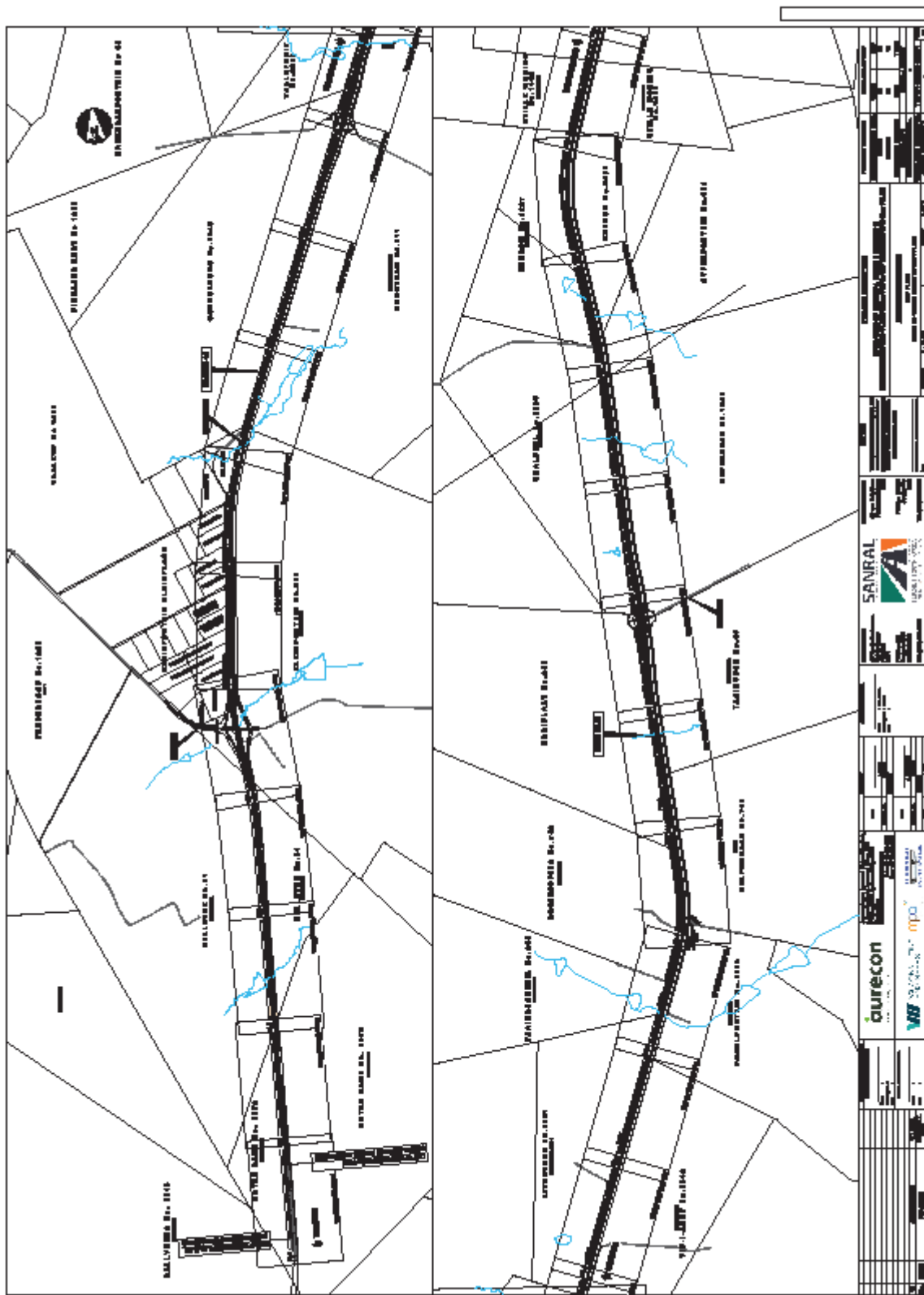


Figure 4: Key plan - N1-16 from km 88.18 – km 111.0



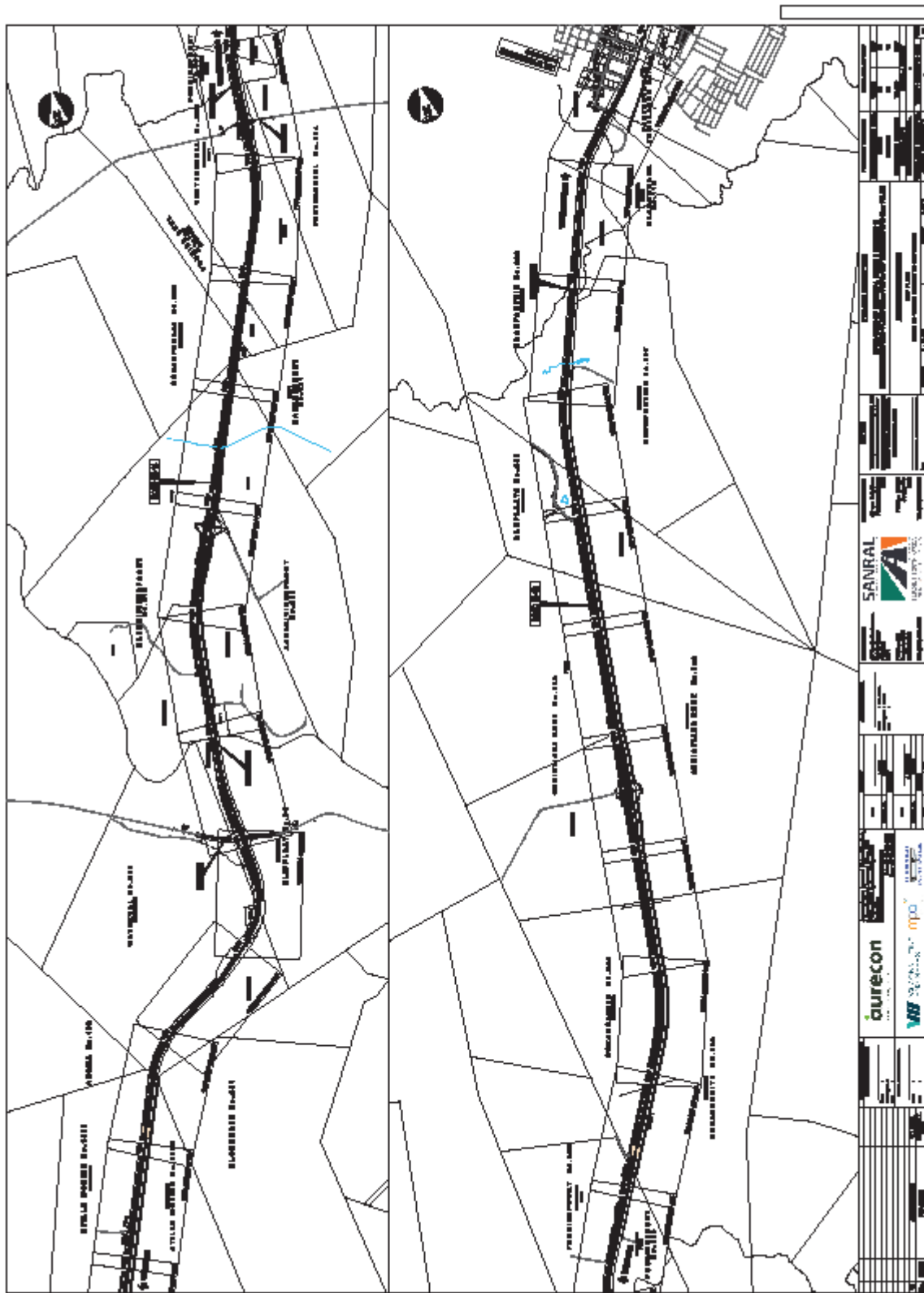


Figure 5: Key plan - N1-16 from km 111.0 – km 132.98

#### 4.1.2 Land Ownership and land use

The rehabilitation of the existing N1-16 carriageway falls within the existing SANRAL owned N1-16 road reserve. The construction of a second lane carriageway falls also within the existing SANRAL owned N1-16 road reserve except for some areas plus the access management plan that currently are located on privately owned land. The land uses surrounding the N1-16 are mainly defined as agricultural use with natural grazing dominant (grey areas on the map), alternated by cultivated fields (yellow areas on the map) as illustrated in Figure 6

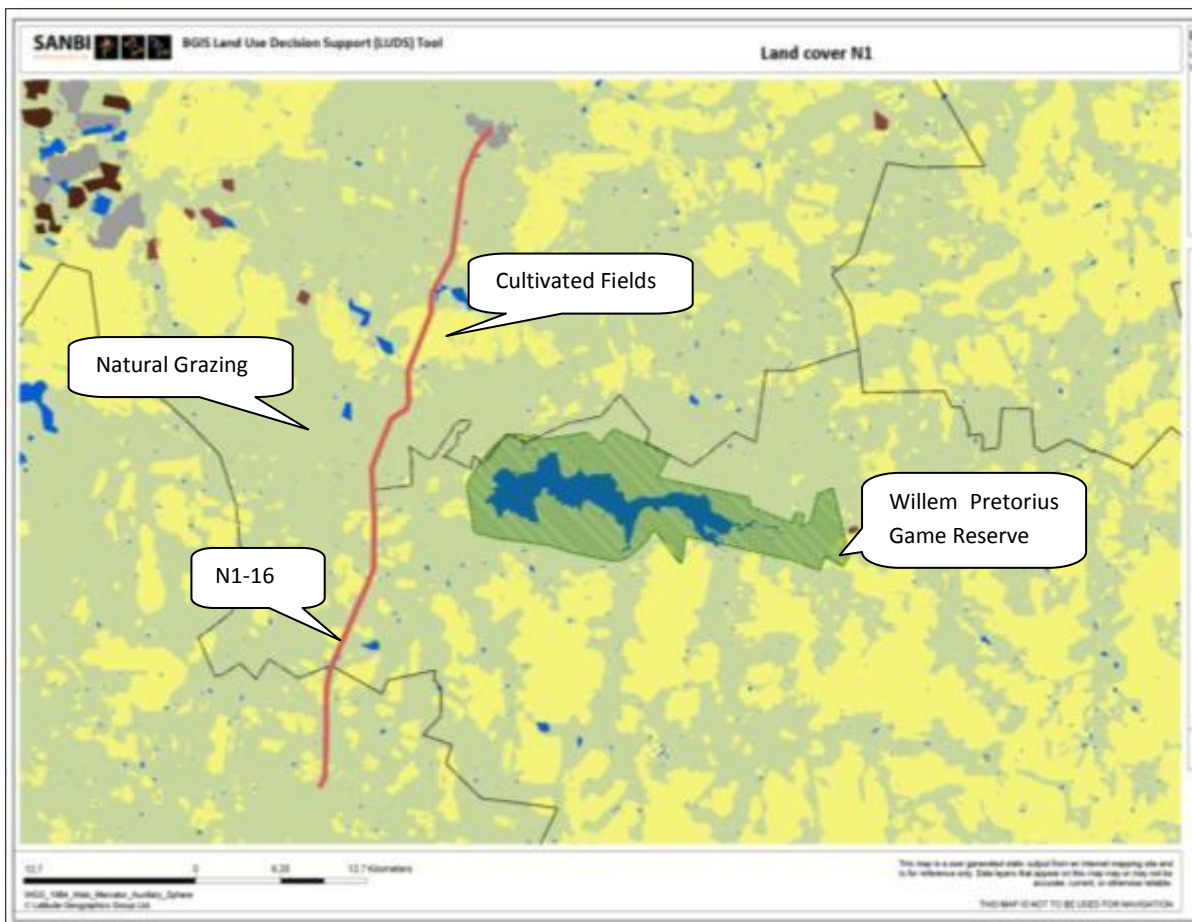


Figure 6: Land uses surrounding the N1-16

The existing N1-16 servitude belongs to SANRAL or the Ventersburg Municipality and was procured as part of the original N1-16 development. A list of the SANRAL owned land is provided in Table 3 as the road progresses through from Winburg Station along to Ventersburg.

Table 3: List of SANRAL owned properties

N O	FARM NAME	FARM PORTION	FARM NO.	SG NUMBER	REG. DIVISION	LAND OWNER
1	Ballymena	1	1243	F0420000000124300001		No Windeed – in existing road reserve (SANRAL)
2	Notre Dame	1	1576	F0420000000157600001	Windburg	SANRAL

<b>N O</b>	<b>FARM NAME</b>	<b>FARM PORTION</b>	<b>FARM NO.</b>	<b>SG NUMBER</b>	<b>REG. DIVISION</b>	<b>LAND OWNER</b>
3	Bellevue	1	51	F0420000000005100001	Windburg	SANRAL
4	Kleinfontein	2	808	F04200000000080800002	Windburg	SANRAL
5	Grootdam	3	611	F04200000000061100003	Windburg	SANRAL
6	Yip-I-Addy	1	1943	F04200000000194300001	Windburg	SANRAL
7	Vogelfontein	1	1970	F04200000000197000001	Windburg	SANRAL
8	Rooikoppies	1	749	F04200000000074900001	Windburg	SANRAL
9	Helpmakaar	2	708	F04200000000070800002	Windburg	SANRAL
10	Taaibosch	1/2	43	F0420000000004300002	Windburg	SANRAL
11	Esperanza	1	1553	F04200000000155300001	Windburg	SANRAL
12	Cyferfontein	1	631	F03500000000063100001	Windburg	No Windeed – in existing road reserve (SANRAL)
13	Keerom	1	2297	F04200000000229700001	Windburg	SANRAL
14	Stillewoning	1	1462	F04200000000146200001	Windburg	SANRAL
15	Waterval	2	310	F03500000000031000002	Ventersburg	SANRAL
16	Waterval	3	310	F03500000000031000003	Ventersburg	No Windeed – in existing road reserve (SANRAL)
17	Klipplaat	1	94	F0350000000009400001	Ventersburg	SANRAL
18	Zandriverspoort	8	213	F03500000000021300008	Ventersburg	SANRAL
19	Zandriverspoort	5	213	F03500000000021300005	Ventersburg	SANRAL
20	Zandriverspoort	7	213	F03500000000021300007	Ventersburg	SANRAL
21	Schaapdraai	1	333	F03500000000033300001	Ventersburg	SANRAL
22	Fouriesdeel	3	125	F03500000000012500003	Ventersburg	SANRAL
23	Ventersdeel	2	334	F03500000000033400002	Ventersburg	SANRAL
24	Fouriespoort	5	365	F03500000000036500005	Ventersburg	SANRAL
25	Fouriespoort	8	365	F03500000000036500008	Ventersburg	No Windeed – in existing road reserve (SANRAL)
26	Fouriespoort	6	365	F03500000000036500006	Ventersburg	No Windeed – in existing road reserve (SANRAL)
27	Corangamite	2	244	F03500000000024400002	Ventersburg	SANRAL
28	Christians Ruhe	2	350	F03500000000035000002	Ventersburg	SANRAL
29	Damplaats	1	556	F03500000000055600001	Ventersburg	SANRAL
30	Kromfontein	10	209	F03500000000020900010	Ventersburg	No Windeed – in existing road reserve (SANRAL)

<b>N O</b>	<b>FARM NAME</b>	<b>FARM PORTION</b>	<b>FARM NO.</b>	<b>SG NUMBER</b>	<b>REG. DIVISION</b>	<b>LAND OWNER</b>
31	Blaauwbank	3	116	F0350000000011600003	Ventersburg	No Windeed – in existing road reserve (SANRAL)
32	Ventersburg Dorpsgronde	20	354	F0350000000035400020	Ventersburg	No Windeed – in existing road reserve (SANRAL)

The new upgrading of the road will be passing, in some areas, through privately owned land. Some small portions of properties will have to be expropriated to expand the four link roads. Expropriation is governed by the Expropriation Act, 1975 (Act No 63 of 1975) as amended, which requires compensation at the market value, actual financial loss and *solatium* (a consolation for loss). The expropriation process is separate from and will occur after the EIA process, as it can only be conducted once the project and preferred alternatives have been authorised and detailed design has been undertaken to identify exactly what additional land is needed for the intersections.

These properties are earmarked for expropriation to accommodate the following:

- new carriageway of road N1-16
- new interchange (intersection of road R73 with the N1-16)
- new major at-grade intersections
- new access/frontage roads

**Table 4: List of privately owned properties**

<b>NO</b>	<b>FARM NAME</b>	<b>FARM PORTION</b>	<b>FARM NO.</b>	<b>SG NUMBER</b>	<b>REG. DIVISION</b>	<b>LAND OWNER</b>
1	Ballymena	Re	1243	F0420000000124300000	Windburg	EJ TRUST
2	Notre Dame	Re	1576	F0420000000157600000	Windburg	GUSTAVE WILHELM VAN DER MERWE
3	Bellevue	Re	51	F0420000000005100000	Windburg	MJ AZAR FAMILIE TRUST
4	Kleinfontein	Re	808	F0420000000080800000	Windburg	TEWIE & BETTIE WOL BOERDERY CC
5	Kleinfontein Small Holdings	0	1	F0420006000000100000	Windburg	WEBBER SUSAN MARY WESSELS PHILIP JOHN WESSELS MATTHEUS HENDRICUS
6	Kleinfontein Small Holdings	0	4	F0420006000000400000	Windburg	WEBBER SUSAN MARY WESSELS PHILIP JOHN WESSELS MATTHEUS HENDRICUS
7	Kleinfontein Small Holdings	0	5	F0420006000000500000	Windburg	ELOFF MULLER FAMILIE TRUST

NO	FARM NAME	FARM PORTION	FARM NO.	SG NUMBER	REG. DIVISION	LAND OWNER
8	Kleinfontein Small Holdings	0	8	F0420006000000800000	Windburg	MAHOLE MPHONG PHILLIP MAHOLE STOMPIE MAGDALINA
9	Kleinfontein Small Holdings	0	9	F0420006000000900000	Windburg	MAHOLE MPHONG PHILLIP MAHOLE STOMPIE MAGDALINA
10	Kleinfontein Small Holdings	0	10	F0420006000001000000	Windburg	VAN STRATEN LEON 6702045105082
11	Kleinfontein Small Holdings	0	23	F0420006000002300000	Windburg	VAN STRATEN LEON
12	Kleinfontein Small Holdings	0	24	F0420006000002400000	Windburg	VAN STRATEN LEON
13	Kleinfontein Small Holdings	0	25	F0420006000002500000	Windburg	PRETORIUS THERESA 7312080166087
14	Kleinfontein Small Holdings	0	26	F0420006000002600000	Windburg	PROVINCIAL GOVERNMENT OF THE FREE STATE
15	Kleinfontein Small Holdings	0	42	F0420006000004200000	Windburg	PROVINCIAL GOVERNMENT OF THE FREE STATE
16	Kleinfontein Small Holdings	0	43	F0420006000004300000	Windburg	NANTES KELDER FAMILIE TRUST
17	Goedgenoeg	0	2249	F0420000000224900000	Windburg	JACOB HENDRIK CORNELIS BOTES TESTAMENTERE TRUST BEKEND AS JAPIE BOTES
18	Grootdam	1	611	F0420000000061100001	Windburg	JACOB HENDRIK CORNELIS BOTES TESTAMENTERE TRUST BEKEND AS JAPIE BOTES
19	Vaalspruit	Re	2250	F0420000000225000000	Windburg	JACOB HENDRIK CORNELIS BOTES TESTAMENTERE TRUST BEKEND AS JAPIE BOTES
20	Liberage	1	2251	F0420000000225100000	Windburg	C W TRUST
21	Yip-I-Addy	Re	1943	F0420000000194300000	Windburg	MARIETTE TRUST
22	Vogelfontein	Re	1970	F0420000000197000000	Windburg	ZELPY 2184 PTY LTD
23	Taaiboschkuil	Re	844	F0420000000084400000	Windburg	ZELPY 2184 PTY LTD
24	Rooikoppies	Re	749	F0420000000074900000	Windburg	HILLS EDWIN HENNENMAN
25	Helpmakaar	1/Re	708	F0420000000070800001	Windburg	MACHPELA BOERDERY PTY LTD
26	Mooiplaat	0	846	F0420000000084600000	Windburg	HILLS EDWIN PIETER
27	Taaibosch	Re	43	F0420000000043000000	Windburg	FOURIE HESTER DORETHIA
28	Smaldeel	Re	2298	F0420000000229800000	Windburg	ULTIMA LANDGOED PTY LTD

NO	FARM NAME	FARM PORTION	FARM NO.	SG NUMBER	REG. DIVISION	LAND OWNER
29	Esperanza	Re	1553	F04200000000155300000	Windburg	DOORS & MARTIE KRUGER FAMILIE TRUST
30	Cyferfontein	Re	631	F03500000000063100000	Ventersburg	CYFERFONTEIN TRUST
31	Keerom	Re	2297	F04200000000229700000	Windburg	CASA NOSTRA TRUST
32	Stille woning	Re	1462	F04200000000146200000	Windburg	GERICKE LUCIA
33	Bloemhoek	0	544	F03500000000054400000	Ventersburg	DU PLOOY PIETER WILLEM
34	Waterval	Re	310	F03500000000031000000	Ventersburg	L M TRUST
35	Klipplaat	Re	94	F0350000000009400000	Ventersburg	MARIUS HONIBALL TRUST
36	Zandriverspoort	Re	213	F03500000000021300000	Ventersburg	REYNDERS CHRISTINA JOHANNA
37	Zandriverspoort	1	213	F03500000000021300000	Ventersburg	JANSEN VAN RENSBURG MICHAEL ANTONIE NICOLAS
38	Zandriverspoort	3	213	F03500000000021300003	Ventersburg	OVERBERG BOERDERY PTY LTD
39	Zandriverspoort	4	213	F03500000000021300004	Ventersburg	DE WET ALBERT HENNING
40	Schaapdraai	RE	333	F03500000000033300000	Ventersburg	HONIBALL MARTHINUS JOHANNES
41	Kareepoort	1	624	F03500000000062400001	Ventersburg	DE WET ALBERT HENNING
42	Fouriesdeel	1	125	F03500000000012500001	Ventersburg	LINDS TRUST
43	Fouriesdeel	Re	125	F03500000000012500000	Ventersburg	HONIBALL MARTHINUS JOHANNES
44	Ventersdeel	1	334	F03500000000033400001	Ventersburg	HONIBALL MARTHINUS JOHANNES
45	Fouriespoort	2	365	F03500000000036500002	Ventersburg	T J NEL FAMILIE TRUST
46	Fouriespoort	3	365	F03500000000036500003	Ventersburg	GOUEKRAANS WILD PTY LTD
47	Corangamite	Re	244	F03500000000024400000	Ventersburg	CORANGAMITE TRUST
48	Christians Ruhe	Re	350	F03500000000035000000	Ventersburg	MARIETTE TRUST
49	Christians Ruhe	1	350	F03500000000035000001	Ventersburg	ANNETTE TRUST
50	Damplaats	Re	556	F03500000000055600000	Ventersburg	TOWCON BESIGHEIDS TRUST
51	Kromfontein	Re	209	F03500000000020900000	Ventersburg	MATJHABENG LOCAL MUNICIPALITY
52	Kromfontein	0	767	F03500000000076700000	Ventersburg	VENTERSBURG ABATTOIR CC
53	Blaauwbank	1	116	F03500000000011600001	Ventersburg	MATJHABENG LOCAL MUNICIPALITY
54	Ventersburg Dorpsgronde	Re	354	F03500000000035400000	Ventersburg	MATJHABENG LOCAL MUNICIPALITY

#### **4.2 Regional setting and Socio economic context**

The upgrading of National Route 1 Section 16 (N1-16) between Winburg Station (km 89.8) and Ventersburg (km 133.53) is located within the Free State Province, within the Lejweleputswa and Thabo Mofutsanyana District Municipalities, and the Masilonyana Local Municipality, Matjhabeng Local Municipality and Setsoto Local Municipalities. A map of the Lejweleputswa District Municipality is given on the next page<sup>9</sup>.

The Masilonyana Municipality is an impoverished semi-urban area with high unemployment rates. The main economic sectors are agriculture, mining and community services. The Matjhabeng Local Municipality represents the hub of mining activity in the Free State with associated better employment figure than the neighbouring municipalities. The main economic sectors are mining and manufacturing. For a small section of the road, the N1-16 road borders the Setsoto Local Municipality in the Thabo Mofutsanyana District Municipality.

The following wards per municipality involved were identified as:

- Masilonyana Local Municipality: Wards 4 and 6.
- Matjhabeng Local Municipality: Wards 1 and 3 and
- Setsoto Local Municipality: Ward 3

A table with the contact details used in the stakeholder engagement process for the municipalities and wards are provided in Appendix I.1

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<sup>9</sup> <http://www.lejweleputswa.fs.gov.za/wp-content/uploads/2012/08/Lejweleputswa-District-Map-2011.pdf>

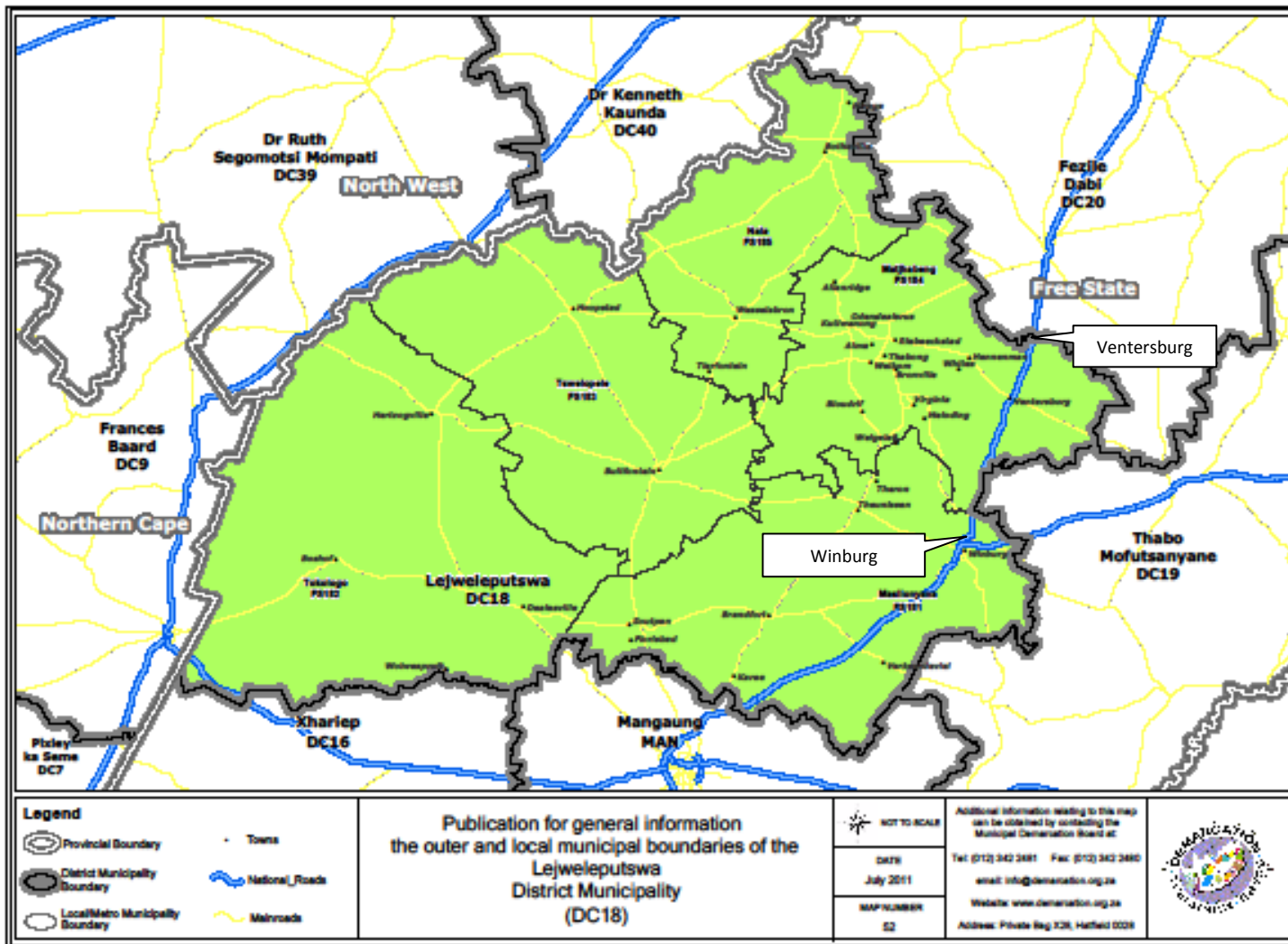


Figure 7: Lejweleputswa District Municipality



#### 4.2.1 Masilonyana Local Municipality

Masilonyana Local Municipality is part of Lejweleputswa District Municipality and consists of an area of 6 618 km<sup>2</sup> including the towns of Brandfort, Soutpan, Theunissen, Verkeerdevlei and Winburg.



Figure 8 : Masilonyana Local Municipality

Seventy seven percent (77.7 %) of the municipality has remained as natural habitat. There is one formal land-based protected area in the municipality, namely the Sandveld Nature Reserve (1740.9ha). There are no RAMSAR sites in the municipality. The municipality has one biome, namely Grassland. Nine vegetation types, are found in the municipal area. These are Bloemfontein Karroid Shrubland, Central Free State Grassland, Eastern Free State Clay Grassland, Highveld Alluvial Vegetation, Highveld Salt Pans, Vaalbos Rocky Shrubland, Vaal-Vet Sandy Grassland, Western Free State Clay Grassland and Winburg Grassy Shrubland. The project itself only affects the Central Free State Grassland and Winburg Grassy Shrubland vegetation areas.

There is one endangered ecosystem, namely Vaal-Vet Sandy Grassland covering 68029.2ha (10 %) of the municipality. There is also one threatened ecosystem, namely Eastern Free State Clay Grassland covering 1.18 % of the municipality. Seven rivers run through the municipality, namely the Groot Vet, Klein Vet, Korannaspruit, Laaispruit, Modder, Taaibospruit and Vet Rivers. Wetlands cover 19470.7ha (2.9%) of the municipal area.

The demographical information of the municipality is given in the table below<sup>10</sup>.

**Table 5: Masilonyana Local Municipality demographics**

	2016	2011
<b>Population</b>	62 770	59 895
<b>Age Structure</b>		
Population under 15	28.0%	29.7%
Population 15 to 64	66.7%	64.5%
Population over 65	5.4%	5.8%
<b>Dependency Ratio</b>		
Per 100 (15-64)	50.0	55.0
<b>Sex Ratio</b>		
Males per 100 females	103.7	102.0
<b>Population Growth</b>		
Per annum	1.07%	n/a
<b>Labour Market</b>		
Unemployment rate (official)	n/a	n/a
Youth unemployment rate (official) 15-34	n/a	n/a
<b>Education (aged 20 +)</b>		
No schooling	4.4%	7.7%
Matric	25.9%	21.1%
Higher education	6.0%	4.0%
<b>Household Dynamics</b>		
Households	21 558	16 476
Average household size	2.9	3.3
Female headed households	39.6%	43.1%

<sup>10</sup> <https://municipalities.co.za/overview/1043/masilonyana-local-municipality>

Formal dwellings	84.0%	82.6%
Housing owned	68.3%	64.8%
<b>Household Services</b>		
Flush toilet connected to sewerage	84.4%	69.9%
Weekly refuse removal	65.0%	52.9%
Piped water inside dwelling	26.5%	29.3%
Electricity for lighting	92.5%	93.3%

Source: <https://municipalities.co.za/overview/1043/masilonyana-local-municipality>

#### 4.2.2 Matjhabeng Local Municipality

Matjhabeng Local Municipality is part of Lejweleputswa District Municipality and contains an area of 5 690 km<sup>2</sup> including the towns of Allanridge, Hennenman, Odendaalsrus, Ventersburg, Virginia and Welkom.



Figure 9: Matjhabeng Local Municipality

The municipality covers an area of 515546.4ha of which 59.8 % has remained as natural habitat. There is one formal land-based protected area in the municipality, namely the Willem Pretorius Nature Reserve. There are no RAMSAR sites. There is one biome in the Matjhabeng Municipality covering 515546.5ha, namely Grassland. Seven vegetation types are found, namely Bloemfontein Karroid Shrubland, Central Free State Grassland, Highveld Alluvial Vegetation, Highveld Salt Pans, Vaal-Vet Sandy Grassland, Western Free State Clay Grassland and Winburg Grassy Shrubland. There is one endangered ecosystem, covering 56728ha (11%) of the Matjhabeng Municipality, namely the Vaal-Vet Sandy Grassland. There is only one water management area, namely the Middle Vaal. Five rivers run through the municipality, including the Koolspruit, Sand river, Sandspruit and Vet river. Wetlands cover 5.5 % of the Matjhabeng municipality.

The demographic information of the municipality is given in the table below<sup>11</sup>:

**Table 6: Matjhabeng Local Municipality demographics**

	2016	2011
Population	429 113	407 020
Age Structure		
Population under 15	25.0%	27.3%
Population 15 to 64	70.2%	68.1%
Population over 65	4.8%	4.7%
Dependency Ratio		
Per 100 (15-64)	42.4	46.9
Sex Ratio		
Males per 100 females	101.2	98.3
Population Growth		
Per annum	1.20%	n/a
Labour Market		
Unemployment rate (official)	n/a	n/a
Youth unemployment rate (official) 15-34	n/a	n/a
Education (aged 20 +)		
No schooling	3.0%	4.4%

<sup>11</sup> <https://municipalities.co.za/overview/1044/matjhabeng-local-municipality>

Matric	33.8%	27.2%
Higher education	7.9%	8.3%
Household Dynamics		
Households	149 163	123 382
Average household size	2.9	3.1
Female headed households	39.3%	39.8%
Formal dwellings	84.5%	78.5%
Housing owned	71.5%	58.5%
Household Services		
Flush toilet connected to sewerage	84.6%	81.0%
Weekly refuse removal	72.7%	86.1%
Piped water inside dwelling	53.3%	54.8%
Electricity for lighting	94.7%	91.1%

Source: <https://municipalities.co.za/overview/1044/matjhabeng-local-municipality>

#### 4.2.3 Setsoto Local Municipality

Setsoto Local Municipality is part of Thabo Mofutsanyana District Municipality with an area of 5 431km<sup>2</sup> and includes the following towns Clocolan, Ficksburg, Marquard and Senekal.



Figure 10: Setsoto Local Municipality

The demographical information of the municipality is given in the table below<sup>12</sup>:

Table 7: Setsoto Local Municipality demographics

	2016	2011
<b>Population</b>	117 362	112 038
<b>Age Structure</b>		
Population under 15	30.5%	32.1%
Population 15 to 64	63.9%	62.0%
Population over 65	5.7%	5.8%
<b>Dependency Ratio</b>		

<sup>12</sup> <https://municipalities.co.za/overview/1054/setsoto-local-municipality>

Per 100 (15-64)	56.6	61.2
<b>Sex Ratio</b>		
Males per 100 females	89.4	87.7
<b>Population Growth</b>		
Per annum	1.06%	n/a
<b>Labour Market</b>		
Unemployment rate (official)	n/a	n/a
Youth unemployment rate (official) 15-34	n/a	n/a
<b>Education (aged 20 +)</b>		
No schooling	4.2%	8.6%
Matric	27.6%	22.5%
Higher education	8.9%	6.6%
<b>Household Dynamics</b>		
Households	37 246	33 496
Average household size	3.2	3.3
Female headed households	47.2%	46.5%
Formal dwellings	76.6%	70.1%
Housing owned	59.0%	62.2%
<b>Household Services</b>		
Flush toilet connected to sewerage	64.1%	56.7%
Weekly refuse removal	58.3%	55.3%
Piped water inside dwelling	15.2%	31.3%
Electricity for lighting	92.5%	88.7%

Source: <https://municipalities.co.za/overview/1054/setsoto-local-municipality>

#### 4.2.4 SANRAL's Social Responsibility

The vision of the South African National Roads Agency SOC Ltd (SANRAL) is ensuring that the national road transport system delivers a better South Africa for all. Since its establishment 20 years ago, SANRAL has ensured that a significant portion of its work actually benefits the local labour

force, including small-, medium- and micro-enterprises (SMMEs) situated close to its national road network and projects. They also encourage the active participation of the local small businesses on all their projects. In general their aim is to have 30% of contract work done by local SMME's, preferably black and woman owned. This is especially applicable during the road maintenance phase of the project life cycle.

A key motivation is to enable local communities to continue to enjoy the long-term economic benefits of SANRAL projects long after they have been completed. SANRAL create job opportunities and help develop skills by training locals in the field of construction and road building. SMME's are also continuously trained to be able to manage their companies and their staff also undergoes training courses to teach them various technical skills related to the work of road building and maintenance. The intention is to leave behind skills and experience to assist the SMMEs and its employees to find work once the SANRAL contract has come to an end.

SANRAL's ten strategic objectives are<sup>13</sup>: 1. Improve SANRAL's reputation; 2. Provide and manage a safe national road network (primary avenues of mobility) to enable and contribute to economic growth and social development; 3. Utilise the primary road network system to spatially transform SA (integrated cities, accessible resources, services, facilities and locations); 4. Democratise the provision of the road network - broad-based black economic empowerment and transformation; 5. Ensure relevance and grow the footprint and impact of SANRAL by positively impacting on communities where we work, building cooperative relationships with other road authorities and departments for effective delivery, developing the capability and capacity of other roads authorities, and enhancing job creation; utilise technology, research and innovation to advance the provision, operation and management of the national road system (meet road-user needs); 7. Pursue adequate government funding to sustainably operate and maintain the national road network. In addition, explore, develop and implement a diversified funding strategy and exploit opportunities for the use of the user pays principle; 8. Lead and/or contribute to South Africa's regional integration objectives and obligations through infrastructure development, human capital, technical know-how and skills development; 9. Pursue global interests and develop a strong commercial business case; 10. Ensure sustainability in the provision of roads inclusive of safety, the environment, resources efficiency, good corporate citizenship and governance

### **4.3 Environmental context**

#### **4.3.1 Climate conditions**

Winburg and Ventersburg lies in the central part of the Free State Province. The climate can therefore be described as moderately warm in summer, and cold in winter. Both towns receive on average between 500 – 580 mm of rain per year, mostly during the summer months (September to May). During the rainy season, there are approximately ten days per month with rain or thundershowers and from February to May fog can be expected on average three days per month.

For eight months of the year the minimum temperatures vary between 8°C and 16°C, whilst the maximum temperatures vary between 20°C and 25°C. The winter months (May to August) tend to

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<sup>13</sup> <https://nationalgovernment.co.za/units/view/175/the-south-african-national-roads-agency-soc-ltd-sanral>



be cold, with between twenty-three and twenty-five days per month with temperatures below freezing, and maximum temperatures on average 15°C.

These climatic conditions indicate nothing extraordinary, and with proper planning, no undue weather delays should occur during construction.

The average temperature and rainfall data over a year for Winburg and Ventersburg is given in the figures below<sup>14, 15</sup>:

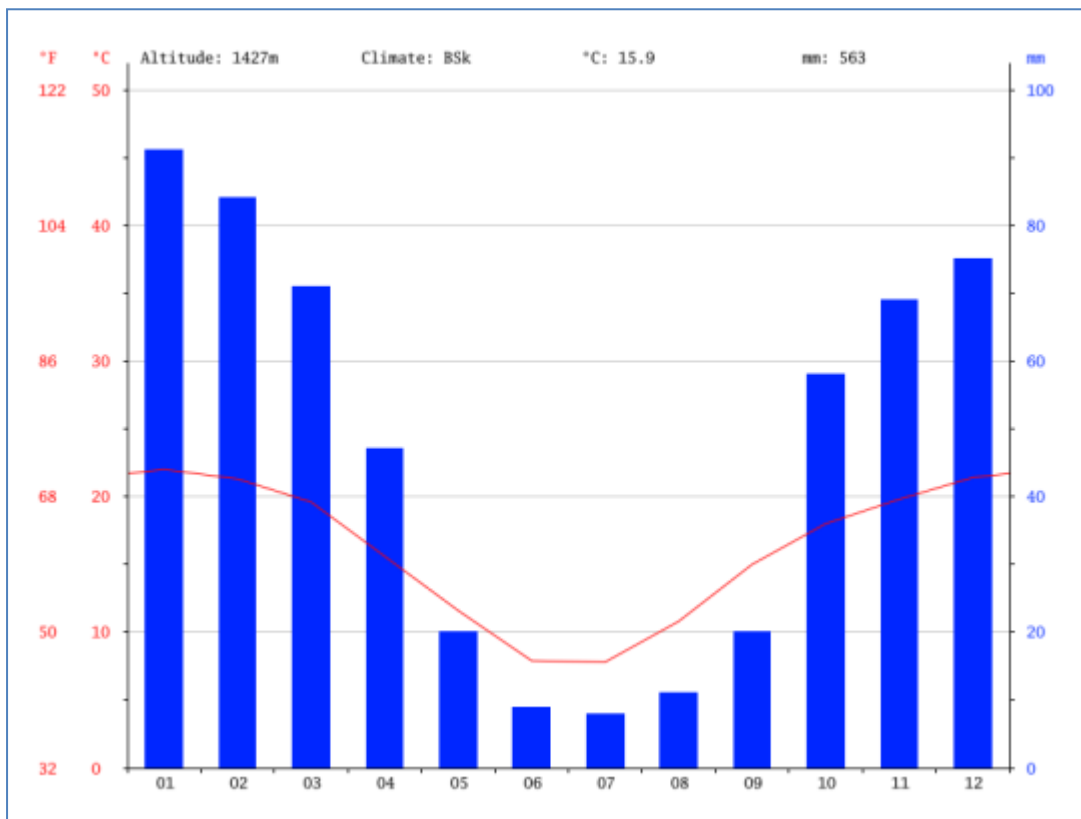


Figure 11: Average temperature and rainfall data for Winburg

<sup>14</sup> <https://en.climate-data.org/africa/south-africa/free-state/winburg-12773/>

<sup>15</sup> <https://en.climate-data.org/africa/south-africa/free-state/ventersburg-19401/>

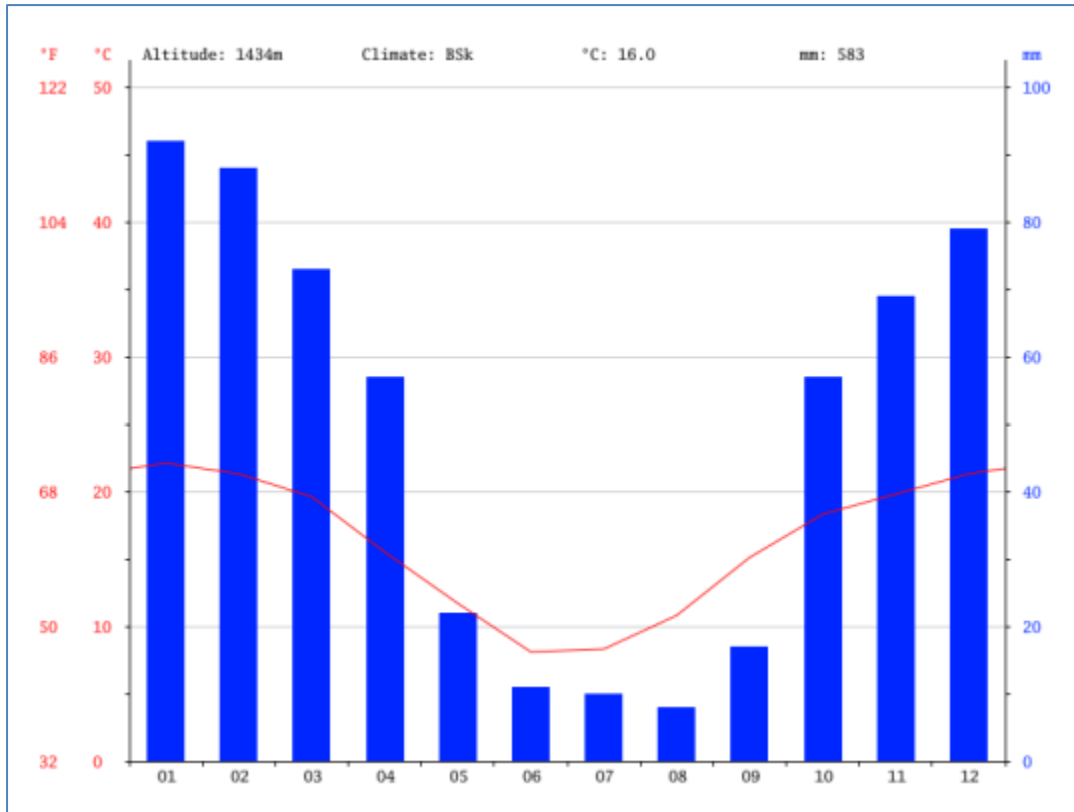


Figure 12: Average temperature and rainfall data for Ventersburg

#### 4.3.2 Groundwater, soil and Geological stability of site

The proposed N1-16 route is underlain by very fine to coarse grained, buff to white- and white sandstone, blue/grey mudstone and shale with subordinate conglomerate of the Adelaide Subgroup (**Pa** or green areas) of the Beaufort Group of the Karoo Supergroup. This has been intruded by large Dolerite sills (**Jd** or red areas). At locations of river crossings Alluvial deposits will also be present (**Qs** or yellow areas). It is assumed that the alluvial deposits will comprise potentially compressible clay soils, derived from the weathering of the mudstone and shale rock as illustrated in Figure 13.

It is anticipated that the bridge foundations along the route will either comprise spread footings bearing on the rock at relatively shallow depth or, where the bridges cross rivers and deeper alluvial soils are anticipated, piled foundations. The same ground conditions can be anticipated for the culverts; shallow spread footings on the rock and either piled or soil raft foundations where deeper alluvial soils are present. The type of foundations (soil raft or piles) will be determined by the loading of the structures and the depth of potentially compressible soils.



Figure 13: Geology (GeoMap 2826 Winburg)

#### 4.3.3 Vegetation and fauna (biota)

The N1-16 upgrading project crosses the vulnerable Central Free State Grassland vegetation type for most of the way. A small area of the least threatened Winburg Grassy Shrubland vegetation type forms part of the "pass" before crossing the Sand River, and a section just before Ventersburg.



Figure 14: Vegetation along the N1-16 route (Mucina & Rutherford, 2006)

In accordance to SANBI<sup>16</sup> - Central Free State Grassland consists of undulating plains supporting short grassland. Under natural condition the vegetation is dominated by *Themeda triandra* while *Eragrostis curvula* and *E. chloromelas* become dominant in degraded habitats. Dwarf Karoo bushes have established habitats in severely degraded clayey bottomlands. Overgrazed and trampled low-lying areas with heavy clayey soils are prone to Acacia Karoo encroachment. Almost a quarter of this vegetations habitat area has been transformed either for cultivation or by building of dams. Only small portions enjoy statutory conservation in the Willem Pretorius, Rustfontein and Koppies Dam Nature Reserves as well as some limited protection in private nature reserves. No serious infestation by alien flora has been observed, but encroachment of dwarf Karoo shrubs has become a problem in the degraded southern parts of this vegetation unit. Erosion low (45%), moderate (30%) or very low (20%).

Winburg Grassy Scrubland<sup>17</sup> features solitary hills, slopes and escarpments of mesas creating a mosaic of habitats ranging from open grassland to scrubland. Tall shrubs and sometimes small trees are sheltered against frequent periods of frost during the winter months and regular veld fires in late winter to early spring. The medium-height evergreen scrublands are dominated by a combination of *Olea europaea subsp. africana*, *Euclea crispa subsp. Crispa*, *Gymnosporia buxifolia*, *Diospyros*

<sup>16</sup> <http://bgis.sanbi.org/MapView>

<sup>17</sup> <http://bgis.sanbi.org/MapView>

*lycioides*, *Rhus burchellii*, *R. ciliata*, *R. erosa* (mainly in the south), *Clutia pulchella* and *Grewia occidentalis*. Trees such as *R. lancea*, *Celtis africana* and *Ziziphus mucronata* are found in more deeply incised drainage lines. The vegetation of this unit differs considerably in species composition and structure, from analogous scrubland typical of koppies south and southwest of Bloemfontein (Besemkaree Koppies Shrubland), in having some *afromontane* elements and a more *mesic* character. Dolerite hills along the Sand River as well as those found in the Willem Pretorius Nature Reserve are home to some sourveld shrub species, such as *Elaeodendron transvaalense*, *Scolopia zeyheri*, *Rhus leptodictya* and *Helinus integrifolius*. Almost 2% of this unit is statutorily conserved in the Willem Pretorius Nature Reserve. More than 10% transformed for cultivation and by urban sprawl. Erosion low (57%), very low (24%) and moderate (18%).

The following tables present the dominant floral species identified within each Hydro Geomorphic type, and terrestrial communities although it should be noted that these lists are not an extensive listing of the floral species found within the project site.

**Table 8: Dominant plant species in Road Reserve along N1-16 route**

TREES/SCRUBS	GRASSES/REEDS/BULRUSHES	FORBS
* <i>Eucalyptus sideroxylon</i>	<i>Aristida adscensionis</i>	* <i>Argemone ochroleuca</i>
* <i>Eucalyptus camaldulensis</i>	<i>Aristida congesta</i>	* <i>Berkheya onopordifolia</i>
<i>Searsia lancea</i>	<i>Aristida bipartita</i>	* <i>Chenopodium album</i>
<i>Vachellia karroo</i>	<i>Aristida diffusa</i>	<i>Chrysocoma ciliata</i>
	<i>Elionurus muticus</i>	<i>Conyza podocephala</i>
	<i>Eragrostis chloromelas</i>	* <i>Convolvulus arvensis</i>
	<i>Eragrostis plana</i>	<i>Cynodon dactylon</i>
	<i>Heteropogon contortus</i>	* <i>Ciclospermum leptolobum</i>
	<i>Oropetium capense</i>	<i>Pseudognaphalium oligandrum</i>
	<i>Tragus koelerioides</i>	* <i>Salvia verbenaca</i>
	<i>Themeda triandra</i>	* <i>Schkuhria pinnata</i>
		* <i>Verbena bonariensis</i>

Note = \* indicates exotic species

The potential diversity of mammals within the study area is low because it is a disturbed area and most natural habitats have been transformed. There are several factors which will reduce the actual number of species present within the project site. The presence of humans and roads, the destruction of natural vegetation, noise etc., has had a major impact on the natural animal populations in the project area.

The following faunal species were confirmed within the project site:

- Single rodent burrows (most likely Four-striped Grass Mouse (*Rabdomys pumilo*).
- Relative large burrows (likely to have been made and utilized by Aardwolf (*Proteles cristatus*), Porcupine (*Hystrix africae-australis*). and/or Aardvark – (*Orycteropus afer*). Smaller burrows were noted and were probably made by Ground squirrel (*Geosciurus inauris*), Yellow Mongoose (*Cunicitis penicillata*) and Zorilla (*Ictonyx striatus*)

None of these species noted within the project site are listed and or protected species.

Of the many reptilian species that have been recorded with the region none of these species are listed as Red Data species. Fifteen amphibian species have been recorded within the region and of these 15 species eight species were recorded within close proximity of the project site. One near threatened species namely the Giant Bullfrog (*Pyxicephalus adspersus*) has been recorded for the quarter degree grid square (QDGS). Although this species was not found on site (not a suitable habitat), it is still likely for this species to occur near the project site as potential suitable habitat (pans and drainage lines) is available in the vicinity of the project site.

Of the more than 320 bird species that have been recorded in the region a few species occur on the study area. Birds such as Crowned Lapwing, Blacksmith Lapwing, Orange River Francolin, Helmeted Guineafowl, Thick-knee, Northern Black Korhaan, Cattle Egrets, Black-headed Heron, Turtle Doves, Rock Pigeons, and Hadeda and others could occur in the project site.

For a more detailed description of the biodiversity (vegetation and fauna (biota)) of the project area see Chapter 4.4.1 and Appendix E.1 for a summary and full version respectively of the Ecological Specialist Study Report.

#### **4.3.4 Topography and drainage (flow and sediment regimes)**

The topography of the catchment areas is mostly grasslands and farm (cultivated) lands. There are few light bushes sparsely distributed in the catchments. There are a few small dams located in the catchments. The small dams that form part of the longest watercourses in some of the catchments can cause attenuation of flood peaks resulting in less run-off volumes. Attenuation of flood peaks will be assumed insignificant in these catchments since the dams are not large enough to cause such an influence. The impact of these dams will therefore not be accounted for in calculations re the drainage and flood potential of the major streams assessed. In one of the catchments (Sand River) the Allemanskraal dam forms part of the catchment. The catchments are approximately 75% grassland and 25% farm land. The slope of these catchments is on average relatively flat (< 10% gradient). There are a high number of tributaries leading to the main streams. The catchments are therefore well-drained and high flood peaks can be anticipated. The following figure illustrates the topography of the project area.

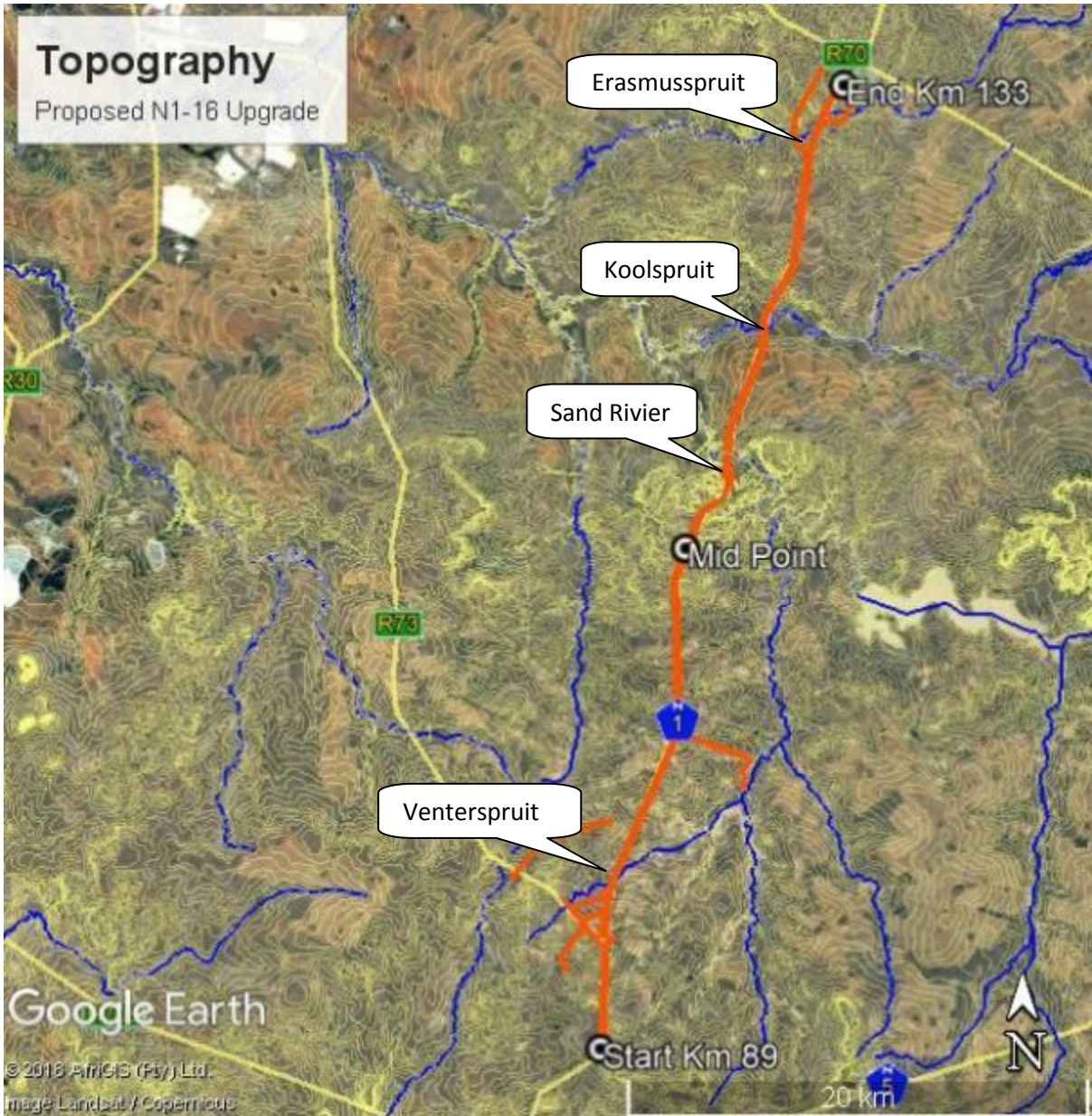


Figure 15: Topography (Contours at 5m intervals)

The catchment area and 1:20 year flood potential for the major streams are given in the table below. This information was derived from the five Drainage Reports developed by Aerocon SA (Pty) Ltd, which are included in Appendix F

Table 9: Catchment areas and 1:20 flood peaks

CATCHMENT NO.	Km DISTANCE	CATCHMENT AREA (km <sup>2</sup> )	1:20 FLOOD PEAK (m <sup>3</sup> /s)	COMMENT
03	91.429	3.3	18	Non-perennial stream
04	93.560	3.4	18	Non-perennial stream
06	96.080	10.7	27	Venterspruit
07	96.525	0.8	2.5	Non-perennial stream

CATCHMENT NO.	Km DISTANCE	CATCHMENT AREA (km <sup>2</sup> )	1:20 FLOOD PEAK (m <sup>3</sup> /s)	COMMENT
09	97.514	3.0	19	Non-perennial stream
10	99.718	10.4	28	Non-perennial stream
12	102.342	5.0	20	Non-perennial stream
14	104.813	3.1	20	Non-perennial stream
15	106.442	3.0	12	Non-perennial stream
16	107.412	2.1	13	Non-perennial stream
22	115.021	0.7	5	Non-perennial stream
	115.930	3684	623	Sand River
24	116.273	3.4	18	Non-perennial stream
25A	118.440	2.3	7	Non-perennial stream
25B	118.463			Non-perennial stream
27	121.328	5.5	11	Non-perennial stream
29	121.690	700	394	Koolspruit
34	129.004	0.7	10	Non-perennial stream
36	130.270	3.5	14	Non-perennial stream
37	130.900	162	219	Erasmusspruit
38	132.330	16	76	Non-perennial stream

#### 4.3.5 Water resources setting

The planned water uses are located in the Sub water management area: Sand/Vet (Lower Sand) which is located in the Middle Vaal Water Management Area (WMA). The Middle Vaal WMA is located downstream of the confluence of the Vaal and the Rietspruit Rivers and upstream of Bloemhof Dam. It extends to the Schoonspruit River in the north and the Vet River in the south, and covers a total catchment area of 52 563 km<sup>2</sup>. Primary sector activities such as mining and agriculture accounted for approximately 55% of the areas total GDP in 1997. Mine dewatering and the discharge into the river systems have a negative impact on water quality within this WMA. Settlement patterns within the Middle Vaal WMA are dispersed and extensive dryland agricultural practices take place throughout this WMA. The planned water use is located in the Sub water management area: Sand/Vet (Lower Sand) which includes the Erasmus Spruit, Koolspruit, Sand River and Venterspruit as well as major and minor culverts as located in Quaternary Catchments C42G, C42F and C42H.

Below is given the figure indicating the Sub water management area: Sand/Vet (Lower Sand) area.





Figure 16: Sub water management area: Sand/Vet (Lower Sand)

The four rivers: the Erasmus Spruit, Koolspruit, Sand Rivier and Venterspruit are indicated in the figure below where they cross the N1-16 road.

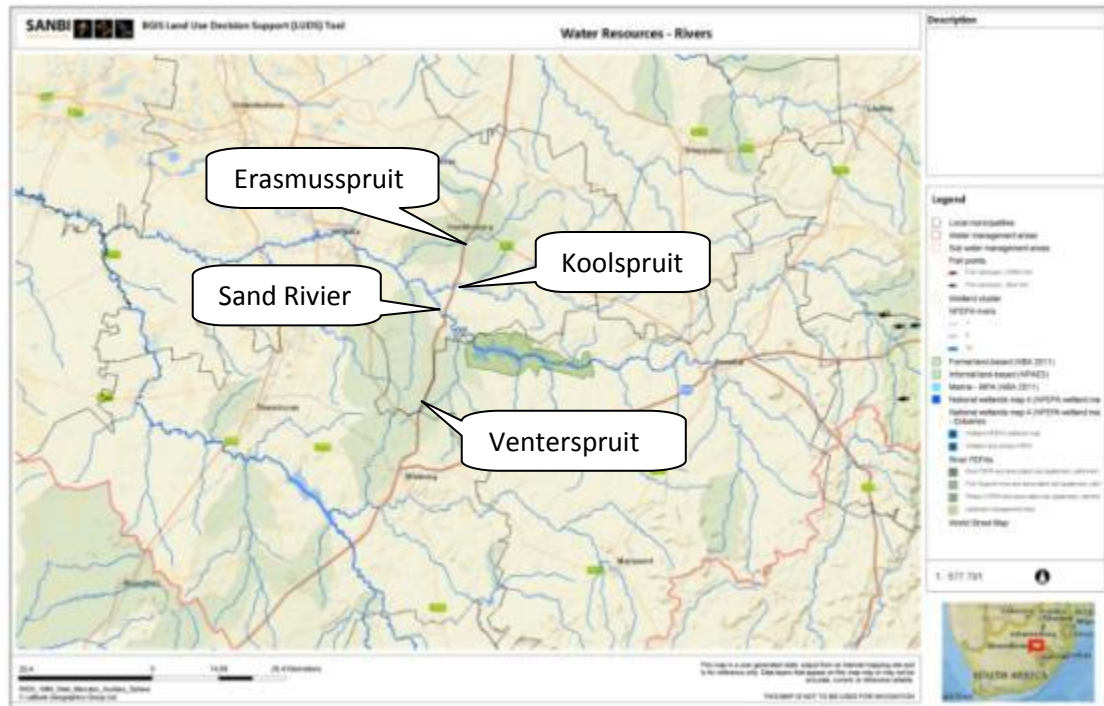


Figure 17: Water resources - Erasmus Spruit, Koolspruit, Sand Rivier and Venterspruit

#### 4.3.6 Cultural/Historical features

There are known heritage sites in close proximity of the proposed extension of the N1-16. These include graves and the site where the Sand River Conversion was signed and pre-colonial stone huts at Willem Pretorius Nature Reserve and along the road. The Sand River Conversion was the convention whereby Great Britain formally recognised the independence of the Zuid Afrikaansche Republiek on 17 January 1852. In the area adjacent to the Sand River Conversion site, the road reserve was reduced in order not to disturb this heritage site.



Figure 18: Sand River Convention memorial

Two archaeological stone-walled sites were identified of the Late Iron Age (LIA). Very little fossil material was found during the survey and very little Adelaide Subgroup rock was observed exposed at the surface immediately adjacent to the road. Most of the road cuttings were observed as being

into dolerite. Consequently, no further paleontological assessment is required. Three grave sites were identified. These graves are less than 50m from the existing road reserve. These graveyards have High heritage significance and may not be altered or removed without a permit from South African Heritage Resources Agency (SAHRA). Plans are currently underway to locate some of the identified graves which will be affected by the road development.

The summary and full Paleontological, Heritage Impact Assessment Study is available in Chapter 4.4.3 and Appendix E.3 respectively.

#### **4.3.7 Sensitive areas and Sensitivity map**

Roads can have a significant impact on surface water features, as depending on the design of the road crossing the surface water feature may be physically affected as the footprint of the road will affect the hydrology and habitat of the surface water feature to varying degrees. The degree of impact depends to a large degree on the type of the road crossing. Spanning a water feature by building a bridge or similar structure typically has much less of an impact than if the road structure is constructed into the wetland – i.e. the substrate of the road is constructed into and across the surface water feature and culvert structures are used to allow flow to underpass the road. A bridge structure typically has a much lesser physical footprint in the bed of the river or wetland, thus resulting in a lower loss of vegetation and disturbance of physical habitat. Conversely roads will tend to have a much greater physical footprint within a surface water feature in the latter case as foreign substrate will need to be laid and imported into the bed and banks of the feature.

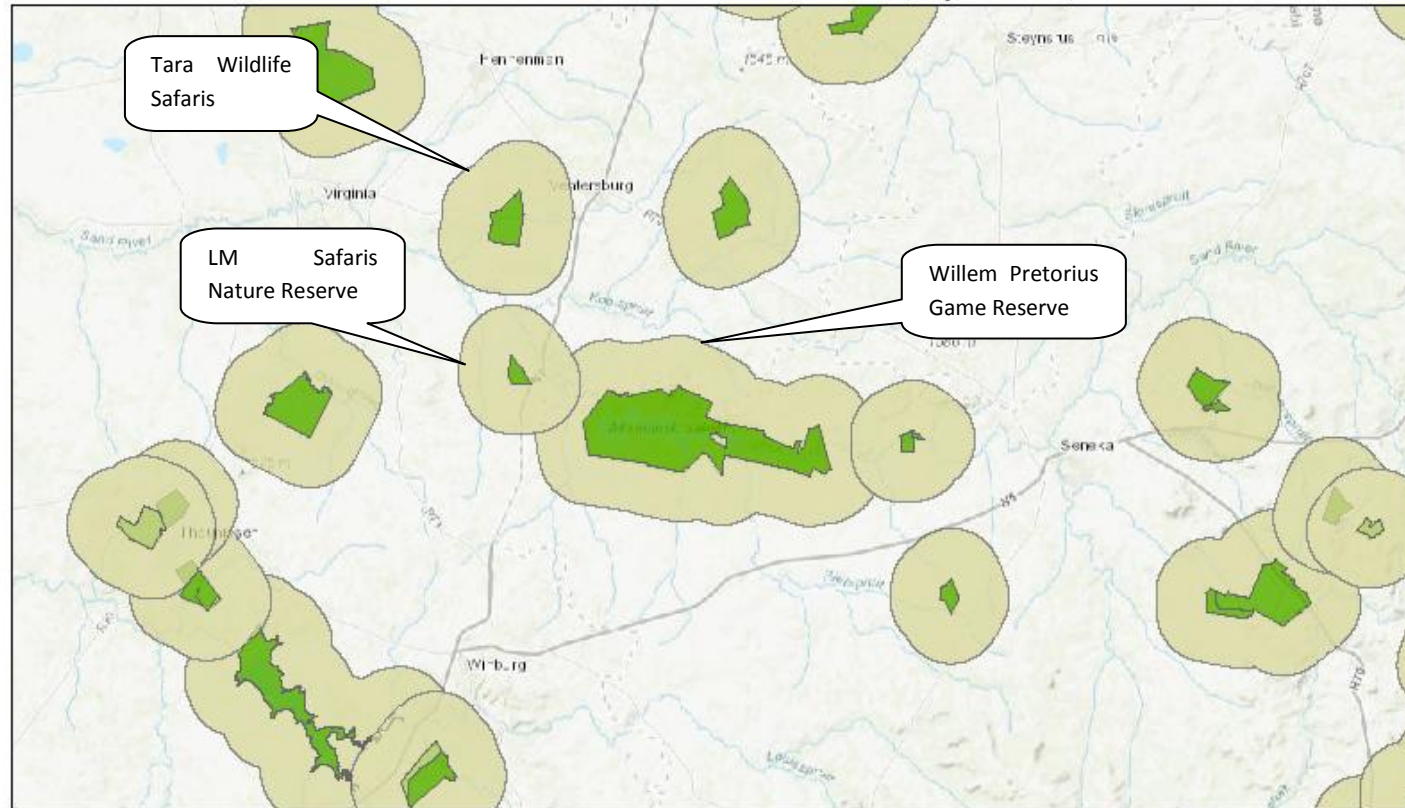
Two nature conservation areas were also identified as indicated in Figure 19. These are the Willem Pretorius Game Reserve and LM Safaris Nature Reserve. The following figure<sup>18</sup> indicates the reserves and the 5 km buffer radius as indicated to assess whether the project will be affected. Only in the case of the LM Safaris Nature Reserve is the N1-16 project within the 5 km buffer zone, though no construction activities will take place within the reserve itself. The existing road is approximately 40 meter from the reserve fence and construction will take place on the opposite side of the existing road to south-eastern side.

The map in Figure 20 provides the sensitivity map of the project area and indicates the, main water courses, wetland delineation and cultural and historic features. **A more detailed map is available in Appendix C in A3 size.**

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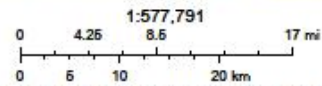
<sup>18</sup> <http://dea.maps.arcgis.com/apps/MapTools/index.html?appid=2367540dd75148e8b6eaeab178a19d3a>

Protected and Conservation Areas of South Africa; April 2018, Quarter 2



September 20, 2018

- PA\_NatureReserve\_5kmBuffer\_2018\_Q2
- PA\_NatureReserve\_2018\_Q2



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBC, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, © OpenStreetMap contributors, and the GIS User Community

Figure 19: Protected and conservation areas (E-GIS)

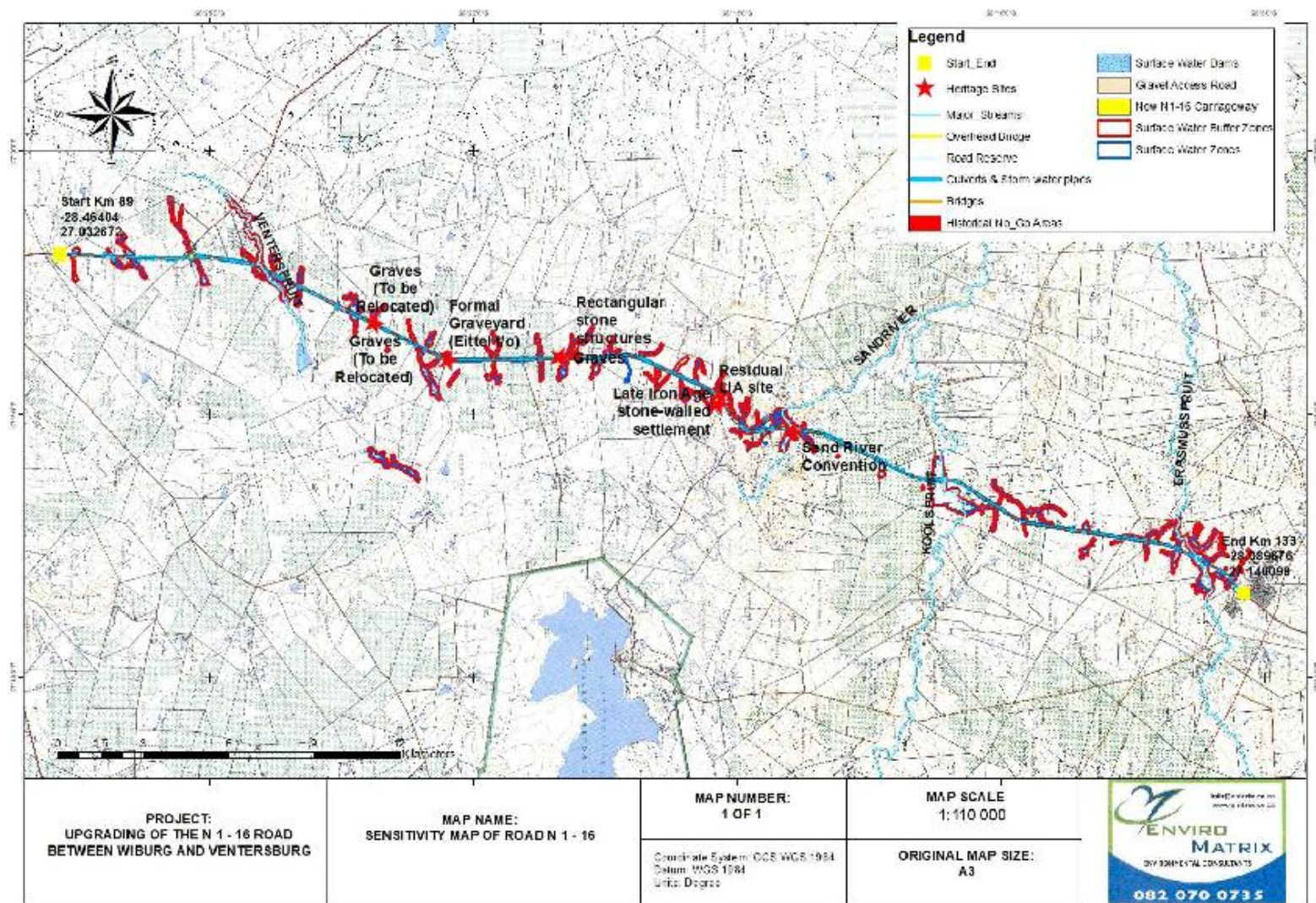


Figure 20: Sensitivity areas map

#### 4.3.8 Site photographs

Photographs taken along the route of the N1-16 upgrading project are included below with a more comprehensive set of photographs given in Appendix G



Figure 21 : View of the N1-16 road (South view)



Figure 22: Bridge over Venterspruit



Figure 23: Major culvert



Figure 24: View of the N1-16 road (North view)



Figure 25: Bridge over Sand River



Figure 26: Smaller culvert

#### **4.4 Summary of specialist reports**

Given the environmental and social context of the area in which the project will be conducted, several specialist studies were conducted to assess these technical specialist areas in further detail.

Here follow a summary from each of these reports as conducted by the appointed specialists.

##### **4.4.1 Ecological Study**

The Environmental Assessment Practitioner, Lefatse Environmental Planning Services (Pty) Ltd, was appointed to conduct an ecological assessment for the project site to determine the impacts which may be triggered by the proposed development.

The requirements of this assessment were to undertake a specialist study to assess the biodiversity and ecology of the project site as well as to determine the significance of the impacts that the proposed project will have on the identified project site.

The following general conclusions were drawn upon completion of the literature review and site assessment:

- According to the National List of Threatened Terrestrial Ecosystems (2011) the study area does not fall in a threatened terrestrial ecosystem
- The study area is not part of a formal or an informal protected area.
- According to Free State Biodiversity Plan (2016) the project site goes through mainly Ecological Support Areas (ESA1 & 2). There are also some degraded and transformed areas (crop fields). The N1 does also cross a number of drainage lines, seasonal and perennial streams classified as aquatic Critical Biodiversity areas. The project area does not cut through any terrestrial Critical Biodiversity Areas (CBA1 & 2);
- Protected plant species occur on the project site
- Species which are suitable transplant must be translocated during a search and rescue operation.
- Permits to collect these species must be obtained from the relevant authority (i.e DESTEA)

A description of the assessment of the terrestrial vegetation along the N1-16 route are provided in the tables below:

**Table 10: Assessment of terrestrial vegetation**

SITE FEATURURES	COMMENTS
Landscape features and vegetation types	<p>Some sandy plains occur in the high-lying parts north of the Sand River. This vegetation type represent the Vaal-Vet Sandy Grassland (Gh10)</p> <p>Shrub covered dolerite hills occur south of and along the Sand River. This vegetation type represent the Winlburg Grassy Shrubland (Gh 7)</p> <p>Extensive dolerite sills occur along the N1 route between Winburg and Ventersburg. These areas do not have a proper soil cover except in shallow depressions and crevices. The dominant vegetation is typical of the Bloemfontein Karroid Shrubland (Gh 8)</p> <p>The areas along the N1-route covered by a deeper soil (clay or sand) supports a <i>Themeda triandra</i> - dominated grassland. The vegetation type represents the Central Free State Grassland (Gh 6).</p> <p>The. A number of seasonal drainage drain the landscape. There are a few pans on flat areas.</p>
Land use of the project site	Agricultural area with grasslands, crop fields, farmsteads roads, dams, etc.
Condition of the vegetation (pristine / degraded / totally transformed)	<p>Originally the character of this area’s vegetation was an extensive grassland landscape. It is now in a highly transformed state due to extensive crop farming on the arable soils. The remaining natural grassland is subjected to grazing practices and in some cases it is degraded and invaded by pioneer grasses such as <i>Aristida congesta</i>, <i>Aristida bipartita</i>, <i>Aristida junciformis</i>, <i>Hyparrhenia hirta</i> and others.</p>
Protected plant species noted	<p>A number of provincial protected plant species occur along the N1 – route:</p> <p><u>Dolerite hills:</u></p> <p><i>Aloe davyana</i></p> <p><i>Olea europaea</i> subsp. <i>africana</i></p> <p><i>Cussonia paniculata</i></p> <p><i>Haemanthus humilis</i></p> <p><i>Stapelia grandiflora</i></p> <p><u>Dolerite sills:</u></p> <p><i>Avonia ustulata</i></p> <p><i>Euphorbia clavaroides</i></p> <p><u>Stream banks and islands:</u></p> <p><i>Crinum bulbispermum</i></p>
Visual indication of and impact on terrestrial fauna (mammals)	<p>The potential diversity of mammals within the study area is low because it is a disturbed area and most natural habitats have been transformed. There are several factors which will reduce the actual number of species present within the project site. The presence of humans and roads, the destruction of natural vegetation, noise etc., has had a major impact on the natural animal populations in the project area.</p> <p>During the site visit the following faunal species were confirmed within the project site:</p> <ul style="list-style-type: none"> <li>• Single rodent burrows (most likely Four-striped Grass Mouse (<i>Rabdomys pumilo</i>).</li> <li>• Relative large burrows (likely to have been made and utilized by Aardwolf (<i>Proteles cristatus</i>), Porcupine (<i>Hystrix africae-australis</i>). and/or Aardvark – (<i>Orycteropus afer</i>). Smaller burrows were noted and were probably made by Ground squirrel (<i>Geosciurus inauris</i>), Yellow Mongoose (<i>Cunicitis penicillata</i>) and Zorilla (<i>Ictonyx striatus</i>)</li> </ul> <p>None of these species noted within the project site are listed and or protected species.</p>
Visual indication of an impact on terrestrial fauna (herpetofauna)	<p>Of the many reptilian species that have been recorded with the region none of these species are listed as Red Data species.</p> <p>Fifteen amphibian species have been recorded within the region and of these 15 species eight species were recorded within close proximity of the project site. One near threatened species namely the Giant Bullfrog (<i>Pyxicephalus adspersus</i>) has been recorded for the quarter degree grid square (QDGS). Although this species was not found on site (not a suitable habitat), it is still likely for this species to occur near the project site as potential suitable habitat (pans and drainage lines) is available in the vicinity of the project site.</p>



SITE FEATURES	COMMENTS
Visual indication of impact on terrestrial fauna (birds)	Of the more than 320 bird species that have been recorded in the region a few species occur on the study area. Birds such as Crowned Lapwing, Blacksmith Lapwing, Orange River Francolin, Helmeted Guineafowl, Thick-knee, Northern Black Korhaan, Cattle Egrets, Black-headed Heron, Turtle Doves, Rock Pigeons, and Hadedas and others could occur in the project site.
Signs of pollution	There are some obvious signs of pollution along the N1-route. Plastic, glass and tin have been dumped along the road. In the streams there are also some plastics which have been transported from further upstream in the catchment.
Erosion potential	There are extensive signs of disturbance and clearance of the vegetation along the road route. Close to stream crossings the erosion potential is higher because of steeper slopes towards the drainage lines.
Ecosystem function	The remaining natural vegetation provides nesting areas for avifauna and occasional shelter for terrestrial fauna. Niche habitats for fauna – providing sheltered burrows and nesting sites. Micro-climate is created by the shrubs and trees housing species sensitive to direct sunlight or frost The perennial and seasonal streams also act as migration corridors

**Table 11: Dominant plant species noted in the terrestrial shrubland communities on dolerite hills south of the Sand River along the N1-route.**

TREES / SHRUBS	GRASSES / REEDS / BULRUSHES	FORBS
<i>Celtis africana</i>	<i>Aristida adscensionis</i>	* <i>Atriplex semmibaccata</i>
<i>Cussonia paniculata</i>	<i>Aristida congesta</i>	<i>Berkheya onopordifolia</i>
<i>Diospyros austro-africana</i>	<i>Aristida bipartita</i>	* <i>Bidens bipinnata</i>
<i>Diospyros lycioides</i>	<i>Cynodon dactylon</i>	* <i>Chenopodium album</i>
<i>Olea europaea subsp. africana</i>	<i>Cynodon transvaalensis</i>	* <i>Conyza bonariensis</i>
<i>Searsia pyroides</i>	<i>Chloris virgata</i>	* <i>Datura ferox</i>
<i>Searsia lancea</i>	<i>Eragrostis chloromelas</i>	<i>Felicia muricata</i>
<i>Vachellia karroo</i>	<i>Eragrostis curvula</i>	<i>Hermannia depressa</i>
<i>Vachellia erioloba</i>	<i>Eragrostis superba</i>	* <i>Salsola kali</i>
<i>Ziziphus mucronata</i>	<i>Heteropogon contortus</i>	* <i>Schkuhria pinnata</i>
	<i>Hyparrhenia hirta</i>	<i>Selago densiflora</i>
	<i>Setaria sphacelata</i>	<i>Senecio hastatus</i>
	<i>Sporobolus fimbriatus</i>	* <i>Tagetes minuta</i>
	<i>Themeda triandra</i>	<i>Tribulus terrestris</i>
	<i>Tragus koelerioides</i>	

(Note \* indicates exotic species.)

**Table 12: Dominant plant species noted in the terrestrial shrubland communities on dolerite sheets along the N1-route.**

TREES / SCHRUBS	GRASSES / REEDS / BULRUSHES	FORBS
<i>Diospyros austro-africana</i>	<i>Aristida adscensionis</i>	<i>Avonia ustulata</i>
<i>Searsia lancea</i>	<i>Aristida congesta</i>	<i>Berkheya onopordifolia</i>
	<i>Aristida bipartita</i>	<i>Berkheya pinnatifida</i>
	<i>Aristida diffusa</i>	<i>Blepharis squarrosa</i>
	<i>Eragrostis nindensis</i>	<i>Chasmatophyllum mustellinum</i>
	<i>Eragrostis chloromelas</i>	<i>Chascanum pinnatifidum</i>
	<i>Eragrostis lehmanniana</i>	<i>Commelina africana</i>
	<i>Heteropogon contortus</i>	<i>Crassula tetraptera</i>
	<i>Oropetium capense</i>	<i>Euphorbia clavaroides</i>
	<i>Tragus koelerioides</i>	<i>Felicia muricata</i>
	<i>Themeda triandra</i>	<i>Geigeria filifolia</i>
		<i>Hermannia depressa</i>
		<i>Indigofera alternans</i>
		<i>Phyllanthus parvulus</i>
		<i>Rhynchosia totta</i>
		<i>Ruschia unidens</i>
		<i>Scabiosa columbaria</i>
		<i>Solanum supinum</i>
		<i>Stomatium braunsii</i>

(Note \* indicates exotic species.)

**Table 13: Dominant plant species noted along the N1-route mostly in the road reserve.**

TREES / SCHRUBS	GRASSES / REEDS / BULRUSHES	FORBS
* <i>Eucalyptus sideroxylon</i>	<i>Aristida adscensionis</i>	* <i>Argemone ochroleuca</i>
* <i>Eucalyptus camaldulensis</i>	<i>Aristida congesta</i>	* <i>Berkheya onopordifolia</i>
<i>Searsia lancea</i>	<i>Aristida bipartita</i>	* <i>Chenopodium album</i>
<i>Vachellia karroo</i>	<i>Aristida diffusa</i>	<i>Chrysocoma ciliata</i>
	<i>Elionurus muticus</i>	<i>Conyza podocephala</i>
	<i>Eragrostis chloromelas</i>	* <i>Convolvulus arvensis</i>
	<i>Eragrostis plana</i>	<i>Cynodon dactylon</i>
	<i>Heteropogon contortus</i>	* <i>Ciclospermum leptolobum</i>
	<i>Oropetium capense</i>	<i>Pseudognaphalium oligandrum</i>
	<i>Tragus koelerioides</i>	* <i>Salvia verbenaca</i>
	<i>Themeda triandra</i>	* <i>Schkuhria pinnata</i>
		* <i>Verbena bonariensis</i>

(Note \* indicates exotic species.)

Protected species noted along the N1 route are indicated in the table below. The succulents (*Aloe davyana*, *Avonia ustulata*, *Euphorbia clavaroides*) as well as the bulbous species (*Haemanthus humilis* and *Crinum bulbispermum*) will have to be translocated before construction commences.

**Table 14: Protected species noted along the N1 route**

TREES / SHRUBS	GRASSES / REEDS / BULRUSHES	BULBS / SUCCULENTS / FORBS
<i>Olea europaea sp africana</i>	None	<i>Aloe davyana</i>
<i>Cussonia paniculata</i>		<i>Avonia ustulata</i>
		<i>Crinum bulbispermum</i>
		<i>Euphorbia clavaroides</i>
		<i>Haemanthus humilis</i>
		<i>Stapelia grandiflora</i>

Due to the agricultural activities extensive disturbance of the natural vegetation occurred. Several alien species and pioneer species were noted on these disturbed areas. Those species marked with an asterisk (\*) in the previous tables are all exotic species.

Where applicable mitigation measures to lower the impacts associated with the construction activities must be implemented in order to at minimum, retain current levels of ecological integrity and functioning of these systems. It is preferable however that suitable rehabilitation measures be implemented, particularly to curb erosion, and to implement an invasive weed removal program to clear the drainage lines and riparian areas in order to improve the Present State of these and to improve the ecological service provision by these systems.

The following impacts are considered to be the most significant regarding the development:

- Reduction of a stable vegetation cover and associated below-ground biomass that currently increases soil surface porosity, water infiltration rates and thus improves the soil moisture availability. Without this vegetation, the soil will be prone to extensive surface capping, leading to accelerated erosion and further loss of organic material and soil seed reserves from the local environment.
- A loss of portions of potential sensitive habitats. .
- Disturbed vegetation in the project site carries a high risk of invasion by alien invasive plants, which may or may not be present in the project site or in close proximity to the project site. The control and continuous monitoring and eradication of alien invasive plants will form an integral part of the environmental management.
- Possible impacts on the seasonal drainage lines and rivers that may be present outside of the project site and downstream from the project site due to altered surface. This may influence species depending on these parts of the ecosystem, as well as downstream wetland ecosystems.

With the diligent implementation of mitigating measures by the developer, contractors, and operational staff, the severity of these impacts can be minimised and reduced to acceptable levels.

The impact on fauna is expected to be small to negligent. Presence of indigenous terrestrial vertebrates within the study area is relatively low. Animals that may be permanently present can be relocated or will move away during construction, and may resettle after construction, depending on safety specifications necessitated by the development. No restricted or specific habitat of vertebrates exists on the project site that will be affected by the proposed development.

The full report is available in Appendix E.1.

#### **4.4.2 Wetland Delineation Study**

The Environmental Assessment Practitioner, Lefatse Environmental Planning Services (Pty) Ltd, was appointed to conduct a wetland delineation, Present Ecological State (PES) and function assessment for the project site to determine the impacts which may be triggered by the proposed development.

The following general conclusions were drawn upon completion of the literature review:

- The study area falls within the Highveld Aquatic Ecoregion,
- According to the National Freshwater Ecosystem Priority Areas (NFEPA) database the study area falls within the Middle Vaal Water Management Area (WMA), and
- the subWMA indicated for the study area is the Sand/Vet;
- WetVeg group: Dry Highveld Grassland Group 4;
- The subWMA is regarded as important in terms of fish sanctuaries, rehabilitation or corridors;
- The subWMA is regarded as important in terms translocation and relocation of fish;
- The subWMA is not a fish FEPA;
- The NFEPA database indicates that there are pans (wetlands) present within the region;
- The NFEPA database indicates that there are no RAMSAR wetlands within the study area or within 500m of the study area;
- According to the National List of Threatened Terrestrial Ecosystems (2011) the study area does not fall in a threatened terrestrial ecosystem
- The study area is not part of a formal or an informal protected area.
- According to Free State Biodiversity Plan (2016) the project site goes through mainly Ecological Support Areas (ESA1 & 2). There are also some degraded and transformed areas (crop fields). The N1 does also cross a number of drainage lines, seasonal and perennial streams classified as aquatic Critical Biodiversity areas. The project area does not cut through any terrestrial Critical Biodiversity Areas (CBA1 & 2);
- Several man-made dams as well as the Sand River, Erasmusspruit, Koolspruit and Venterspruit are NFEPA – listed aquatic systems

Upon completion of the riparian and wetland assessment the following general conclusions were drawn: The ephemeral drainage lines as well as the Sand River, Erasmusspruit, Koolspruit and Venterspruit as well as their tributaries drain the project site. The following points summarise the results obtained:

- These features were classified according to the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems (Ollis *et al.*, 2013), as Inland Systems falling within the Highveld Aquatic Ecoregion;
- At Level 4 of the Classification System, the features within the study area were classified as: Rivers & floodplain wetland, valley – bottom wetlands with channel as well as pans
- The riparian features found along the Sand River, Erasmusspruit, Koolspruit, Venterspruit as well as the man-made dams received a score of 49% and 45% respectively, indicating that the Vegetation Response Assessment Index (VEGRAI) Ecological Category falls in Category D which means that the system is a largely modified system where the loss of natural habitat, biota, and basis ecosystem functions have occurred. The VEGRAI score for Floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit is 35% (Category E) which means that the system is a seriously modified system where the loss of natural habitat, biota, and basis ecosystem functions is extensive. The ephemeral drainage lines and nearby pans scores a VEGRAI score of 83% and 80% (Category B) respectively. The B class indicates that these systems are largely natural with few modifications. A small change in natural habitat and biota may have taken place but the ecosystem functions are essentially unchanged.

Summary of results of the VEGRAI assessments conducted for the Sand River, Erasmusspruit, Koolspruit and Venterspruit, floodplain wetlands, drainage lines, pans and man-made dams.

**Table 15: VEGRAI Assessment**

FEATURES	PRESENT SCORE (%)	STATE	PRESENT STATE CATEGORY
Sand River, Erasmusspruit, Koolspruit and Venterspruit	49		D
Floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit	35		E
Ephemeral drainage lines	83		B
Pans	80		B
Man-made dams	45		D

The Index of Habitat Integrity (IHI) was applied to the conducted for the Sand River, Erasmusspruit, Koolspruit and Venterspruit, floodplain wetlands, drainage lines, pans and man-made dams to assess the Present Ecological State (PES). Summary of results of the WET-IHI assessments conducted for the Sand River, Erasmusspruit, Koolspruit and Venterspruit, floodplain wetlands, drainage lines, pans and man-made dams is given in the table below:

**Table 16: Wetland Index of Habitat Integrity**

FEATURES	PRESENT SCORE (%)	STATE	PRESENT STATE CATEGORY
Sand River, Erasmusspruit, Koolspruit and Venterspruit	63		C
Floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit	30		E
Ephemeral drainage lines	85		B
Pans	80		B
Man-made dams	65		C

## WET HEALTH – Overall Present Ecological State (PES)

Summary of results of the WET-Health assessments conducted for the Sand River, Erasmusspruit, Koolspruit and Venterspruit, floodplain wetlands, drainage lines, pans and man-made dams.

**Table 17: Overall Present Ecological State (PES)**

FEATURES	HYDOLOGY IMPACT SCORE	GEOMORPHOLOGY IMPACT SCORE	VEGETATION IMPACT SCORE	PRESENT ECOLOGICAL STATE (PES) CATEGORY
Sand River, Erasmusspruit, Koolspruit and Venterspruit	C	C	D	C
Floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit	D	E	E	E
Ephemeral drainage lines	C	B	B	B
Pans	B	B	B	B
Man-made dams	C	C	D	C

The overall PES Category for the larger streams namely the Sand River, Erasmusspruit, Koolspruit and Venterspruit is a **C** which means that these systems are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.

The overall PES Category for the floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit is also an **E** which means that the change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural features are still recognizable.

The overall PES Category for the ephemeral drainage lines is a **B** which means that these systems are largely natural with few modifications. A slight change in ecosystem processes is notable and a small loss of natural habitats and biota may have taken place.

The pans in the 500m buffer around the project site scored an overall PES category of a **B** which means that these systems are largely natural with few modifications. A slight change in ecosystem processes is notable and a small loss of natural habitats and biota may have taken place.

The man-made dams in the 500m buffer around the project site scored an overall PES category of a **C** which means that these systems are moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place, but the natural habitat remains predominantly intact.

### Ecological Functionality and Ecological Service Provision

Summary of the wetland and riparian ecological function and service provision assessments conducted for the Sand River, Erasmusspruit, Koolspruit Venterspruit, floodplain wetlands, drainage lines, pans and man-made dams is given in the table below:

**Table 18: Ecological Functionality and Ecological Service Provision**

ECOSYSTEM	SCORE	CATEGORY
Sand River, Erasmusspruit, Koolspruit and Venterspruit	1.3	Moderately - low
Floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit	1.5	Moderately - low
Ephemeral drainage lines	1.3	Moderately - low
Pans	0.9	Moderately - low
Man-made dams	1.3	Moderately - low

The ecological functions and service provision for these hydro-geomorphic units and the hydro-geomorphic units as a whole was calculated. Biodiversity maintenance is low in the Sand River, Erasmusspruit, Koolspruit, Venterspruit floodplain wetlands, drainage lines, pans and man-made dams.'s riparian vegetation. The agricultural activities and the presence of exotic species has a limiting factor in this area in terms of biodiversity maintenance and support. The average ecological functions and service provision score for the Sand River, Erasmusspruit, Koolspruit, and Venterspruit floodplain wetlands, drainage lines, pans and man-made dams'. riparian vegetation on the project site scores a **Moderately – Low** rating.

These systems' riparian vegetation scored low values in terms of tourism, recreation, education and research and they also do not play any form of cultural importance to the surrounding communities.

### Ecological Importance and Sensitivity (EIS)

Summary of the wetland and riparian vegetation's Ecological Importance and Sensitivity (EIS) assessments for the Sand River, Erasmusspruit, Koolspruit, and Venterspruit floodplain wetlands, drainage lines, pans and man-made dams is given in the table below:

**Table 19: Ecological Importance and Sensitivity (EIS)**

ECOSYSTEM	SCORE	CATEGORY
Sand River, Erasmusspruit, Koolspruit and Venterspruit	1	C/D
Floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit	0.55	D
Ephemeral drainage lines	0.55	D
Pans	0.55	D
Man-made dams	0.66	D

These results indicate that the Sand River, Erasmusspruit, Koolspruit, Venterspruit floodplain wetlands, drainage lines, pans and man-made dams within the 500m zone of the project site’s riparian vegetation are calculated to fall within and EIS Category D, indicating that these systems are largely modified. It is also an indication that these systems are considered to be ecologically unimportant and not sensitive on a provincial and local scale.

**Recommended Ecological Category (REC)**

The Recommended Ecological Category (REC) for the Sand River, Erasmusspruit, Koolspruit, Venterspruit and the floodplain’s riparian wetlands wetland features were determined taking into account the results of the IHI, wetland and riparian function, EIS and the WET-Health assessments. The REC deemed appropriate for the wetland and riparian features are presented in the table below.

Summary of the REC categories assigned to the various features for all riparian and wetland features within the project site is given in the table below:

**Table 20: Recommended Ecological Category (REC)**

<b>ECOSYSTEM</b>	<b>REC CATEGORY</b>
Sand River, Erasmusspruit, Koolspruit and Venterspruit	Upper D
Floodplain wetlands of the Sand River, Erasmusspruit, Koolspruit and Venterspruit	Upper D
Ephemeral drainage lines	Upper D
Pans	Upper D
Man-made dams	Upper D

**Impact Assessment**

The results of the impact assessment indicate that although the impacts prior to mitigation may potentially be “Moderate”, strict and effective implementation of mitigation measures will reduce the impact significance to “Low” levels. In view of the fact that large portions of the study area and the catchment of the watercourse have already been impacted due to human activities such as crop production, construction of roads, dams, farmsteads, etc. It is the opinion of the specialist that should the mitigation measures, be adhered to, the proposed construction activities may have a lower risk to the wetland or riparian resources or natural vegetation within the project site than without the mitigation measures.

General mitigation measures which must also be implemented include the following:

- Any fauna threatened by the construction and operation activities should be removed to safety by the ECO or appropriately qualified environmental officer.
- All construction vehicles should adhere to a low speed limit (<30km/h) to avoid collisions with susceptible species such as snakes and tortoises.
- All construction footprint areas should remain as small as possible and should as far as possible not encroach into surrounding areas. It must be ensured that where possible the riparian and



drainage line systems, and their associated buffer zones are off-limits to construction vehicles and personnel;

- The boundaries of footprint areas are to be clearly defined and it should be ensured that all activities remain within defined footprint areas;
- Appropriate sanitary facilities must be provided during the construction phase and all waste removed to an appropriate waste facility (landfill);
- No informal fires should be permitted in within the study area;
- Ensure that an adequate number of rubbish bins are provided so as to prevent litter and ensure the proper disposal of waste generated during construction activities;
- Ensure that as far as possible all infrastructure is placed outside of drainage lines and riparian areas and their respective buffer zones. Where this is not possible, construction footprints must be kept as small as possible and impacts must be minimized as far as possible.

The full report is available in Appendix E.2.

#### **4.4.3 Paleontological and Heritage Impact Assessment Study**

Two archaeological sites were identified. The eastern edge of the Late Iron Age (LIA) stone-walled site (28° 15' 18.84" S 27° 04' 39.66" E) currently lies some 50m west of the current N1 median and 30 m from the edge of the road current reserve fence. In order to protect the integrity of this site this buffer distance should be maintained as far as possible. A second site lies to the east of the N1 on the same axis at 28°15'20.36"S 27° 4'49.63"E. The latter is however some 200m beyond the current median and should not be impacted by construction activities. Both these areas should be avoided entirely as a stock-pile area, plant park area, or the establishment of a construction camp.

Very little fossil material was found during the survey and very little Adelaide Subgroup rock was observed exposed at the surface immediately adjacent to the road. Most of the road cuttings were observed as being into dolerite. Consequently, no further palaeontological assessment is required. During the laying of the road bedding for the proposed project it is recommended that non-fossiliferous rocks are used (e.g. dolerite / berg-gruis etc.) as a foundation fill for tar/concrete mix, and that if local rocks are being sourced for this purpose then it is suggested that the quarrying of fossiliferous bedrock be avoided if possible. If sandstone, mudstone or shale is locally quarried for use in the new development, it is very likely to contain fossil material, and this will require monitoring by a professional palaeontologist.

Three grave sites were identified. Some 200m to the south of the rectangular stone structures a cluster of stone packed graves without headstones was observed at 28° 18' 20.65" S 27° 03' 55.35" E. A small graveyard was observed at 28°21'51.80"S 27° 3'16.79"E. It is well fenced and contains 3 visible headstones. Another graveyard was observed at the Eittel turn off, at road marker N1 -16X, 28°20'28.86"S 27° 3'57.84"E. These graves are less than 50m from the existing road reserve. These graveyards have High heritage significance and may not be altered or removed without a permit from SAHRA. Preferably the site should be buffered with a sturdy fence. However, construction activities in its vicinity may negatively impact on the graves and exhumation and relocation may have to be considered, following prescribed protocols by SAHRA.

Recommended mitigation measures are:

#### Palaeontological deposits

During the laying of the road bedding for the proposed project it is recommended that non-fossiliferous rocks are used (e.g. dolerite / berg-gruis etc.) as a foundation fill for tar/concrete mix, and that if local rocks are being sourced for this purpose then it is suggested that the quarrying of fossiliferous bedrock be avoided if possible. If sandstone, mudstone or shale is locally quarried for use in the new development, it is very likely to contain fossil material, and this will require monitoring by a professional palaeontologist.

#### Graves and cemeteries

All identified graves and cemeteries within 50m of the expanded alignment must be securely fenced with minimally, steel fence posts and 5 strands of barbed wire. During construction these should be draped with ski-netting.

Should road design predicate that any graves should be relocated such will have to be done by an ASAPA accredited grave specialist under a permit and protocols issued by SAHRA under a separate Phase 2 mitigation programme.

It is recommended that the development proceed with the proposed heritage mitigations being part of the anticipated Record of Decision (R.o.D). If permission is granted for development to proceed, all is reminded that the NHRA requires that a developer cease all work immediately and adhere to the protocol described in the report should any heritage resources, as defined in the Act, be discovered during the course of development activities.

The full report is available in Appendix E.3

It is important to note that relocation of the grave in the identified sites is currently being investigated. The gravesites that will fall within the extended road reserve will be relocated.

## 5 PROJECT DESCRIPTION

The Aurecon Consulting Engineering Team was appointed to develop an upgrade strategy for the N1-16. The Aurecon Engineering Consulting Team consists of Aurecon SA (Pty) Ltd, MPA Consulting Engineers, V3 Consulting Engineers and Leporogo Specialist Engineers.

The N1-16 follows a south-to-north alignment from a position north of Winburg up to Ventersburg. The project entails the upgrading of the existing single carriageway road (one lane per direction) to a dual carriageway road (two lanes per direction). The major aspects of the project include the following:

- rehabilitation of the existing road N1-16 carriageway;
- construction of a new carriageway;
- upgrading of the vertical alignment (over approximately 14% of the road section);
- cross-section configuration (per direction) comprising 2 x 3.7m wide lanes, 3.0m wide outside shoulder (of which 2.5m is surfaced), 1.6m wide inside shoulder (of which 1.0m is surfaced) and a 7.4m wide median;
- installation of new median drainage between the existing carriageway and the new carriageway;
- replacement of the majority of the existing minor culverts;
- demolition and replacement of existing major culverts (6 locations);
- widening and/or lengthening of existing major culverts (11 locations);
- construction of 4 new road-over-river bridges adjacent to the existing road-over-river bridges;
- retaining two of the four existing bridges and demolishing and raising the other two remaining bridges;
- widening of existing cuttings (especially the cutting along the "pass" section between km 113.800 and km 114.100);
- implementation of an access management plan where the number of locations with direct access to the N1-16 is reduced; and
- land expropriation required for the following amongst other things:
  - new carriageway of road N1-16;
  - new interchange (intersection of road R73 with the N1-16);
  - new major at-grade intersections;
  - new access/frontage roads; and
  - new or expanded borrow pits and quarries.

Road design will include aspects like:

- Earth shaping;
- Cut and fill and bank stabilisation;
- Bridge and culvert structure extensions, (Roads will be constructed to ensure effective drainage. Where roads cross streams, suitable drainage structures will be constructed. Storm water drainage will be accommodated within the road reserve);
- Re-design on link roads; and
- Temporary gravel road access to Borrow Pits.

Other road construction activities associated with general road construction will include:

- **Construction Traffic** - Construction traffic will include construction equipment, large vehicles / trucks for material delivery as well as smaller passenger vehicles used to transport construction staff.
- **Waste Management** - Waste management will be the responsibility of relevant contractors. All construction waste must be removed from the work areas and disposed of at approved (municipal) waste disposal facilities. Where possible, options for the reuse or recycling of waste materials must be favoured over disposal.
- **Surface Water Management** – This part of the N1 is located in a summer rainfall area, and storm water management is required during the rainy season. Surface water management aims to prevent contamination of runoff and surrounding areas and to prevent erosion of the construction site and downstream areas.
- **Air Quality Management** - Sources of emissions include dust generated by construction vehicles on the construction site, bulk earthworks and stockpiles as well as exhaust emissions from construction vehicles and diesel generators and other emissions related to the surfacing of the road.

Emissions will be limited as far as possible through stabilisation of any exposed areas and watering of unsealed surfaces when dust becomes problematic to surrounding activities. Construction vehicles and generators will be maintained in good working order to minimise emissions.

### 5.1 Project design and layout

As part of the previous Concept Design phase various issues regarding the design approach were evaluated and decided upon for further development during the Preliminary Design phase. A summary of these decisions is as follows:

#### Cross-section

- The cross-section is to be a 4-lane divided dual carriageway (versus an undivided 4-lane single carriageway).
- Offset between the centre of the carriageways and the peg line is 9.0m. Future widening for the 6-lane stage will, therefore, be to the outside.
- Along the “pass” section (km 112.500 to km 115.600) the two additional lanes for the future 6-lane configuration will be provided on the inside. This is due to the fact that adopting the divided dual carriageway cross-section through the “pass” will require a significant cutting (with benches) and the re-construction there-of (should the future widening be to the outside) is to be avoided. The future 6-lane stage will, therefore, consist of an undivided single carriageway.
- From  $\pm$  km 131.8 to  $\pm$  km 132.2 the dual carriageway cross-section transitions to an undivided 4-lane carriageway in order to tie-in with the cross-section within Ventersburg.

### Horizontal alignment

- Initially (at the start of the project in the southern side) the new carriageway is to be on the LHS (western side) in order to tie in with the BVI design of road N1-16 further southwards. The offset between the centre of the carriageways and the peg line is 12.7m (versus the 9.0m along the rest of the project).
- Along the first curve ( $\pm$  km 92.7 to  $\pm$  km 93.3) the new carriageway will transition from the LHS (western side) to the RHS (eastern side).
- Beyond  $\pm$  km 93.3 the new carriageway will remain on the RHS (eastern side) up to before Ventersburg.

### Design speed

- The horizontal alignment is to adhere to 120km/h design speed standards ( $e_{max} = 8\%$ ).
- The vertical alignment is to adhere to 100km/h design speed standards for crests ( $K_{min} = 60$ ) whilst accepting  $K = 36$  for existing sags.

These aspects ultimately had an impact on the proposed horizontal- and vertical alignment of the main line. Aspects that were also considered were to mitigate access restriction to the main line which entailed a phased access implementation i.e. initially construct at-grade intersections and during the life cycle of the road construct grade separated accesses (interchanges) as warranted by the traffic requirements and Level of Service.

### Access Management Plan

An Access Management Plan (AMP) was developed during the Concept Design phase to provide indicative options for discussion purposes and for further development during the following design stages after consultation with SANRAL and there-after with all the interested and affected parties (which forms part of the Environmental Approval process). Initial feedback from SANRAL was that the provision of minor crossings on the route should be avoided and that only one (1) diamond interchange and three (3) major intersections should be implemented. Frontage roads will be required to provide access to road N1-16 where existing direct accesses have been closed. The original proposed intersection positions were as follows:

- km 93.615 : T-junction (LHS) - road R73 (upgrade to interchange).
- km 105.810 : T-junction (RHS) - road S464 (upgrade to major crossing).
- km 115.020 : Crossing - Virginia (LHS) / Aldam (RHS) - road P24 (upgrade to major crossing).
- km 121.324 : Crossing - Road S309 (upgrade to major crossing).

At the Gateway Review on the Concept Design, approval was granted for the provision of two additional intersections at the following locations:

- km 117.780.
- km 126.510.

The advantages of providing these two additional intersections are as follows:

- Length of the access roads will be reduced by 16.5km.
- Property owners will have shorter distances to travel to get access to the N1-16.

- No new bridges or underpasses will have to be constructed as part of the service road development.
- Farmers with properties on either side of the N1-16 have much shorter travel distances.
- Provision is made for implements/vehicles to cross the N1-16 without the need for implement culverts.
- Reduced disruption to farming activities and the affected owners.
- Cost saving (excluding Right-of-Ways) of R 4.0 million.

Following the Gateway Review, meetings were held with interested and affected parties where the aforementioned six (6) access locations were presented. Feedback from these meetings indicated that an additional intersection was required between km 93.615 and km 105.810. Evaluation of this request resulted in an intersection being proposed at km 99.020.

Access from the farms and other properties to the interchange and intersections will be provided by means of new frontage/access roads and existing gravel roads that may have to be proclaimed. The roads will be gravel surfaced with a 6.0m wide formation width within a 16m road reserve.

The project design and layout drawing, describing the route, storm water management structures (culverts and pipes) as well as the four major bridges are also given in the following appendixes.

The road design and layout can be viewed in the drawings supplied in Appendix D

## **5.2 Project Management**

A high level schedule, with preliminary dates, as it is currently indicated is given below:

- |                                  |               |
|----------------------------------|---------------|
| • Start of expropriation process | December 2020 |
| • Start of road construction     | January 2029  |
| • End of construction            | December 2034 |

It is currently envisaged that the road will be in full use by the public by January 2035.

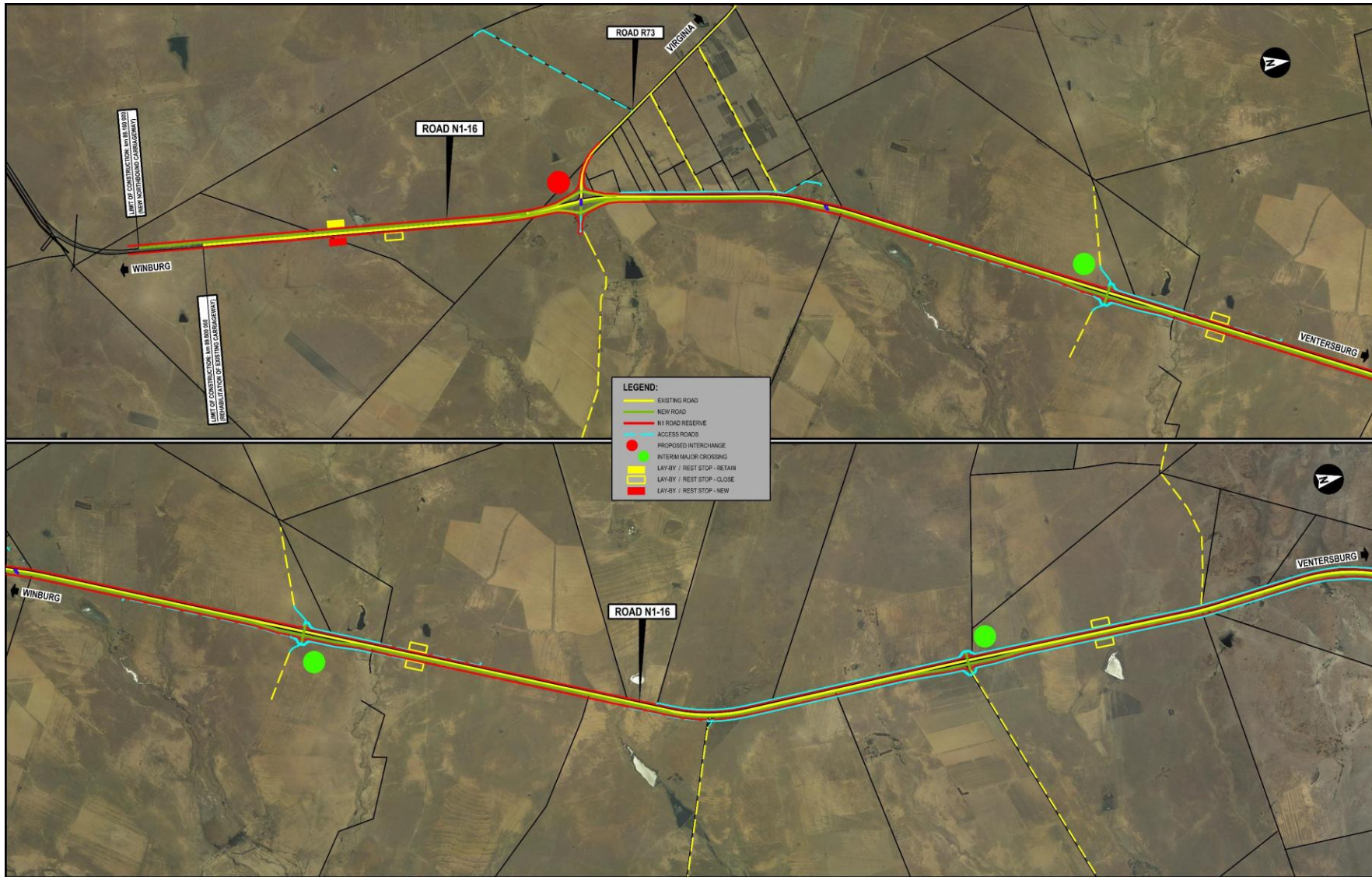


Figure 27: Access Management Plan (1 of 2)

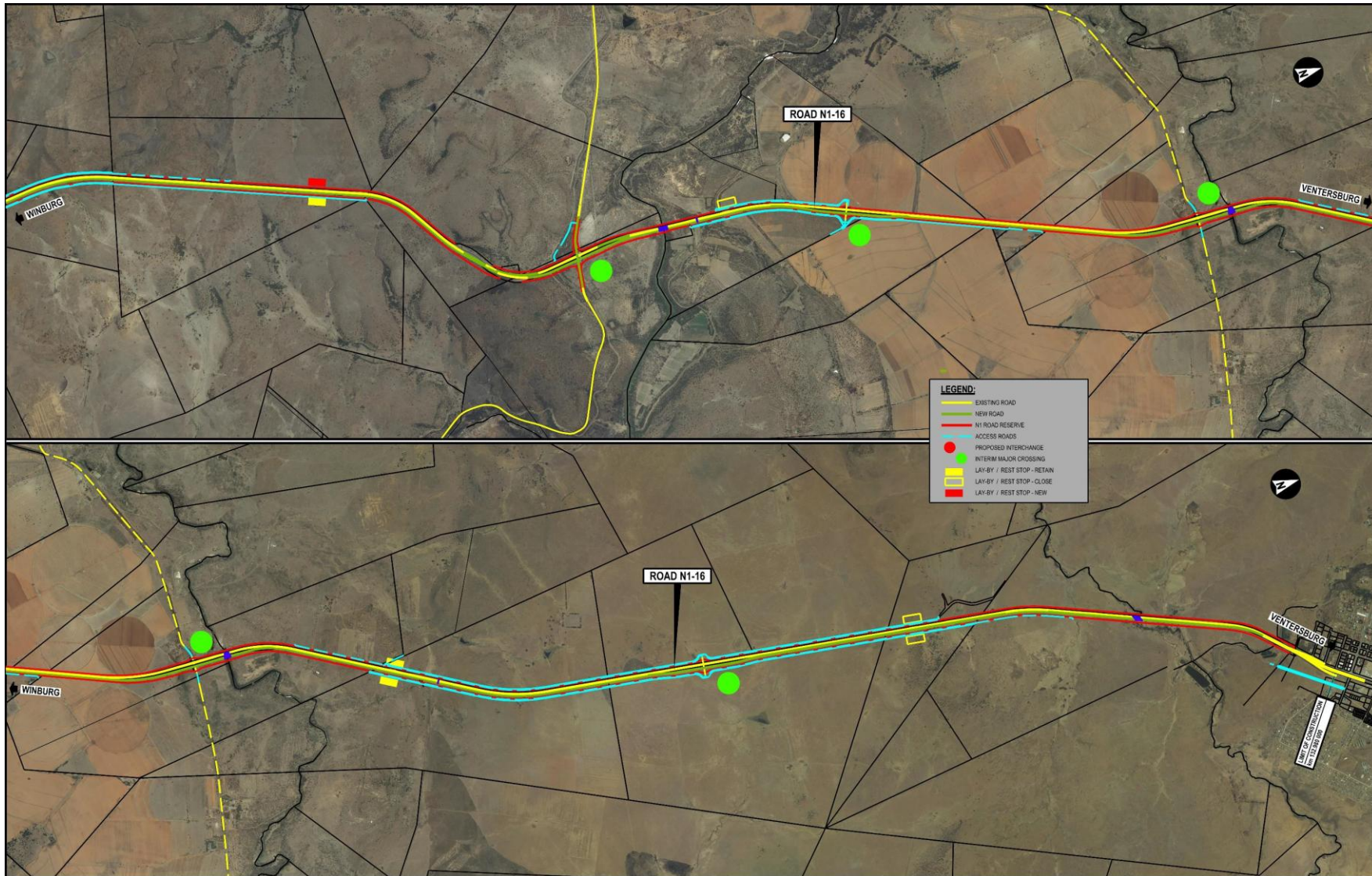


Figure 28: Access Management Plan (2 of 2)



### 5.3 Project Alternatives

As required by GN R 982 in Appedix 1 Regulations 2 and 3, the description of alternatives that were considered in this application is required. Alternatives should include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished in the specific instance taking account of the interest of the applicant in the activity. The no-go alternative must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

#### 5.3.1 Property

Alternatives regarding the property on which or location where it is proposed to undertake the activity. Since the planned upgrading of the N1-16 will require a new carriageway in parallel to the existing road within the current road reserve, there are not an alternative to the location of the road.

#### 5.3.2 Type

Alternatives regarding the type of activity to be undertaken. Since the planned upgrading of the N1-16 will require a new carriageway in parallel to the existing road within the current road reserve, there are not an alternative to the type of activity to be undertaken.

#### 5.3.3 Design and layout

Alternatives regarding the design or layout of the activity are to be considered. During the design process several alternatives were considered in accordance to the SANRAL Drainage Manual and Access Management Plan:

- Major bridge design

For the assessment of the existing bridge structure and the design of the new bridge several alternatives were considered for the bridge over the Sand River according to the Drainage Report: Sand River August 2018 that can be found in Appendix F.3.

**Table 21: Sand River bridge design alternatives considered**

OPTION NO.	DESCRIPTION	DIMENTIONS
Alternative 0	Do-nothing: Maintain the existing bridge and build a new bridge upstream identical to the existing bridge	Downstream 6 x 5.1m spans (existing) Upstream 6 x 5.1m spans
Alternative 1	Maintain the existing bridge and add 2 spans at each approach. Construct the upstream bridge identical to the downstream bridge	Downstream 10 x 5.1m spans Upstream 10 x 5.1m spans
Alternative 2	Maintain the existing bridge and add 2 spans at each approach. Construct the upstream bridge with similar length but fewer spans	Downstream 10 x 5.1m spans Upstream 17.5m +25m +17.5m spans
Alternative 3	Maintain the existing bridge and add 2 spans at each approach and lift bridge by 0.6m. Construct the upstream bridge identical in length and level to the downstream bridge.	Downstream 10 x 5.1m spans, level 0.6m higher Upstream 10 x 5.1m spans, level 0.6m higher

OPTION NO.	DESCRIPTION	DIMENSIONS
Alternative 4	Maintain the existing bridge and add 2 spans at each approach and lift bridge by 0.6m. Construct the upstream bridge with identical length and level to the downstream bridges but with different spans.	Downstream 10 x 5.1m spans, level 0.6m higher Upstream 17.5m +25m +17.5m spans, level 0.6m higher
Alternative 5	Demolish the existing bridge and build two new bridges with 3 spans (17.5m – 25m – 17.5m) and elevate the deck to conform to a Class 1 road (+2.0m)	Downstream 3 spans (17.5m – 25m – 17.5m) Upstream 3 spans (17.5m – 25m – 17.5m)

The conclusion of the technical assessment is as follows:

- The existing bridge must be replaced and the new upstream bridge for the second carriageway must comply with Road Class 1 requirements. This is based on the risk, the extent of overtopping of the existing bridge and the economic study of the road which is feasible for this alternative.
- The required bridges should be 60m long and to the required level to conform to the Road Class 1 requirements

A similar process of consideration of design alternatives for the bridges over the Erasmusspruit, Koolspruit and Venterspruit were also conducted. These Drainage Reports for the Erasmusspruit, Koolspruit and Venterspruit are available in Appendix F

Preferred bridge design for the project is given in the table below:

BRIDGE	PREFERRED BRIDGE DESIGN
Bridge No. B1525, N001_16NC_B1525, over the Venterspruit river (± km 96.080).	<ul style="list-style-type: none"> <li>• Downstream: 5 x 3.5m (2.7m)* spans</li> <li>• Upstream: 5 x 3.5m (2.7m) spans</li> </ul> <p>Keep existing bridge as is, construct a new similar bridge upstream to meet road class 2 requirements. The new bridge is to be a fully integral bridge.</p>
Bridge No. B1526, N001_16NC_B1526, over the Sand river (± km 115.924).	<ul style="list-style-type: none"> <li>• Downstream: 12 x 6.6m spans</li> <li>• Upstream: 12 x 6.6m spans</li> </ul> <p>To some extent keep existing bridge and jack deck to the meet Road Class 1 requirements. Construct new bridge upstream to meet Road Class 1 requirements. Both bridges are to be 3.09m higher than the existing bridge. Span lengths and number of spans are to be the same as the existing structure. Upstream bridge will have a continuous deck which is to be cast monolithic with piers and supported on bearings at the abutments. The upstream bridge cannot be made a full integral bridge because the deck is relatively long (i.e. deck longer than 60m).</p>

<p>Bridge No. B1527, N001_16NC_B1527, over the Koolspruit river (<math>\pm</math> km 121.665).</p>	<ul style="list-style-type: none"> <li>• Downstream: 9.615m – 9.854m – 9.952m – 9.379m</li> <li>• Upstream: 4 x 15m</li> </ul> <p>Keep the existing bridge and build a similar bridge upstream but 20m longer and approximately 1m higher than the existing bridge. The upstream bridge will have a continuous deck which is to be cast monolithic with piers and abutments (i.e. it is to be a full integral bridge). Both bridges comply with Road Class 1 requirements for freeboard and overtopping (the freeboard on existing bridge is only 100mm less than required). A concrete wall will connect the piers of the two bridges and channel the flow through the bridges. The height of the wall will be up to the 1:100 year flood level (i.e. QT)</p>
<p>Bridge No. B1528, N001_16NC_B1528 over the Erasmusspruit river (<math>\pm</math> km 130.905).</p>	<ul style="list-style-type: none"> <li>• Downstream: 17.5m – 25m – 17.5m</li> <li>• Upstream: 17.5m – 25m – 17.5m</li> </ul> <p>Demolish the existing bridge and build two new bridges to Road Class 1 requirements. Both bridges are to be full integral bridges, i.e., the decks are to be continuous and are to be cast monolithic with the piers and abutments. Each bridge will have a total length of 60m.</p>

Above table was derived from the respective bridge’s Technical Bridge Report.

- Culvert design considerations

In the Drainage Report: Major Culverts (Appendix F.1) the proposed methodology for the replacement, extension or adding of cells for major culverts is as follows:

- According to the SANRAL Drainage Manual, existing culverts for a Class 1 road only have to comply with Road Class 2 requirements. The upgrading from a single carriageway road to a divided dual carriageway road is considered to be an upgrading of an existing road. Culverts that must be extended for the new carriageway must therefore comply with Road Class 2 requirements.
- Existing culverts that do not comply partially or fully with the Road Class 2 requirements will be evaluated and upgraded according to the requirements of Table 10.2 of the SANRAL Drainage Manual.
- Existing precast culverts with a height or span equal to or more than 1.8m that require replacement, according to the methodology explained above, shall be replaced with in-situ concrete culverts.
- Existing precast culverts with a height or span equal to or more than 1.8m that comply with Road Class 2 shall be extended with in-situ concrete culverts under the new carriageway. The existing culverts shall therefore remain as precast units (subject to the requirement that the culverts are in a good condition).

Preferred culvert design/size for the upgrading of existing and new culverts is given in the table below:

Km DISTANCE (Peg line)	STRUCTURE NO.	SIZE (meter)
91.429	N001_16NX_C 3242	4/1.2 x 1.2 + 3/1.8 x 1.2
93.560	N001_16NX_C 0711	2/3.6 x 1.8
Ramp A	N001_16NX_C 0710	2/3.6 x 1.8
Road R73	N001_16NX_C 0712	2/3.6 x 1.8
97.514	N001_16NX_C 3247	7/1.8 x 1.2
99.718	N001_16NX_C 0714	5/2.5 x 1.8
102.342	N001_16NX_C 3249	2/1.8 x 1.2 + 4/1.2 x 1.2
104.813	N001_16NX_C 3251	3/2.4 x 1.5
106.442	N001_16NX_C 3252	2/3.0 x 1.5
107.412	N001_16NX_C 9491	4/1.5 x 1.2 + 2/1.8 x 1.2
Road P24	N001_16NX_C 0724P	2/1.8 x 1.8
116.273	N001_16NX_C 3258	1/2.4 x 1.8 + 1/1.8 x 1.8
118.463	N001_16NX_C 0713-	9/1.2 x 1.2
121.398	N001_16NX_C 3260	2/2.4 x 1.5
129.004	N001_16NX_C 3263	1/2.1 x 2.1
130.270	N001_16NX_C 3264	1/3.05 x 1.65 + 1/2.45 x 1.5
132.320	N001_16NX_C 3265	4/4.7 x 2.8

- Access management

The access management for the section km115 to km133 of the N1-16 road had two alternatives that were assessed. Option 1 includes the construction of service roads parallel to the N1-16 road together with the construction of two new roads that will enter into Ventersburg – See Figure 29.

Option 2 involve shorter access/service roads parallel to the N1-16 road and the construction of two new intersections at km 117.78 and km126.5 – see Figure 30. The service road length of Option 2 is also shorter than for Option 1

Cost comparison of the two alternative access management options is given below:

**Table 22: Cost comparisons – Access management alternative options**

Alternative	R (million)
Option 1	22.2
Option 2	18.25
Cost difference (excluding expropriation cost)	3.95

Option 2 with the additional intersections is the preferred option.



Figure 29: Access management alternative option 1



Figure 30: Access management alternative option 2

- Dual or single carriageway

It is also concluded by analysis and motivation that a dual carriageway freeway is more economical than a 4 lane single carriageway. The grade separated diamond interchanges at the existing intersections therefore perfectly complement the proposed 4 lane dual carriageway facility.

The proposed 4 lane dual carriageway is the preferred option.

#### **5.3.4 Technology**

Alternatives regarding the technology to be used in the activity were not identified.

#### **5.3.5 Operational Aspects**

Alternatives regarding the operational aspects of the activity were not identified.

#### **5.3.6 No-go alternative**

The No Go alternative will be considered in the EIA in accordance with the requirements of the EIA Regulations in GN R 982. The No Go alternative entails no change in existing status quo, in other words, the proposed N1 - 16 road will not be upgraded to include additional two lanes.

### **5.4 Drainage and Storm water Management**

The majority of the N1- 16 traverses flat terrain with the exception of the latter few kilometres traversing what could be described gently rolling terrain. The route crosses the Erasmus Spruit, Koolspruit, Sand Rivier and Venterspruit over bridges. The smaller streams are shallow, and their flood plains fairly wide. These streams are accommodated by means of small structures – culvers or pipes. Rising of the vertical profile of the road will imply higher fills at the location of these structures, which will result in an increase in the capacity of these small stream structures. It is envisaged that the proposed upgrade of this route will allow for the installation of larger culverts, if need be, without affecting the integrity of the pavement layers. SANRAL has a requirement that the minimum box culvert dimension will be 900x600mm, and drainage pipe diameter of 750mm and mostly of 900mm, for ease of maintenance. Due to these maintenance requirements, it is proposed that culverts that are not within these specs should be replaced with at least the minimum dimensions, bearing in mind the catchments run-off requirements.

Surface runoff of storm water, in low fill conditions, will be allowed to run off the surface without collection at the edge of the road surface. In high fill or cut conditions surface runoff will be collected at the edge of the road surface and discharged at regular intervals to the side of the road.

It is not foreseen that extension of major bridges will affect stream crossings significantly. Bridge extension construction activities will remain within road reserves. The bridges are:

- Bridge No. B1525, N001\_16NC\_B1525, over the Venterspruit river ( $\pm$  km 96.100): Length = 13.5m.
- Bridge No. B1526, N001\_16NC\_B1526, over the Sand river ( $\pm$  km 115.930): Length = 80m.
- Bridge No. B1527, N001\_16NC\_B1527, over the Koolspruit river ( $\pm$  km 121.690): Length = 39.6m.

- Bridge No. B1528, N001\_16NC\_B1528 over the Erasmusspruit river ( $\pm$  km 130.900): Length = 31.0m.

The existing bridges over Venterspruit (B1525) and Koolspruit (B1527) will be retained while the existing bridges over the Sand River (B1526) and Erasmusspruit (B1528) will be demolished and replaced. These bridges will be placed at a higher level than that of the existing bridge. For the new carriageway four new bridges will be constructed.

Drainage Reports for the Erasmusspruit, Koolspruit, Sand River, Venterspruit and Major Culverts are available in Appendix F

The road layout indicates the position and size of the culverts (both minor and major) and storm water drainage pipes and can be viewed in the drawings supplied in Appendix D. Table of the major drainage control culverts is given below as derived from the Drainage Report: Major Culverts (Appendix F.1):

**Table 23: Major drainage control culverts**

Km DISTANCE (Peg line)	STRUCTURE NO.	SIZE	CATCHMENT AREA (km <sup>2</sup> )
91.429	N001_16NX_C 3242	4/1.2 x 1.2 + 3/1.8 x 1.2	3.3
93.560	N001_16NX_C 0711	2/3.6 x 1.8	3.4
Ramp A	N001_16NX_C 0710	2/3.6 x 1.8	
Road R73	N001_16NX_C 0712	2/3.6 x 1.8	
97.514	N001_16NX_C 3247	7/1.8 x 1.2	3.0
99.718	N001_16NX_C 0714	5/2.5 x 1.8	10.4
102.342	N001_16NX_C 3249	2/1.8 x 1.2 + 4/1.2 x 1.2	5.0
104.813	N001_16NX_C 3251	3/2.4 x 1.5	3.1
106.442	N001_16NX_C 3252	2/3.0 x 1.5	3.0
107.412	N001_16NX_C 9491	4/1.5 x 1.2 + 2/1.8 x 1.2	2.1
Road P24	N001_16NX_C 0724P	2/1.8 x 1.8	0.68
116.273	N001_16NX_C 3258	1/2.4 x 1.8 + 1/1.8 x 1.8	3.4
118.463	N001_16NX_C 0713-	9/1.2 x 1.2	2.3
121.398	N001_16NX_C 3260	2/2.4 x 1.5	5.5
129.004	N001_16NX_C 3263	1/2.1 x 2.1	0.7
130.270	N001_16NX_C 3264	1/3.05 x 1.65 + 1/2.45 x 1.5	3.5
132.320	N001_16NX_C 3265	4/4.7 x 2.8	16

A list of the bridges and culverts with coordinates are given in Appendix F.6

All existing roadside drainage elements will be replaced and additional drainage elements will have to be provided as required for the new proposed dual carriageway cross-section. The required road side drainage elements are:

- Concrete lined side drains

- Median drains
- Concrete drains at guard rails
- Catchwater banks and cut-off drains
- Benches at very deep cuts
- Kerbs at intersections

Storm Water Management Plan is available in Appendix H.2

## **5.5 Waste, Effluent, Emission and Noise Management**

SANRAL is committed to limiting pollutants within their road reserves, reusing and/recycling of resources, rather than waste, and mitigating and monitoring of negative impacts on the environmental media. Strategies for enhancing eco-efficiency are considered from the design phase through to the construction and operational phases.

### **5.5.1 Waste Management**

SANRAL contractors undergo training with respect to environmental management procedures and they are encouraged to prevent littering, minimise domestic waste and reuse certain empty containers, where possible (construction sites are monitored by resident environmental control officers). Steel off-cuts and cables are recycled and construction waste is reused as underlying road fill material.

Waste skips will be provided at the construction camp site and strategically along the route. These waste bins will be regularly emptied by a contractor who in turn will dispose of the waste at a recognized waste disposal site. The solid waste will be disposed of at a recognized waste disposal site. Waste will feed into the Masilonyana Local Municipality municipal waste stream.

Mitigation measures for water generation during construction are included in the Environmental Management Plan (EMP) (Appendix H.1).

### **5.5.2 Effluent Management**

The proposed upgrading and bridge construction activities will not produce any liquid effluent.

There will be at least one (1) chemical toilet for every 22 workers. Disposal of sewerage from the chemical toilets will be done by a sub-contractor. Measures for management of the toilets are included in the Environmental Management Plan (EMP) (Appendix H.1).

### **5.5.3 Air pollution management**

Source of air pollution during construction activities will be limited to one main contributor:

Dust generated by heavy earth moving machinery and tipper trucks will be the main source of air pollution. The typical ambient dust levels around the construction site due to vehicle movement are approximately 80 – 120 mg/m<sup>2</sup>/day. This is significantly low and well within the maximum allowable guidelines set by SANS 1929:2005.

The liberation of dust into the surrounding environment shall be effectively controlled by the use of, inter alia, water spraying and/or other dust-allaying agents. During construction, access roads will be graded and the surface compacted. Grading and land clearing will result in dust generation with vehicles and construction equipment such as graders, scrapers and dozers (most likely to be diesel



fuelled) emitting gaseous pollutants such as sulphur dioxide, oxides of nitrogen, carbon monoxide, hydrocarbons and diesel particulates. Due to the impact being limited to the local area surrounding the activity and the short duration of the construction phase, the impact from vehicular fugitive emissions can be considered low and with mitigation can be reduced to negligible. The impact on air quality from vehicular emissions during the operational phase can also be considered as low and can be reduced to negligible significance. The impact on air quality from dust during the construction phase can be considered of moderate significance and can be reduced to low with the implementation of mitigation measures.

Mitigation measures for dust generation construction are included in the Environmental Management Plan (EMP) (Appendix H.1).

#### **5.5.4 Noise management**

The character of ambient noise in the project area is currently free of any influences from economic activity other than livestock farming and the traffic noise from the use of the existing road. There are no mines or industries in the area. Ambient noise at and around residences comprises predominantly of natural sounds (birds, insects and wind) and of low intensity noises produced by existing traffic, farm activity and livestock activity.

The natural ambient noise levels in the area are largely determined by natural sounds, i.e. birds, insects and the wind in the foliage of plants. Occasional anthropogenic sounds include vehicles moving on the N1-16 road and the occasional aircraft flying over the area. The estimated noise levels are comparatively lower (80-90dBA during the day and 30-40 dBA during the night) than those listed in the revised SABS 0103 standards. Movement of tipper trucks, excavators and other construction equipment/machinery will create some noise – especially during daytime when operations are active. The noise levels will increase to 90-100 dBA during day time. There is however few dwellings or settlements within the immediate proximity to the N1 - 16 project area.

Mitigation measures for noise generated during construction are included in the Environmental Management Plan (EMP) (Appendix H.1).

#### **5.6 Water Use**

Water will be used during construction of the road for both dust suppression as well as for the road construction. The water will be abstracted for lawful sources under NWA from mainly rivers, dams and groundwater sources (i.e. boreholes). No water will be sources from the local municipality. Water use is currently estimated to amount to approximately 5 m<sup>3</sup>/day during the construction period. Thus approximately 4 000 m<sup>3</sup> over the 6 years projected project life. This is an estimated value that requires more detailed determination.

A separate application to DWS will be lodged to obtain the rights to use process water from legal water suppliers for a three to six year period, mostly from the four rivers or landowners in the nearby area. Specific abstraction points will be identified prior to the road upgrading commencing.

#### **5.7 Energy Efficiency**

No specific energy efficient design measures are considered for the road upgrading and bridge construction. Though energy saving measures (where possible) are encouraged for all SANRAL operations. The use of energy efficient lighting is considered and as such, design measures include

the reduction of luminaires, with improved reflectors, resulting in energy savings of up to 50%. The use of solar panels as a full or partial energy source is also considered for cameras, for use in the Intelligent Transport System (ITS)<sup>19</sup>.

The activity will involve consumption of the following forms of energy:

1. Electricity

Electrical equipment and utilities will be used at the contractor's camp during the road construction phase. The construction equipment will use only a limited fraction of the available electricity and this will be for the duration of the construction of the road period ONLY.

2. Fuel and oil

Delivery vehicles and other construction equipment will use petrol, diesel and oil. Use and number of such vehicles and machinery will be restricted to that which is absolutely necessary for the construction activities and deliveries.

### **5.8 Traffic accommodation during construction**

Road N1-16 forms part of one of the busiest routes in the country, particularly over holiday periods. Thus, aligning the requirements of the accommodation of traffic to the upgrade of the route, will prove to be prudent.

The objective of the accommodation of traffic design is to establish basic feasible alternatives to ensure that the upgrading process can be executed without undue (within reasonable limits) interference to the general motoring public. Particular attention needs to be given to reduce the hazardous conditions inherently part of any construction/rehabilitation process under traffic.

The right-of-ways and access roads should also be established/constructed at the beginning of the construction phase to ensure that affected land-owners will have alternative means of access as most of the existing accesses will be closed-off in accordance with the final Access Management Plan.

Following the relocation of the road reserve to its final position and the establishment of the access roads, the relocation of services should be done (especially the underground optic fibre cable and the ESKOM power lines. Ideally the relocation of services should be done before construction commences to prevent any possible delays.

Construction of the new carriageway (including the construction of the new road-over-river bridges and major culverts) will largely take place without affecting the existing carriageway and will cause minimal impact on through traffic on the existing carriageway. This will keep the merging of construction vehicles in and out of the flow of through traffic to a minimum. Construction/rehabilitation of the existing carriageway will be carried out after moving the traffic onto the new carriageway.

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<sup>19</sup> [https://www.nra.co.za/live/content.php?Category\\_ID=15](https://www.nra.co.za/live/content.php?Category_ID=15)

## 5.9 Road Maintenance Programme

The SANRAL approach to road maintenance is an integral feature of the agency's established record of corporate citizenship. To give structure and organisational knowledge to the maintenance of national roads, SANRAL has developed a Routine Road Maintenance Manual (RRM)<sup>20</sup> to guide the site management team who manage the routine road maintenance contracts. This Manual combines the skills and knowledge that SANRAL and its partners have developed over the years. It is a tool to assist those involved in RRM to identify remedial actions to be taken to preserve and render the road safe. The Manual is a guide to take the corrective action not only to provide a safe, efficient road network but also to protect the environment. Environmental Management is integrated in all the chapters of the Manual.

Through the routine road maintenance contracts, the national road reserve receives comprehensive alien weed control, vegetation cutting and of course, the introduction of indigenous tree and shrub species. SANRAL cannot lay claim to more than 15% of the successful growth of new plant species within the road reserve though, as Mother Nature plays a huge role in re-establishing tree, shrub, groundcover and bulbous species within the reserve. This has been encouraged through the change in maintenance practices over the past 6 years where responsible grass cutting practices and changes in the cutting programme has led to plant species germinating and growing with limited threat from man's intervention. Planting programmes are restricted to those areas where no successful germination has taken place of localised species or where a desired growth pattern is required. Examples of this are in centre medians wide enough to accommodate shrubs and trees, along fence lines as possible fence-replacements in areas of high community cattle grazing and in areas of new development where some screening of the road is desired.

SANRAL encourages planting partnerships in its quest to re-populate the road reserve to a similar state it was in before the construction of the road. Conservancies and the Wildlife and Environmental Society of South Africa are just two examples of planting partners. Corporate companies are also encouraged to participate in the planting programme when developing adjacent to the national road.

In areas susceptible to fire, some burning of vegetation is undertaken as part of SANRAL's responsibility but is restricted in size and undertaken in a responsible manner. Extensive weed control programmes have been implemented by SANRAL. Large areas that were once dominated by alien vegetation have been cleared and are now indigenous havens encouraging fauna to inhabit these once partially sterile areas. Through routine control, emerging weed species are kept under control.

The Landscape Management Plan is available in Appendix H.4

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<sup>20</sup> [https://www.nra.co.za/live/content.php?Category\\_ID=176](https://www.nra.co.za/live/content.php?Category_ID=176)

## 6 PUBLIC PARTICIPATION

### 6.1 Public Participation Process

#### 6.1.1 Objectives and Approach to Stakeholder Engagement

The overall aim of stakeholder engagement is to ensure that all Interested and Affected Parties (I&APs) have adequate opportunity to provide input into the process and raise their comments and concerns. More specifically, the objectives of stakeholder engagement are to:

- Identify IAPs and inform them about the proposed development and Basic Assessment process;
- Provide stakeholders with the opportunity to participate effectively in the process and identify relevant issues and concerns; and
- Provide stakeholders with the opportunity to review documentation and assist in identifying mitigation and management options to address potential environmental issues.

#### 6.1.2 Stakeholder Engagement process

The following table provide the objective of each task in the public participation process:

**Table 24: Stakeholder engagement process tasks and objectives**

TASK	OBJECTIVE
Conduct pre-consultation with DEA	To confirm authority requirements.
Initial discussion with affected landowners	To notify affected landowners of the proposed project and obtain initial comments on the proposal.
Focus group meetings with relevant parties	To discuss the proposed project with key stakeholders and obtain initial comments on the proposal.
Placement of site notices, placement of newspaper adverts and the release of Background Information Document (BID)	To notify stakeholders of the proposed project and the commencement of the EIA process, and to request registration as IAPs.
Initial IAP registration period	To provide stakeholders with the opportunity to register as IAPs for the project.
Release of the draft Basic Assessment Report for stakeholder comment	To provide stakeholders with a description of the proposed project and the affected environment, as well as a description of potential environmental issues.
Public comment period	To provide stakeholders with the opportunity to review and comment on the results of the Draft Basic Assessment report.

#### 6.1.3 Identification of Stakeholders

In line with the requirements of EIA Regulations GN R982, relevant local, provincial and national authorities, conservation bodies, local forums, and representatives of affected landowners and occupants must be notified of the environmental impact assessment process.

The following stakeholders were included:

- Affected landowners;
- Masilonyana Local Municipality, Municipal Manager and affected ward councillors;
- Matjhabeng Local Municipality, Municipal Manager and affected ward councillors;

- Setsoto Local Municipality, Municipal Manager and affected ward councillors;
- Lejweleputsa District Municipality, Municipal Manager;
- Department of Agriculture Free State, Land Use Management;
- Free State Heritage Resources Agency;
- Department of Water and Sanitation, Free State;
- Department of Police, Roads and Transport, Free State;
- Other registered Interested and affected parties.

#### **6.1.4 Notification of BAR process**

A BID containing information about the proposed project and the Basic Assessment (BA) process was compiled and distributed to the initial list of key stakeholders by post and/or email. Notices were also placed at the following locations:

- on-route on several of the farm fences between Winburg and Ventersburg;
- the Masilonyana Local Municipality (Winburg);
- the Winburg Library;
- the Winburg OVK;
- the Matjhabeng Local Municipality (Ventersburg);
- the Ventersburg Spar.

Newspaper advertisements announcing the commencement of the BA process, the availability of the BID and inviting members of the public to register on the IAP database will be placed in a regional paper, "Die Volksblad" in Afrikaans), and at specific locations such as the local Library and/or municipal offices.

#### **6.1.5 Stakeholder Meetings**

Early stage meetings with stakeholders directly affected such as landowners will be done, and it's suggested that project engineers assist with these meetings. Individual meetings with affected landowners are also proposed where relevant.

#### **6.1.6 Release of the draft Basic Assessment Report (BAR)**

The release of the draft BAR for public review will be communicated to all registered I&AP's by post or email; copies of an Executive Summary will accompany the notifications.

Site notices (posters) announcing the availability of the draft BAR for public comment will be placed at the following venues together with hard copies of the full report for public review:

- Winburg library;
- Ventersburg Library.

## **6.2 Key stakeholders and Interested and Affected Parties**

List of identified key stakeholders and registered I&AP are provided in Appendix I.1. This includes a table for each of the following:

- Affected Landowners
- Municipal and Ward Councillors

- State Departments
- Other registered I&AP's

### 6.3 Advertisement and Notification of Interested and Affected Parties

During the course of the public participation process several notices and communication with I&AP were conducted. The following table provide detail of engagements as well as the location and the report of the proof thereof.

**Table 25 Method and Proof of I&AP notification**

DATE	DESCRIPTION – METHOD OF NOTIFICATION	PROOF
February 2018 – September 2018	Interviews with and meetings with affected landowners by Aurecon, MPA and V3 Engineering Consultants	Appendix I.2
4 October 2018	Advertisement in Volksblad	Appendix I.3
4 October 2018	Notices were placed on-route on the farm fences between Winburg and Ventersburg at: <ul style="list-style-type: none"> <li>• Bellevue 1/51 Farm (west) - 28°26'40.76"S 27°01'59.94"E</li> <li>• Bellevue 1/51 Farm gate - 28°26'37.67"S 27°02'00.32"E</li> <li>• Bellevue 1/51 Farm (east) - 28°26'21.74"S 27°01'02.20"E</li> <li>• Damplaats 1/556 Farm(east) - 28°07'20.90"S 27°07'23.74"E</li> <li>• Grootdam 3/611 Farm - 28°22'31.05"S 27°02'56.91"E</li> <li>• Keerom 1/2297 Farm - 28°17'46.37"S 27°03'55.34"E</li> <li>• Kleinfontein 2/808 Farm (east) - 28°25'24.37"S 27°02'00.96"E</li> <li>• Kleinfontein 2/808 Venterspruit - 28°23'56.41"S 27°02'13.86"E</li> <li>• Kleinfontein 2/808 Farm (west) - 28°24'40.11"S 27°02'02.16"E</li> <li>• Klipplaat 194 Farm (east) - 28°14'30.08"S 27°05'17.65"E</li> <li>• Klipplaat 194 Farm (west) - 28°14'28.99"S 27°05'15.51"E</li> <li>• Ventersdeel 2/334 Farm gate - 28°11'14.44"S 27°06'15.08"E</li> <li>• Ventersdeel 2/334 Farm (west) - 28°11'15.60"S 27°06'08.98"E</li> <li>• Vogelfontein 1/1970 Farm gate - 28°20'53.27"S 27°03'45.76"E</li> <li>• Zandriverspoort 7/213 Farm gate - 28°13'52.01"S 27°05'19.21"E</li> <li>• Zandriverspoort 7/213 pivot - 28°13'42.65"S 27°05'17.42"E</li> <li>• Zandriverspoort 7/213 Farm (west) - 28°12'56.48"S 27°05'34.64"E</li> </ul>	Appendix I.4
4 October 2018	A notice was placed at the at the Masilonyana Local Municipality (Winburg) - 28°31'04.78"S 27°00'46.83"E	Appendix I.4
4 October 2018	A notice was placed at the Winburg Library - 28°31'01.29"S 27°00'45.82"E	Appendix I.4
4 October 2018	A notice was placed at the Winburg OVK - 28°31'00.66"S 27°00'49.51"E	Appendix I.4
4 October 2018	A notice was placed at the at the Matjhabeng Local Municipality (Ventersburg) - 28°05'07.32"S 27°08'14.18"E	Appendix I.4
4 October 2018	A notice was placed at the Ventersburg Library - 28°05'08.62"S 27°08'13.20"E	Appendix I.4
4 October 2018	A notice was placed at the Ventersburg Spar - 28°05'16.75"S 27°08'83.23"E	Appendix I.4
10 October 2018	Circulation of BID to IAP's through register post	Appendix I.5
12 October 2018	Bulk e-mail to parties providing BID document – landowners	Appendix I.6

DATE	DESCRIPTION – METHOD OF NOTIFICATION	PROOF
12 October 2018	Bulk e-mail to parties providing BID document- IAP's	Appendix I.6
16 October 2018	Bulk e-mail to parties providing BID document - Municipalities	Appendix I.6
16 November 2018	Bulk email to parties – update on progress and notice of specialist studies	Appendix I.6
27 November 2018	Bulk sms to parties without email contact details – update on progress and request for email addresses	Appendix I.6
25 January 2019	Bulk email to landowners for request for convenient way for obtaining signatures for property owner for Water Use License forms.	Appendix I.6
31 January 2019	Bulk email to all I&AP to inform them of the Public Participation Meeting of 6 & 7 February 2019.	Appendix I.7
4 February 2019	Bulk sms to some I&AP (no email address) to inform them of the Public Participation Meeting of 6 & 7 February 2019.	Appendix I.7
6 February 2019	Public Participation Meeting held at the Winburg Hotel at 13:00.	Appendix I.7
7 February 2019	Public Participation Meeting held at the Ventersburg Library at 10:00	Appendix I.7
20 February 2019	Bulk email to all Landowners and attendees for the distribution for comment of the Minutes of Meeting for the Shareholder Meetings held on 6 and 7 February 2019	Appendix I.7
11 September 2019	Bulk email to all landowners and I&AP to inform them of the Executive Summary of the Integrated Water Use Licence Report.	Appendix I.6
1 November 2019	Bulk email to all landowners and I&AP to inform them of the BAR Executive Summary and where the Report will be available (i.e. Winburg Library and Ventersburg Library) for review and invite them to comment during the 30 day period from 1 November 2019 till 30 November 2019. A reminder was also sent on 21 November 2019.	Appendix I.6
12 November 2019	Email to the parties indicated on the DEA: Biodiversity and Conservation web site (Mr Shonisani Munzhedzi, Mr Simon Maletse and Ms Skumsa Mancotywa) with regards to the LM Safaris Nature Reserve. A follow-up email was sent on 3 December 2019.	Appendix I.11
20 November 2019	Even though Mr Marx is an existing I&AP we communicated with him specifically about the LM Safaris Nature Reserve.	Appendix I.11

Meetings were also held with state departments

- 23 October 2018 Meeting with DESTEA, DWS and Department of Police, Roads and Transport
- 27 February 2019 Pre-application meeting with DWS
- 07 August 2019 DWS Site inspection visit

Attendance registers for these meetings are available in Appendix I.10

#### 6.4 Stakeholder Engagement Meetings

Two Stakeholder Engagement Meetings have been held. These are:

- Stakeholder Engagement Meetings on 6 February 2019 at Winburg Hotel at 13:00
- Stakeholder Engagement Meetings on 7 February 2019 at Ventersburg Library at 10:00

The minutes of these meetings together with the presentation and attendance register are available in Appendix I.7

Photos taken of the Stakeholder Engagement Meetings are provided below.



Figure 31: Presentation at Public Engagement Meeting



Figure 33: Discussion of Layout plans - 2



Figure 32: Discussion of Layout plans - 1



## 6.5 Comments and Responses

A full Comments and Response Report detailing all comments and the response thereto are provided for in **Appendix I.8**. A summary of the main concerns and the response are given below:

**Table 26: Summary of main concerns raised and response**

NO	COMMENT	RESPONSE
1	Culverts to be lengthened and enlarged	Culverts were designed to stretch over the entire breath of the planned new and existing carriage ways and enlarged where relevant. Culverts C3244, C3247, C3248, IDC 0097, C3260 and C3265 were enlarged. See Drainage Report: Major Culverts in Appendix F
2	Closure of roads with direct access to the N1. Request direct access to N1	Access management plan was developed to provide all the farmers access to their farms, while minimising the number direct access points. As described in Chapter 5.2.3 no 3, two new intersections (one at km 117.810 and the other at km 126.51) was approved by SANRAL Head-office to accommodate the ease of access via the access roads that run parallel to the N1. The Engineers have minimized the length of the access roads as far as possible and have reduced the length from 60 to 46 km
3	Farm stall, Camping site access to N1 when current access roads are closed	See response to comment 2
4	Safety of farmers and small holdings due to new access roads	These access roads are not public roads and the rightful users can by agreement restrict the access, but it must remain open for the rightful users to secure safety and security.
5	Access to farm located on both sides of the N1 (also for implements and heavy vehicles)	See response to comment 2. In some cases the culverts were enlarged to accommodate underpass access.
6	Access and construction activities planned such that it will enable the farming activities of proceed as normal as possible and not have any activities adversely affected	All traffic control measures will be communicated to affected parties to plan as far as possible normal traffic flow. Construction activities and schedule will be communicated to affected parties to minimise impact.
7	Water resources (borehole and spring) close to road must not be compromised or replaced/compensated	Boreholes are not replaced as it has been found difficult in the past to replace an existing borehole with one of the same quality and strength. SANRAL would request a quotation to be provided for the replacement of the borehole and the owner will receive compensation for actual financial cost. In extreme cases where the borehole is the only source of water to the property and the development of a new borehole is not a viable option then SANRAL has gone so far as to buy out the entire property
8	Expropriation of land process for the enlarged road reserve	Normal acquisition process will be followed as done historically with farmers. The road reserve area will be transferred to SANRAL.
9	The current alignment is crossing some dams will it be replaced?	Infrastructure such as dams that are affected by the development will be moved and rebuilt by the contractor. Alternatively the owner will be compensated for the actual financial cost for affected infrastructure.

## 6.6 Comments on Written Submissions

No comments were received on the BID document submitted to these I&AP's, apart from the submission of Registration forms (Appendix I.9).

The draft BAR has been made available for comment at the Winburg and Ventersburg Libraries from 1 November 2019 till 2 December 2019 to I&AP. The Executive Summary was also e-mailed to all

I&APs to inform them of where the Report will be available (i.e. Winburg Library and Ventersburg Library) for review and invite them to comment during the 30 day period from 1 November 2019 till 30 November 2019. A reminder was also sent on 21 November 2019.

The emails, review register and received comments forms can be viewed in Appendix I.12. No comments requiring any alterations of the BAR was received from other I&AP, though comments received from DEA was included in the update of the report and are available in the Appendix.

The following comments were received on the Draft BAR document from I&APs. (See Appendix I.12 for emails and comment forms)

**Table 27: Comments and Response on Draft BAR**

Name and details	Comments and Concerns	Response
<p>Annelize Grobler Landscape Dynamics Environmental Consultants Tel : 082 566 4530 / 012 460 6043 Fax : 086 685 3822 E-mail : agrobler@landscapedyn amics.co.za</p>	<p>5 November 2019 – Email “Thank you for forwarding this information to me. Please provide me with an electronic copy of the following:-</p> <ul style="list-style-type: none"> <li>• Draft BAR</li> <li>• Draft EMPr</li> <li>• Ecological Report”</li> </ul>	<p>Email was send with the requested information</p>
<p>Rian Craill Owner Fouriespoort, Ventersburg Tel: 083 3918357</p>	<p>22 November 2019 – Comment Form</p> <ol style="list-style-type: none"> <li>1. Game fence</li> <li>2. Water useage</li> <li>3. Environmental impact on game (stress)</li> <li>4. Access to property</li> </ol>	<p>Email was send.</p> <p>Game fencing will not be replaced/moved by the contractor. The farmer will be required to obtain quotations to move the fence and will be reimbursed accordingly.</p> <p>Water will only be abstracted for the project from a water source after obtaining a Water Use Licence from the Department of Water and Sanitation.</p> <p>Noise was identified as a potential impact and can cause stress to the game. This impact will be mitigated in accordance to the EMP. The EMP also prohibits construction staff to hunt or stress fauna in any way outside of their normal construction duties.</p> <p>The layout plan provided in the Draft BAR, show the access route to the farm Fouriespoort will be via the gravel roads parallel to the N1 from the intersection at km 126.5.</p>

The comment received on the Draft BAR document from **Department of Environmental Affairs (DEA)** with their office in Pretoria is attached in Appendix I.12. All comments were, as far as possible, incorporated into the final BAR report as indicated in the following table.

**Table 28: Response to DEA Comments on Draft BAR**

NO	DEA COMMENT DESCRIPTION	FINAL BAR
(a)	Listed activities	Chapter 7.1
	Coordinates of each major and minor culver and bridges to be provided in Appendix	Appendix F.6
(b)	Layout and Sensitivity Maps	Appendix C and D
(c)	Alternatives – indicate preferred alternative in 5.3.3	Chapter 5.3.3
(d)	Public Participation Process – Draft BAR circulation	Chapter 6.6, Appendix I.12
	Communication DEA: Biodiversity and Conservation	Appendix I.11
	Comments and Response Report	Appendix I.8
(e)	Specialist Assessments – Specialist Declaration of Interest Forms	Appendix E
(f)	Environmental Management Programme (EMPr)	Appendix H1 and in EMP Chapter 2
General	Comply with Appendix 1 and Regulation 19(1) of the EIA Regulations, 2014	Chapter 2.4
	Include the period for which the Environmental Authorisation is required and the date on which the activity will be concluded	Chapter 8.1

No feedback or comments were received from the **Department of Environmental Affairs (DEA): Biodiversity and Conservation**. See Appendix I.11 for the communication emails with them and the owner of LM Safaris Nature Reserve.

## **6.7 Notification of Authorisation Decision**

The Environmental Authorisation has not yet been issued.

## 7 IMPACT ASSESSMENT

### 7.1 Project description in terms of applicable listed activities

Amended Environmental Impact Assessment Regulations, 2014 (GN R982 in GG 38382 of 4 December 2014: National Environmental Management Act (107/1998): Environmental Impact Assessment Regulations, 2014 (GNR 982)) that regulate the environmental authorisation process and list activities that may not commence without Environmental Authorisation from the Competent Authority in the following regulations:

- GN R983 in GG 38382 of 4 December 2014: Listing notice 1: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R983)
- GN R984 in GG 38382 of 4 December 2014: Listing notice 2: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R984)
- GN R985 in GG 38382 of 4 December 2014: Listing notice 3: List of activities and competent authorities identified in terms of sections 24 (2) and 24 D (GN R985)

It is anticipated that the planned upgrading of the N1-16 with service roads and borrow pits project will trigger the following activities:

**Table 29: Applicable listed activities**

Activity No(s):	Provide the relevant <b>Basic Assessment Activity(ies)</b> as set out in <b>Listing Notice 1</b> (GN R983)	Describe the portion of the proposed project to which the applicable listed activity relates.
12	<i>“The development of – (ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs-(a) within a watercourse.”</i>	Construction, upgrading and reconstruction of four bridges over the Erasmusspruit River ( $\pm 2570 \text{ m}^2$ ), Koolspruit River ( $\pm 3930 \text{ m}^2$ ), Sand River ( $\pm 3585 \text{ m}^2$ ) and Venterspruit ( $\pm 475 \text{ m}^2$ ) respectively as well as major culverts of a $100 \text{ m}^2$ or more. Dimensions of the 17 major culverts are given in Table 23.
19	<i>“The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock or more than 10 cubic metres from-a watercourse”</i>	Construction, upgrading and reconstruction of four bridges over the Erasmusspruit, Koolspruit, Sand River and Venterspruit as well as 17 major culverts will trigger this activity. The existing river and/or stream widths will be retained or the bridges will be wider than the existing bridge/stream. It must, however, be noted that construction work will be done within the river/stream for the bridge piers – excavation for the foundations will take place. Approach abutments will not extend into the river stream. The current stream/river width at the bridges/major culverts will, therefore, be similar to the existing scenario or will be wider.

24	<i>"The development of a road—(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres"</i>	Implementation of an access management plan where the number of locations with direct access to the N1-16 is reduced through the construction of new access roads of approximately 46 Km with a new reserve of ±16 meters parallel to the N1 road. This will be a new reserve and gravel road on expropriated land of approximately ±736 km <sup>2</sup> of which ±649 km <sup>2</sup> is indigenous veldt, ± 76 km <sup>2</sup> is cultivated farm land and ±11 km <sup>2</sup> is spill point farming land.
31	<i>"The decommissioning of existing facilities, structures or infrastructure for (i) any development and related operation activity or activities listed in this Notice ... or Listing 3 of 2014 (v) any activity regardless the time the activity was commenced with, where such activity (b) is still in operation ..."</i>	Demolishing of two of the four bridges. The existing bridges over the Sand River (± 3585 m <sup>2</sup> ) and Erasmusspruit (± 2570 m <sup>2</sup> ) will be demolished and new bridges will be constructed for the existing road.
48	<i>"The expansion of (i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; where such expansion or expansion occurs- (a) within a watercourse; (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse."</i>	The expansion of 17 major culverts and ±160 smaller culverts and storm water pipes from the existing road to the new carriageway. The coordinates of the bridges and culverts are provided in Appendix F.6. Dimensions of the 17 major culverts are given in Table 23.
56	<i>"The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-(i) where the existing reserve is wider than 13,5 meters"</i>	The construction of a new carriageway, increasing the road reserve width from 32m to 80m for approximately 44 Km. Existing disturbed road reserve of ± 1408 km <sup>2</sup> and new expropriated land for the widening of the road reserve to 80m of ± 2112 km <sup>2</sup> of which ±1907 km <sup>2</sup> is indigenous veldt, ± 75 km <sup>2</sup> is cultivated farm land and ±131 km <sup>2</sup> is spill point farming land.
<b>Activity No(s):</b>	<b>Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 (GN R985)</b>	<b>Describe the portion of the proposed project to which the applicable listed activity relates.</b>
12	<i>"The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. (b) Free State (iv) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland."</i>	Construction, upgrading and reconstruction of four bridges over the Erasmusspruit River (± 2570 m <sup>2</sup> ), Koolspruit River (± 3930 m <sup>2</sup> ), Sand River (± 3585 m <sup>2</sup> ) and Venterspruit (± 475 m <sup>2</sup> ) respectively as well as major culverts of a 100 m <sup>2</sup> or more. Dimensions of the 17 major culverts are given in Table 23.
14	<i>"The development of (ii) infrastructure or</i>	Construction of the bridge over the Sand

	<i>structures with a physical footprint of 10 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, (b) Free State (i) Outside urban area; (hh) areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve"</i>	River and 5 major culverts will trigger this activity as it is within the 5km buffer zone of the 12 December 1997 proclaimed LM Safaris Nature Reserve of ± 348Ha. The existing carriageway reserve boundary is ±40 meter away from the Nature Reserve fence and will therefore not encroach on the Nature Reserve itself as the construction will be south east on the other side of the existing road reserve. No construction will take place within the Nature Reserve. Therefore sub-regulation (ff) is not applicable.
18	<i>"The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre. (b) Free State (i) Outside urban area; (gg) areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland"</i>	The construction of a new carriageway which will increase the existing road reserve width from 32m to 80m for approximately 44 km from Winburg Station to Ventersburg, The existing road pass within the 5Km buffer zone of the LM Safaris Nature Reserve – no construction activities will take place within the reserve. The existing road and proposed dual carriageway cross the Erasmusspruit, Koolspruit, Sand River and Venterspruit with 6 new bridges to be constructed retaining two of the existing structures as well as the 17 major culverts that will be extended to the new road.
Activity No(s):	Provide the relevant <b>Scoping and EIR Activity(ies)</b> as set out in <b>Listing Notice 2 (GN R984)</b>	Describe the portion of the proposed project to which the applicable listed activity relates.
	None of these activities were triggered.	

## 7.2 Impact Assessment Methodology

The impact of the identified impacts will be determined by way of the following methodology. The methodology is mainly divided into two categories, namely occurrence and severity of the impact. These two categories are further subdivided as can be seen in the tables below.

**Table 30: Description of Occurrence and Severity for Impact Assessment**

OCCURRENCE		SEVERITY	
Probability of occurrence	Duration of occurrence	Magnitude of impact	Scale/extent of impact

To assess each of the impacts identified and listed during the scoping process, the following ranking scales are to be used.

**Table 31: Description of Probability, Duration, Scale and Magnitude for Impact Assessment**

PROBABILITY	DURATION
0 – None	
1 – Improbable	1 – Immediate
2 – Low probability	2 – Short term (0 – 7years)
3 – Medium probability	3 – Medium term (8 – 15 years)
4 – High probability	4 – Long term
5 – Definite / Don't know	5 - Permanent

SCALE	MAGNITUDE
0 – None	
1 – On site only	2 – Minor
2 – Local	4 – Low
3 - Regional	6 – Moderate
4 - National	8 – High
5 - International	10 – Very high / Don't know

Once all of the possible impacts are ranked according to the factors listed in the tables above, an Impact Point out of 100 is given to the impact which relates to the severity of the impact. The mark allocated to each of the impacts is determined by the following formula:

**IP (Impact Point) = (magnitude + duration + scale) x probability**

The IP can then be interpreted as follow to indicate significance as indicated in the table below.

**Table 32: Significance indication for Impact Assessment**

IP > 75	Indicates high environmental significance	Major impact. Can influence the decision whether or not to carry on with the development or not, regardless of mitigation
IP 30 – 75	Indicates moderate environmental significance	An impact sufficiently important to require proper management, which could have a influence on the decision if not mitigated
IP <30	Indicates low environmental significance	Impacts with very little effect which should have a small or no impact on the project designs and needs limited mitigation
IP +	Positive impact	Impact that is an improvement on the current standings of the project site

### **7.3 Impact Assessment and Risk characterisation**

During the environmental assessment and public participation process the following environmental issues were identified which may have an impact during the project phases of the N1-16 upgrading project. The following tables (Tables 26-29) provide the issues that were identified and the possible impact thereof during the different project phases as well as the proposed mitigation measures. The same tables also provide the impact and risk characterisation Impact Score (IP) with and without mitigation of these identified issues. This was done for all the identified alternatives including the “no-go” alternative. The full and detailed impact and risk assessment is available in Appendix J.

The detailed description of the different alternatives is provided in Chapter 5.3. A summary of the different alternatives considered are:

Alternative 1: Proposed project.

Proposed road design of a dual carriageway with the selected interchanges and access management plan of gravel roads running in parallel to the N1. Bridge and Culvert design is per the recommendation made in the Drainage Reports. Thus the proposed project as per the layout is given in Figures 4 and 5.

Alternative 2: Bridge and culvert design

Design alternatives considered for the design or size of the bridges and culverts over water courses (i.e. rivers, streams etc).

Alternative 3: Access Management Plan

Layout alternatives considered in the access management plan for the local farmers. Without the intersections add in Alternative 1, the Access Management plan will require 46km of access gravel roads, the road footprint will be 20m bigger in breath. For most sections of the road a dual access roads (i.e. gravel roads) will run in parallel to the main N1-16 carriageway.

Alternative 4: Dual or single carriageway

Design and layout alternative or a single carriageway. Thus a instead of the separate two lane carriageway the runs in parallel to the existing road as per the proposed project the alternative is to expand the existing road to a four lane road with two lanes running in alternate directions.

The detailed impact assessment of the identified issues and their possible impacts are given in the tables in Appendix J to determine their significance with and without mitigation.



### 7.3.1 Alternative 1 - Proposed project

The proposed project as per the layout is given in Figures 4 and 5. Thus conforming to the design requirements of the SANRAL Drainage Manual and incorporating the comments from the associated landowners.

**Table 33: Direct possible impacts and mitigation measures**

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
<b>Design and Planning Phase</b>					
1	Environmental Legal and Policy compliance	Failure to adhere to existing policies and legal obligations could lead to the project conflicting with local, provincial and national policies, legislation etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment	M	Both SANRAL and the Engineering Consultants adhere to strict Policy and Legal compliance requirements. Conducting the Environmental Authorisation applications at DEA and DWS is proof thereof.	L
2	Design considerations	There are few impacts that the design will result in or can change within the existing road reserve. The roadway culverts and bridges can be constructed to operate for a specific demand and assurance level. These aspects will influence the design parameters. Thus, there are practical and technical limitations to the alternatives available to minimise impacts or the footprint of the development.	M	The SANRAL Drainage Manual prescribes the design criteria and methodology to be followed by the Engineering Consultants and ensure that the required design standards are followed in a uniform manner on national roads.	L
3	Public acceptance	Potential visual, spatial, safety and nuisance impacts make the project contentious to parties	M	The individual interviews and Stakeholder Meetings held with the Landowners as well as the public notifications to I&AP ensured that the public is informed and were given adequate opportunity to comment on the proposed project.	L
<b>Construction Phase</b>					
1	Air pollution - Dust Impact	Increase in dust levels around the construction area can be expected due to construction vehicles and traffic movement	M	Dust caused by construction activities shall be controlled by means such as water spray vehicles and applied at sufficient frequency so as not to cause nuisance to adjacent habitation or affect farming activities or natural vegetation. For more management detail see the EMP Chapter 8.5	L
2	Biological impacts – road reserve	Limited impact as the most part of the linear site is in an existing road reserve.	M	Opportunity to remove existing alien vegetation in the road reserve The project specification may instruct the removal of CARA-listed category 1 and 2 alien species and planting of specified indigenous species. For more management detail see the EMP Chapter 8.4 and 9.1.2	+P

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
3	Biological impacts - vegetation	Direct destruction of existing vegetation especially trees listed as protected tree species.	M	The contractor has a responsibility to inform his staff of the need to be vigilant against any practice that will have a harmful effect on vegetation. Only trees and shrubs directly affected by the works, and such others as may be indicated by the engineer in writing, may be felled or cleared. For more management detail see the EMP Chapter 9.1.2	L
4	Biological impacts - alien invasive species	Spread and establishment of alien invasive species	M	The contractor shall be responsible for the management of vegetation by the prevention of alien vegetation germinating in areas disturbed by road construction activities within and outside the road reserve. For more management detail see the EMP Chapter 8.4	L
5	Ecological impacts – site establishment	Direct natural habitat modification / destruction	M	The contractor shall establish his site in a manner that does not adversely affect the environment. However, before any site establishment can begin, the contractor shall submit plans of the exact location, extent and construction details of these facilities and the impact mitigation measures the contractor proposes to put in place. ‘No-go- areas’ and other sensitive areas shall also be clearly demarcated on site, and staff must be made aware of them. For more management detail see the EMP Chapter 9.1.1 and 9.5	L
6	Ecological impacts – drainage channels	Direct natural habitat modification / destruction	M	The contractor shall also ensure that any stream deviations or diversions are undertaken in such a manner that the impact on the environment is minimised. Method statements shall be submitted to the engineer for comment, detailing how the work will be undertaken, what risks are foreseen and what measures will be employed to minimise such risks. For more management detail see the EMP Chapter 8.3	L
7	Ecological impacts – wetlands	Direct natural habitat modification / destruction	M	The contractor shall also ensure that any stream deviations or diversions are undertaken in such a manner that the impact on the environment is minimised. Method statements shall be submitted to the engineer for comment, detailing how the work will be undertaken, what risks are foreseen and what measures will be employed to minimise such risks. For more management detail see the EMP Chapter 8.3	L

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
8	Hydrological – Storm water system	Inadequate storm water management design can impact negatively on the hydrology	M	The contractor shall also ensure that any stream deviations or diversions are undertaken in such a manner that the impact on the environment is minimised. See also the Drainage Reports in Appendix F. For more management detail see the EMP Chapter 8.3	L
9	Hydrological – water supply construction	Inadequate supply of water required for construction	M	The contractor's use of water shall take into consideration that it is a scarce commodity, and shall be optimised. For more management detail see the EMP Chapter 8.3	L
10	Hydrological – water supply agricultural	Damage to water supply required for farming activities – dams, streams, boreholes	M	The quality, quantity and flow direction of any surface water runoff shall be established prior to disturbing any area for construction purposes. Cognisance shall be taken of these aspects and incorporated into the planning of all construction activities. For more management detail see the EMP Chapter 8.3	L
11	Hydrological – siltation and soil erosion	Soil erosion and siltation of water resources due to construction activities	M	The contractor shall submit to the engineer his proposals for prevention, containment and rehabilitation measures against environmental damage of the identified water and drainage systems that occur on the site. Consideration shall be given to the placement of sedimentation ponds or barriers where the soils are of a dispersive nature or where toxic fluids are used in the construction process. For more management detail see the EMP Chapter 8.3	L
12	Soil impacts – preservation of topsoil	Preservation and stockpiling of topsoil from areas where physical disturbance of the surface will occur	M	The contract will provide for the stripping and stockpiling of topsoil from the site for later re-use. For more management detail see the EMP Chapter 9.7.1	L
13	Soil impacts - pollution	Potential soil pollution from asphalt and concrete batching and mixing areas as well as tar and oil.	M	The Contractor shall be responsible for the safe siting, operation, maintenance and closure of any spoil site he uses during the contract period, including the defects notification period. For more management detail see the EMP Chapter 9.8.3	L
14	Soil impacts - erosion	Cleared areas and exposed soils increase the risk of soil erosion through wind and storm water runoff, especially in sloping terrain. Loss of topsoil through erosion can decrease soil fertility and results in a decrease in the agricultural potential of the soil.	M	Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work Areas.  For more management detail see the EMP Chapter 8.4 and Environmental Method Statement Chapter 5.10.	L

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
15	Waste – solid waste (refuse) & Littering	Littering may occur by personnel during construction phase and at the stop/go sites.	M	Solid waste shall be stored in an appointed area in covered, tip-proof metal drums or similar container for collection and disposal. No littering by construction workers shall be allowed and particular emphasis on litter control measures shall apply at stop/go facilities. For more management detail see the EMP Chapter 9.3	L
16	Waste – Sewage / Effluent	Very little sewage will be generated during the construction phase.	M	Safe and effective sewage treatment will require one of the following sewage handling methods: septic tanks and soak-always, dry-composting toilets such as “enviro loos”, or the use of chemical toilets which are supplied and maintained by a specialist service provider. The type of sewage management will depend on the geology of the area selected For more management detail see the EMP Chapter 9.2	L
17	Waste – construction material	Generation of construction solid waste during construction left at site	M	The opportunity for recycling and reuse of construction and demolition waste as fill for road embankments, land reclamation and drainage control must first be explored and take priority before the option of declaring these materials a ‘waste’. For more management detail see the EMP Chapter 9.3.4	L
18	Waste – hazardous waste	Generation, use and storage of hazardous waste during construction	M	Hazardous waste such as bitumen, tar, oils etc. shall be disposed of at a DEA approved landfill site. Special care shall be taken to avoid spillage of bitumen products such as binders or pre-coating fluid to avoid water-soluble phenols from entering the ground or contaminating surface water. For more management detail see the EMP Chapter 9.3.3 and 9.4	L
19	Cultural and historical impacts - graves	Limited cultural and historical aspects will be impacted during the construction phase.	L	Known grave sites will be designated as “no-go areas. If a grave or midden is uncovered during construction then all work in the immediate vicinity of the graves/middens shall be stopped and the engineer informed of the discovery. The SAHRA and SAPS should be contacted. For more management detail see the EMP Chapter 10.2	L
20	Cultural and historical impacts - Sand Rivier Convention	Limited cultural and historical aspects will be impacted during the construction phase.	M	All effort will be made to reserve the Sand River Convention historical area. For more management detail see the EMP Chapter 10	L

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
21	Cultural and historical impacts - archaeological	Unknown archaeological or paleontological sites unearthed during any activity	M	If an artefact on site is uncovered, work in the immediate vicinity shall be stopped immediately. The Contractor shall take reasonable precautions to prevent any person from removing or damaging any such article and shall immediately upon discovery thereof inform the engineer of such discovery. SAHRA is to be contacted. For more management detail see the EMP Chapter 10.1	L
22	Human Health and Safety – unsafe areas	Safety and access impacts of open trenches, borrow pits and to unsafe areas	M	Protect dangerous excavations or Works that may pose a hazard to humans and animals. Demarcate these areas with hazard tape or fencing as required and post the appropriate danger signs. For more management detail see the Environmental Method Statement Chapter 7.12.	L
23	Social impacts - employment	Employment opportunities will be created temporarily during the construction period for the upgrading of the road	+P		+P
24	Social impacts – skills development	Skills development and work experience can be gained	+P		+P
25	Socio-economic - Traffic Impact	The proposed development can generate additional traffic in the area and congestion during traffic hold-ups.	M	Keep traffic hold-ups to less than 10 minutes and restrict movement to the road area.	L
26	Land transformation – Fire	Machinery and human activity will increase fire risk levels.	M	Take adequate precautions to ensure that fires are not started as a result of Works on site. Environmental Method Statement Chapter 7.11	L
27	Land transformation – Fire from cooking / smoking	Accidental fire due to road workers (construction) fires for cooking of heat or other irresponsible actions (i.e. smoking)	M	The contractor shall ensure that energy sources are available at all times for construction and supervision personnel for heating and cooking purposes. For more management detail see the EMP Chapter 9.1.4	L
28	Land transformation – Noise from blasting	Increased levels of noise due to blasting activities.	M	Noises that could cause a major disturbance should only be carried out during the hours prescribed by the conditions of contract (i.e. normal working hours). Should such noise generating activities have to occur at any time outside normal hours the people in the vicinity of the noise-generating activity shall be warned about the noise well in advance and the activities kept to a minimum. For more management detail see the EMP Chapter 8.6	L

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
29	Land transformation – Noise from construction	Generation of noise associated with the construction of the road (i.e. construction vehicles and machinery)	M	The contractor shall endeavour to keep noise generating activities to a minimum. Noises that could cause a major disturbance should only be carried out during the hours prescribed by the conditions of contract (i.e. normal working hours). For more management detail see the EMP Chapter 8.6	L
30	Land transformation – Nuisance	The construction activities are likely to generate nuisance impacts such as noise, dust, temporary disruption of access, littering, pollution, dumping of rubble, social disruption, possible theft or poaching and/or general disturbance of peace and privacy for the adjacent land owners.	M	The contractor shall endeavour to keep nuisance generating activities to a minimum by good housekeeping, following requirements of EMP and general good judgement. For more management detail see the EMP Chapter 8.5, 8.6, 9.3	L
31	Land transformation – Spills	Spills of dangerous substances can have a negative impact on soil, surface and groundwater quality around the road and construction sites	M	Streams, rivers and dams shall be protected from direct or indirect spillage of pollutants. In the event of a spillage, the contractor shall be liable to arrange for professional service providers to clear the affected area. For more management detail see the EMP Chapter 8.2	L
32	Land transformation – Visual impacts	Small visual impacts can occur due to increase in construction vehicle movement.	M	Restrain the movement of the vehicles to the construction area and construction site camps.	L
<b>Operational Phase</b>					
1	Hydrological - Storm water drainage	If the storm water channels are blocked with materials or rubbish there is a possibility of ineffective storm water drainage	M	The drainage system manages both surface and subsurface water coming off the road surface and from the surrounding countryside. The maintenance of this system is described in detail in the Routine Road Maintenance Manual Chapter 10 (Drainage) and Chapter 13 (Maintenance of Structures).	L
2	Biological Vegetation -	Control of the vegetation in the road reserve	M	Management of the vegetation in the road reserve include invasive weed management, protected plants, grass cutting, pruning of trees and scrubs and burning of vegetation where necessary. The maintenance of the road reserve is described in detail in the Routine Road Maintenance Manual Chapter 12 (Road Reserve Management)	L
3	Waste Domestic -	The build up of litter from road users can have a negative waste management impact.	M	Management of the road reserve is all important to provide a safe operating environment for the road user and to make for pleasurable travel conditions. The maintenance of the road reserve is described in detail in the Routine Road Maintenance Manual Chapter 12 (Road Reserve Management)	L

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
4	Land transformation - Fire	Accidental fire due to irresponsible actions of road users	M	Make the area safe. Phone the Police (Tel 10111) and/or Fire Brigade 998/999	L
5	Land transformation - Spills	Accidental spills of dangerous goods can have negative health safety and environmental impacts	M	Contain spillages and make the area safe. Phone the Police (Tel 10111) and the local Disaster Management Centre for the Free State - Telephone: 051 407 2001	L
6	Human Health and Safety	Increased ease of traffic flow will reduce occurrence of accidents along the road	+P		+P
7	Socio-economic - Traffic Impact	Increase in the ease of traffic flow. Road has capacity to handle the projected increase in the volume of traffic.	+P		+P
<b>Decommissioning Phase</b>					
At present it is not anticipated that the N1-16 will ever be decommissioned in its entirety. Ongoing maintenance and upgrades, where necessary, will be carried out. In the unlikely event that decommissioning is necessary it is recommended that a detailed decommissioning strategy and rehabilitation plan is prepared and implemented.					

**Table 34: Indirect possible impacts and mitigation measures**

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
<b>Construction Phase</b>					
1	Land transformation - Pollution	Pollution may occur if the contractor does not remove all the litter, waste and rubble from site after each phase of construction.	M	Solid waste shall be stored in an appointed area in covered, tip-proof metal drums or similar container for collection and disposal. No littering by construction workers shall be allowed and particular emphasis on litter control measures shall apply at stop/go facilities. For more management detail see the EMP Chapter 9.3	L
2	Land transformation - Fire	Indiscriminate fires started by the contractor's labour could also damage nearby buildings, structures and vegetation.	M	Contractor to take adequate precautions to ensure that fires are not started as a result of Works on site. (EMP Chapter 9.1.4 and Environmental Method Statement Chapter 7.11). Should a fire occur the local farmer must be informed immediately and the necessary fire fighting measures implemented to contain and extinguish the fire as soon as noticed.	L
3	Socio-economic impact - casual labour	Casual labour taking advantage of the job opportunities created by the construction phase may increase the number of people loitering, levels of vagrancy and possibly petty crime.	M	Restrict the access to the construction site to personnel only.	L
4	Socio-economic impact - small businesses	Disruption of small businesses along the road	M	Provide easy access to these businesses as soon as practicable..	L

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
5	Socio-economic impact – Access management plan	Disruption of farmers access to N1 and farmers with farms on both sides of the N1 road	M	Provide easy access to these farms along the road as soon as practicable.	L
6	Socio-economic impact - property	Access to and potential damage to property / infrastructure	M	Control access and avoid any damage to property / infrastructure.	L
7	Human Health and Safety - farmers	Safety of farmers due to stoppages on the road, increase in unauthorised movement in the area.	M	Control access to private roads and private property.	L

**Table 35: Cumulative possible impacts and mitigation measures**

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
<b>Construction Phase</b>					
1	Land transformation - Pollution	Pollution may occur if the contractor does not remove all the waste and rubble from site after each phase of construction. The impact will escalate over time as it impacts on the surrounding farm fauna, flora and domestic animals.	M	Solid waste shall be stored in an appointed area in covered, tip-proof metal drums or similar container for collection and disposal. No littering by construction workers shall be allowed and particular emphasis on litter control measures shall apply at stop/go facilities. For more management detail see the EMP Chapter 9.3	L
<b>Operational Phase</b>					
2	Waste – Littering	Increase in volume of traffic will increase the potential for littering with the subsequent accumulation of the pollution impact on the fauna and flora of the surrounding farm areas	M	Management of the road reserve is all important to provide a safe operating environment for the road user. The monitoring and clean-up of the road area will have to be increased to address the increased volume. SANRAL Routine Road Maintenance Manual Chapter 12 (Road Reserve Management)	L
3	Air pollution – vehicle emission	Decrease in air quality due to the increase in vehicle emissions	L	Dispersion by wind	L

The full and detailed impact and risk assessment is available in Appendix J.

### **7.3.2 Alternative 2 –Alternatives in bridge and culvert design**

The alternatives considered in the design or size of the bridges and culverts over water courses (i.e. rivers, streams etc) will have the same environmental impact as for Alternative 1. The selection of the design was based on the catchment and flood assessment based on the criteria and design requirements included in the SANRAL Drainage Manual.



### 7.3.3 Alternative 3 – Access management

The alternatives considered in access management plan for the local farmers will have the same environmental impact as for Alternative 1. The only difference with Alternative 1 is that there will be four additional intersections and the road impact will be 20m bigger in breath on most section of the road as dual access roads (i.e. gravel roads) will run in parallel to the main N1-16 carriageway.

### 7.3.4 Alternative 4 – Dual or single carriageway

The alternatives considered in dual or single carriageway will have the same environmental impact as for Alternative 1. Weather the road will be a single carriageway with four lanes or two carriageways with two lanes each will not change the impact to the environment.

### 7.3.5 No –go Alternative

The No Go alternative will be considered in the EIA in accordance with the requirements of the EIA Regulations in GN R 982. The No Go alternative entails no change in existing status quo, in other words, the proposed N1 - 16 road will not be upgraded to include additional two lanes.

**Table 36: No-go alternative possible impacts and mitigation measures**

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
<b>Direct Impacts</b>					
1	Hydrological - Storm water drainage	If the storm water channels are blocked with materials or rubbish there is a possibility of ineffective storm water drainage	M	The drainage system manages both surface and subsurface water coming off the road surface and from the surrounding countryside. The maintenance of this system is described in detail in the Routine Road Maintenance Manual Chapter 10 (Drainage) and Chapter 13 (Maintenance of Structures).	L
2	Biological Vegetation	Control of the vegetation in the road reserve	M	Management of the vegetation in the road reserve include invasive weed management, protected plants, grass cutting, pruning of trees and scrubs and burning of vegetation where necessary. The maintenance of the road reserve is described in detail in the SANRAL Routine Road Maintenance Manual Chapter 12 (Road Reserve Management)	L
3	Waste – Domestic	The build up of litter from road users can have a negative waste management impact.	M	Management of the road reserve is all important to provide a safe operating environment for the road user and to make for pleasurable travel conditions. The maintenance of the road reserve is described in detail in the SANRAL Routine Road Maintenance Manual Chapter 12 (Road Reserve Management)	L
4	Land transformation - Fire	Accidental fire due to irresponsible actions of road users	M	Make the area safe. Phone the Police (Tel 10111) and/or Fire Brigade 998/999	L

NO	ISSUE IDENTIFIED	POSSIBLE IMPACT	IP	MITIGATION	IP
5	Land transformation - Spills	Increase in accidental spills of dangerous goods can have negative health safety and environmental impacts	H	Contain spillages and make the area safe. Phone the Police (Tel 10111) and the local Disaster Management Centre for the Free State - Telephone: 051 407 2001	M
6	Socio-economic - Traffic Impact	Decrease in the ease of traffic flow with the increase in traffic volume. Capacity to handle the projected increase in the volume of traffic is reduced.	H	N1-16 upgrading project is the proposed mitigation measure	H
<b>Indirect Impacts</b>					
7	Human Health and Safety	Increased congestion of traffic flow will escalate the occurrence of accidents along the road with the associated potential loss of life.	H	N1-16 upgrading project is the proposed mitigation measure	H
<b>Cumulative Impacts</b>					
8	Waste – Littering	Increase in volume of traffic will increase the potential for littering with the subsequent accumulation of the pollution impact on the fauna and flora of the surrounding farm areas	M	Management of the road reserve is all important to provide a safe operating environment for the road user. The monitoring and clean-up of the road area will have to be increased to address the increased volume. SANRAL Routine Road Maintenance Manual Chapter 12 (Road Reserve Management)	L

The full and detailed impact and risk assessment is available in Appendix J.

#### 7.4 Management of impacts and mitigation measures

The documents describing the mitigation measures are available in the Appendices as indicated below:

- Environmental Management Plan (EMP) – Appendix H.1
- Storm Water Management Plan – Appendix H.2
- Environmental Method Statement – Appendix H.3
- Landscape Maintenance Plan – Appendix H.4
- Rehabilitation Plan – Appendix H.5

#### 7.5 Environmental Impact Statement

The significance of the identified impacts was rated by taking into account its duration, scale, severity (magnitude) and the probability that the impact may occur. The findings of the specialist studies undertaken during this study provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. The study concluded that most of the negative impacts will be mitigated to be of low significance and all the positive impacts will be

enhanced to be of high significance, by implementing the mitigation measures described in the attached EMP (Appendix H.1).

Findings from the environmental impact assessment are:

- The impacts before mitigation are “medium”;
- After mitigation the identified impacts significance were reduced to “low”;
- The Alternative 1,2,3,4 have the same impacts, risk rating and mitigation measures;
- The NO-GO alternative has two “high” risk rating for which the proposed project is the mitigation measure.

The findings conclude that provided that the recommended mitigation and management measures are implemented there are no environmental disqualifying factors that should prevent the proposed project from proceeding. In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the mitigation measures detailed in the specialist studies have been captured in the EMP.

This EMP will form part of the contract with the contractors appointed to construct and maintain the proposed plant and associated infrastructure. The EMP would be used to ensure compliance with environmental specifications and management measures. The implementation of this EMP for key cycle phases (i.e. construction and operation) of the proposed project is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

It is recommended that the process of open communication and consultation with the community is maintained throughout the life cycle of this project.

#### **7.6 Recommendation of EAP**

The information contained in this report and the documentation attached hereto is sufficient to make a decision in respect of project applied for.

A variety of mitigation measures have been identified that will serve to mitigate the scale, intensity, duration or significance of the impacts that have a medium significance rating. These include guidelines to be applied during the construction and operational phases of the project. It is submitted that the proposed mitigation measures, if implemented, will reduce the significance of the identified impacts to “low”, and that the proposed project should proceed.

The following conditions must be included in the environmental authorization:

- Schedule the construction process to limit obstruction to traffic flows to times outside of peak traffic hours as far as practicable;
- Provide feedback to road users using ITS where it already exists. Ensure that ITS is functioning at all times if it already exists;
- Maintenance done on construction vehicles must be done in such a manner to prevent spillage of fuel and oils;
- Construction vehicles must be kept in good working order so as not to generate excessive noise;

- Surrounding residents/farmers should be notified in advance of construction and blasting schedule;
- Activities which will lead to excessive noise near residential/farm residence areas should be limited to take place during normal working hours. All reasonable precautions must be taken to minimize noise generation;
- Restrict disturbance to riparian areas to as close as practically possible to the proposed bridge and culvert expansion footprint. Areas outside of the footprint and reasonable construction access to be marked as no-go areas;
- Re-enforce river banks with gabions where applicable to prevent instability of the river banks;
- Implement erosion control measures where applicable;
- Rehabilitate directly after construction was completed;
- Only indigenous vegetation should be utilised during rehabilitation;
- Re-vegetate and rehabilitate areas directly after construction activities are finished;
- Rehabilitation success should be monitored;
- After the completion of construction, any possible soil compaction and spillage of substances within the construction camp must be rehabilitated.
- Construction camp to be erected where it will have the least environmental impact.
- No construction workers are permitted to be accommodated over night on the site or in the site construction camp except for skeleton security personnel.
- Appointment of an Environmental Control Officer
- Use inert construction waste (e.g. old road surface and foundations) as fill material where possible.
- Where possible limit the removal of riparian vegetation.
- If excessive spillage of oil and fuel etc. should occur due to accidents, it should be cleaned-up immediately.
- Disposal of domestic and hazardous waste must be at a registered waste disposal site.
- Visible remains of concrete as a result of construction must be physically removed and disposed of as building wastes.
- During construction all staff must be adequately identified. Only construction personnel or relevant persons should have access to the construction site.

## 8 AUTHORISATION AND SUPPORTING DOCUMENTATION

### 8.1 Project schedule and authorisation period

A high level schedule, with preliminary dates, as it is currently indicated is given below:

- Start of expropriation process December 2020
- Start of road construction January 2029
- End of construction December 2034

It is currently envisaged that the entire road section will be in full use by the public by January 2035.

Therefore the environmental authorisation applied for is until December 2035 including the one year post construction monitoring period.

### 8.2 Other Authorisation applications in progress

The following other authorisations and applications are in progress:

- Water Use License - The responsible authority for water use license is the Department of Water and Sanitation (DWS) Middle Vaal Water Management Area with their offices located in Bloemfontein.
- Mining Authorisation - The responsible authority for the mining authorisation of the borrow pits is the Department of Mineral Resources (DMR) with their offices located in Welkom.

### 8.3 Other supporting documentation

The following documents were developed to support the application:

**Table 37: Supporting documentation**

DOCUMENT	DOCUMENT LOCATION
Specialist Study – Ecological Assessment	Appendix E.1
Specialist Study – Wetland delineation	Appendix E.2
Specialist Study – Cultural, Heritage and Palaeontological Impact Assessment	Appendix E.3
Environmental Management Plan	Appendix H.1
Storm Water Management Plan	Appendix H.2
Environmental Method Statement	Appendix H.3
Landscape Maintenance Plan	Appendix H.4
Rehabilitation Plan	Appendix H.5
Screening Report – Proposed Site Environmental Sensitivity	Appendix K

### 8.4 Screening Report – Proposed Site Environmental Sensitivity

The Screening Report is available in Appendix K. Below is a table with the proposed development area environmental sensitivity.

**Table 38: Proposed development site environmental sensitivity**

THEME	VERY HIGH	HIGH	MEDIUM	LOW
Agriculture theme	X			
Aquatic biodiversity theme	X			
Archaeological and culture heritage theme		X		
Civil aviation theme		X		
Palaeontology theme		X		
Plant species theme				X
Defence theme				X
Terrestrial biodiversity theme	X			

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. As it is the responsibility of the EAP to confirm this list and to motivate in the assessment report the reason for not including any of the identified specialist studies, such is given in the table below.

**Table 39: Screening Report – Proposed specialist assessments**

NO	SPECIALIST ASSESSMENT	COMMENT
1	Agricultural Impact Assessment	Proposed upgrade of the N1-16 road is in a rural area and will mostly be conducted in an existing road reserve with the existing road currently in use. As the proposed road upgrade is the expansion of an existing road reserve to 80 m through the expropriation of small portion of adjacent agricultural land the impact on the agricultural was deemed as negligible and an Agricultural Impact Assessment a study was therefore not conducted.
2	Landscape / Visual Impact Assessment	As the proposed road upgrade is the expansion of an existing structure the landscape and visual impact will be minimal and a Landscape / Visual Impact Assessment was not conducted.
3	Archaeological and Cultural Heritage Impact Assessment	Such a study was done in the Palaeontology and Heritage Impact Assessment and included in Appendix E.3
4	Palaeontology Impact Assessment	Such a study was done in the Palaeontology and Heritage Impact Assessment and included in Appendix E.3
5	Terrestrial Biodiversity Impact Assessment	Such a study was done in the Ecological Specialist Study and included in Appendix E.1
6	Aquatic Biodiversity Impact Assessment	Such a study was done in the Wetland Assessment Specialist Study and included in Appendix E.2
7	Noise Impact Assessment	Proposed upgrade of the N1-16 road is in a rural area and will mostly be conducted in an existing road reserve with the existing road currently in use. The additional noise from the construction vehicles will be temporary and are addressed in the EMP. A Noise Impact Assessment was therefore not conducted.

8	Traffic Impact Assessment	A traffic assessment was conducted and included in the Preliminary Design Report which is not included in this BAR report. This includes the traffic information and analysis chapter and the Safety / crash analysis chapters in the report.
9	Geotechnical Assessment	Road design was conducted in accordance to the SANRAL Design Manual that specifies all required studies, tests and requirements for the design of roads, bridges and culverts. A specific Geotechnical Assessment was not conducted.
10	Socio-Economic Assessment	Proposed upgrade of the N1-16 road is in a rural area and job creation will mostly benefit the local community. The upgrade will also ease the flow of traffic on a national road and is of strategic importance. A Socio-Economic Assessment was therefore not conducted.
11	Ambient Air Quality Impact Assessment	Proposed upgrade of the N1-16 road is in a rural area and will mostly be conducted in an existing road reserve with the existing road currently in use. The additional dust and exhaust air pollution from the construction vehicles will be temporary and are addressed in the EMP. An Ambient Air Quality Impact Assessment was therefore not conducted.
12	Plant Species Assessment	The Screening Report rates this of low environmental sensitivity and therefore a Plant Species Assessment was not conducted.
13	Animal Species Assessment	Such a study was done in the Ecological Specialist Study and included in Appendix E.1

## 9 GAPS, UNCERTAINTIES AND ASSUMPTIONS

This report is based on the information to date that is currently available as provided by the client, specialist studies and other sources of information used.

## **10 CONCLUSION AND RECOMMENDATIONS**

SANRAL is committed to conduct its planning and design, construction, operation and maintenance, in accordance with the guidance of the competent authority and the requirements of NEMA. The Basic Assessment Report have provided information to the Department Environmental Affairs on all environmental impacts, mitigation and management aspects associated with the anticipated upgrading of the N1-16 Road.

The information contained in this report and the documentation attached hereto is sufficient to make a decision with respect of project. As a variety of mitigation measures have been identified that will serve to mitigate the scale, intensity, duration or significance of the impacts that have a medium significance rating. These include guidelines to be applied during the construction and operational phases of the project. It is submitted that the proposed mitigation measures, if implemented, will reduce the significance of the identified impacts to “low”. Therefore the proposed project should proceed and an Environmental Authorisation be issued



**11 UNDERTAKING UNDER OATH OF AFFIRMATION BY EAP**

I **Thomas Arnoldus Hugo** herewith undertake that the information provided in the foregoing report is correct and that it includes the comments from Interested and Affected Parties and other stakeholders as well as the inputs and recommendations from specialist reports where relevant.

\_\_\_\_\_  
Signature by EAP

\_\_\_\_\_  
Date

**COMMISSIONER OF OATH:**

\_\_\_\_\_  
Signature of Commissioner of Oaths

\_\_\_\_\_  
Date

\_\_\_\_\_  
Designation

Official stamp (below)